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Project No. 5702

SOURCE EVALUATION REPORT

Bullseye Glass Company
Portland, Oregon

Glass Furnace T7
Baghouse BH-1 (Inlet & Outlet)
Particulate Matter
Total Chromium and Hexavalent Chromium Data Collection

Test Dates: April 26 – 29, 2016
Report Issued: June 9, 2016

Test Site:
Bullseye Glass Company
3722 SE 21st Ave
Portland, OR 97202

Report ID: HORIZON ENGINEERING 16-5702

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1. QUALITY STATEMENT

I certify that this testing was performed in accordance with Montrose Air Quality Services (MAQS) Quality Assurance Manual (QAM).

Thomas Rhodes, EIT, QSTI
District Manager

Signature ________________ Date 5/26/16

Name, Telephone Number and E-mail address of AETB

Horizon Engineering, an affiliate of Montrose Environmental
503-255-5050
trhodes@montrose-env.com

Name and E-mail Address of the Qualification Exam Provider

Source Evaluation Society (SES)
qstiprogram@gmail.com

2. CERTIFICATION

2.1 Project Manager

I hereby certify that the test detailed in this report, to the best of my knowledge, was accomplished in conformance with applicable rules and good practices. The results submitted herein are accurate and true to the best of my knowledge.

Name: Jason French, QSTI

Signature ____________________ Date 5/25/16

2.2 Senior Report Review

I hereby certify that I have reviewed this report and find it to be true and accurate, and in conformance with applicable rules and good practices, to the best of my knowledge.

Name: Andy Vella, PE, QSTI

Signature ____________________ Date 2016.05.26

2.3 Report Review

I hereby certify that I have reviewed this report and find it to be true and accurate, and in conformance with applicable rules and good practices, to the best of my knowledge.

Name: Michael E. Wallace, PE

Signature ____________________ Date 5/25/16

3. INTRODUCTION

3.1 Test Site: Bullseye Glass Company
3722 SE 21st Ave
Portland, OR 97202

3.2 Mailing Address: Same as above

3.3 Test Log:

Baghouse, BH-1, Inlet and Outlet: PM

Test Date	Run No.	Test Time
April 26 – 27, 2016	1	17:30 (4/26) – 09:30 (4/27)
April 27 – 28, 2016	2	17:30 (4/27) – 09:30 (4/28)
April 28 – 29, 2016	3	17:00 (4/28) – 09:00 (4/29)

Summary: Three valid runs: (All runs were valid runs) Inlet and outlet of baghouse was tested simultaneously.

3.4 Test Purpose: Performance testing for baghouse, BH-1.

3.5 Background Information: None

3.6 Participants:

Montrose Air Quality Services Personnel:

Jason French, QSTI, Team Leader, Calculations, and Report Review
Chris Hinson, QSTI, Field Technician
Joe Heffernan, QSTI, Field Technician
John Lewis, QSTI, Field Technician
Mihai Voivod, QSTI, Field Technician
Brett Sherwood, QI, Field Technician
Patrick Todd, Field Technician
Brandon Crawford, Field Technician
Josh Muswieck, Field Technician
Paul Berce, Field Technician
Sleight Halley, Field Technician
Thomas Rhodes, EIT, QSTI, Project Coordinator & Report Review
Michael E. Wallace, PE, Data Reduction, Calculations and QA/QC
Andy Vella, PE, QSTI, Senior Report Review
Mauri Fabio, Technical Writer

Test Arranged by: Dan Schwoerer, Bullseye Glass Company

Observers:

Plant Personnel: Dan Schwoerer, Bullseye Glass Company
Consultants: John Browning, Bridgewater Group
Agency Personnel: Michael Eisele, P.E., ODEQ, Mark Ludwiczak, ODEQ; Zach Hedgepeth, US EPA

Test Plan Sent to: Michael Eisele, P.E. & George Davis, ODEQ

4. SUMMARY OF RESULTS

4.1 Tables of Results:

Table 1

Baghouse BH-1 Inlet PM Emissions Results

	Units	Runs 1	Run 2	Run 3	Averages
Test Dates:		17:30 (4/26)	17:30 (4/27)	17:00 (4/28)	
		09:30 (4/27)	09:30 (4/28)	09:00 (4/29)	
Sampling Time	minutes	820	895	880	865
Sampling Results					
Filterable PM					
Filterable PM Concentration	gr/dscf	0.077	0.083	0.095	0.085
Rate	lb/hr	0.30	0.28	0.31	0.30
	lb/ton	8.58	8.12	8.84	8.51
Sample Weight, Filterable	mg	1,192	1,289	1,369	1,283
Condensable PM					
Condensable PM Concentration	gr/dscf	0.00046	0.00037	0.00058	0.00047
Rate	lb/hr	0.002	0.001	0.002	0.002
	lb/ton	0.051	0.036	0.054	0.047
Sample Weight, Condensable	mg	7.1	5.7	8.3	7.0
Total PM					
Total PM Concentration	gr/dscf	0.077	0.083	0.096	0.085
Rate	lb/hr	0.30	0.28	0.31	0.30
	lb/ton	8.63	8.16	8.89	8.56
Sample Weight, Total	mg	1,199	1,295	1,377	1,290
Sample Volume	dscf	240.6	239.8	222.6	234.3
Flow Rate					
Flow Rate (Actual)	acf/min	538	481	475	498
Flow Rate (Standard)	dscf/min	455	397	378	410
Temperature	°F	148	161	179	163
Moisture	%	2.6	3.4	4.3	3.4
Percent Isokinetic	%	97	102	101	100

Table 2

Baghouse BH-1 Outlet PM Emissions Results

	Units	Runs 1	Run 2	Run 3	Averages
Test Dates:		17:30 (4/26)	17:30 (4/27)	17:00 (4/28)	
		09:30 (4/27)	09:30 (4/28)	09:00 (4/29)	
Sampling Time	minutes	938	950	930	939
Sampling Results					
Filterable PM					
Filterable PM Concentration	gr/dscf	0.00004	0.00001	0.00012	0.00006
Rate	lb/hr	0.00024	0.00005	0.00061	0.00030
	lb/ton	0.0070	0.0013	0.0176	0.0086
Sample Weight, Filterable	mg	1.5	0.30	3.9	1.9
Condensable PM					
Condensable PM Concentration	gr/dscf	0.00034	0.00025	0.00015	0.00025
Rate	lb/hr	0.0019	0.0012	0.0007	0.0013
	lb/ton	0.0543	0.0349	0.0208	0.0366
Sample Weight, Condensable	mg	11.7	8.0	4.6	8.1
Total PM					
Total PM Concentration	gr/dscf	0.00038	0.00026	0.00027	0.00031
Rate	lb/hr	0.0021	0.0013	0.0013	0.0016
	lb/ton	0.0612	0.0362	0.0384	0.0453
Sample Weight, Total	mg	13.2	8.3	8.5	10.0
Sample Volume	dscf	534.4	488.2	481.8	501.5
Flow Rate					
Flow Rate (Actual)	acf/min	764	653	674	697
Flow Rate (Standard)	dscf/min	651	559	572	594
Temperature	°F	143	142	147	144
Moisture	%	2.6	3.1	3.1	2.9
Percent Isokinetic	%	96	101	100	99

Table 3
Removal Efficiency

Removal Efficiency	**Unit**	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable PM	%	99.92	99.98	99.80	99.90
Condensable PM	%	-4.72[1]	-0.93	62.00	18.78
Total PM	%	99.29	99.56	99.57	99.47

Table 4
Process/Production Data

Process/Production Data	**Unit**	**Run 1**	**Run 2**	**Run 3**	**Average**
Natural Gas Usage	ft^3/hr	322	322	327	324
Furnace Temperature	°F	2415	2410	2443	2423
Baghouse Pressure Drop	inches, H_2O	5.5	5.3	5.7	5.5
Duration of Charging Period	minutes	5	5	5	5
Duration or Refining Period	hours	8	8	8	8

[1] lb/hr Condensable PM is higher at the outlet than on the inlet for Run 1, making removal efficiency calculation irrelevant. Higher exhaust flows in dscf/min compared to the inlet flow is the reason for this reading.

4.2 Description of Collected Samples:

Inlet:
PM Filters: Green
Impinger Contents: Clear

Outlet:
PM Filters: White
Impinger Contents: Clear

4.3 Discussion of Method Errors and Quality Assurance Procedures:

This table is taken from a paper entitled "Significance of Errors in Stack Sampling Measurements," by R.T. Shigehara, W.F. Todd and W.S. Smith. It summarizes the maximum error expressed in percent, which may be introduced into the test procedures by equipment or instrument limitations.

Measurement	% Max Error
Stack Temperature Ts	1.4
Meter Temperature Tm	1.0
Stack Gauge Pressure Ps	0.42
Meter Gauge Pressure Pm	0.42
Atmospheric Pressure Patm	0.21
Dry Molecular Weight Md	0.42
Moisture Content Bws (Absolute)	1.1
Differential Pressure Head ΔP	10.0
Orifice Pressure Differential ΔH	5.0
Pitot Tube Coefficient Cp	2.4
Orifice Meter Coefficient Km	1.5
Diameter of Probe Nozzle Dn	0.80

4.3.1 Manual Methods: QA procedures outlined in the test methods were followed, including equipment specifications and operation, calibrations, sample recovery and handling, calculations and performance tolerances.

On-site quality control procedures include pre- and post-test leak checks on the sampling system and pitot lines. If pre-test checks indicate problems, the system is fixed and rechecked before starting testing. If post-test leak checks are not acceptable, the test run is voided and the run is repeated. The results of the leak checks for the test runs are on the Field Data sheets.

Thermocouples used to measure the exhaust temperature are calibrated in the field using EPA Alternate Method 11. A single-point calibration on each thermocouple system using a reference thermometer is performed. Thermocouples must agree within ±2°F with the reference thermometer. Also, prior to use, thermocouple systems are checked for ambient temperature before heaters are started or readings are taken. Nozzles are inspected for nicks or dents and pitots are examined before and after each use to confirm that they are still aligned. The results were within allowable tolerances. Pre- and post-test calibrations on the meter boxes are included with the report along with semi-annual calibrations of critical orifices, pitots, nozzles, and thermocouples (sample box impinger outlet and oven, meter box inlet and outlet, and thermocouple indicators), as specified by ODEQ.

4.3.2 Audit Requirement: The EPA Stationary Source Audit Sample Program was restructured and promulgated on September 30, 2010 and was made effective 30 days after that date. The Standard requires that the Facility or their representative must order audit samples if they are available, with the exception of the methods listed in 40 CFR 60, 60.8(g)(1). The TNI website is referred to for a list of available accredited audit Providers and audits (www.nelac-institute.org/ssas/). If samples are not available from at least two accredited Providers they are not required. Currently, accredited Providers offer audit samples for EPA Methods 6, 7,

8, 12, 13A, 13B, 26, 26A, 29 and 101A. Based on the above, Bullseye Glass is not required to obtain audit samples for this test program.

5. SOURCE DESCRIPTION AND OPERATION

5.1 Process and Control Device Description and Operation:

Single natural gas fired colored art glass manufacturing tank furnace with an approximate operating capacity of 1,550 pound per batch; installed pre-2007.

Unspecified manufacturer baghouse filtration unit consisting of 14 filter bags and a design inlet gas flow rate of 1,000 acfm.

5.2 Test Ports:

5.2.1 Test Duct Characteristics:

Source: Baghouse, BH-1, Inlet

Construction: Steel
Shape: Circular
Size: 12 inches inside diameter
Orientation: Horizontal
Flow straighteners: None
Extension: None
Cyclonic Flow: None expected
Meets EPA Method 1 Criteria: Yes

Source: Baghouse, BH-1, Outlet

Construction: Steel
Shape: Circular
Size: 12.5 (E), 12.25 (W) inches inside diameter
Orientation: Vertical
Flow straighteners: None
Extension: None
Cyclonic Flow: None expected
Meets EPA Method 1 Criteria: Yes

Note: Outlet is warped, making it difficult to measure exact diameter

5.3 Operating Parameters: See Production/Process Data section of Appendix.

5.4 Process Startups/Shutdowns or Other Operational Changes During Tests: Process was continuous during testing.

6. SAMPLING AND ANALYTICAL PROCEDURES

6.1 Sampling Procedures:

6.1.1 Sampling and Analytical Methods: Testing was in accordance with procedures and methods listed in the Source Test Plan dated March 24 & April 25, 2016 (see Correspondence Section in the Appendix), including the following: EPA methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, from the Electronic Code of Federal Regulations (www.ecfr.gov), January, 2014; Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, April, 2015.

Baghouse, BH-1 – Inlet & Outlet

Flow Rate:	EPA Methods 1 and 2 (S-type pitot w/ isokinetic traverses)
Fixed Gases:	EPA Method 3C (gas chromatograph with a thermal conductivity detector)
Moisture:	EPA Method 4 (incorporated w/ ODEQ Method 5)
PM:	ODEQ Method 5 (filterable and condensable PM; isokinetic impinger train technique)

6.1.2 Sampling Notes: During sample recovery it was discovered that the filter for Run 3 at the baghouse outlet had torn. This most likely happened during the post-test leak check. ODEQ Method 5 is a Total Particulate method so this should not affect the Total PM results. Results for Run 3 are comparable to Run 1 and Run 2 so it is included in the run average.

The recommended 72 hour holding time for Tedlar bags was exceeded for the EPA Method 3C samples. Due to the low permeability of the material and stability of the compounds analyzed, we do not believe this affected the results for the molecular weight determination. The CO_2 results for the samples are consistent with the theoretical values based on the measured moisture content of the exhaust for the combustion of natural gas with O_2.

6.1.3 Laboratory Analysis:

Analyte	**Laboratory**
FPM & CPM	Antech, Corbett, OR
Fixed Gases	ALS, Simi Valley, CA

6.2 Sampling Train Diagram:

Figure 1
ODEQ Method 5 Particulate Matter Sample Train Diagram

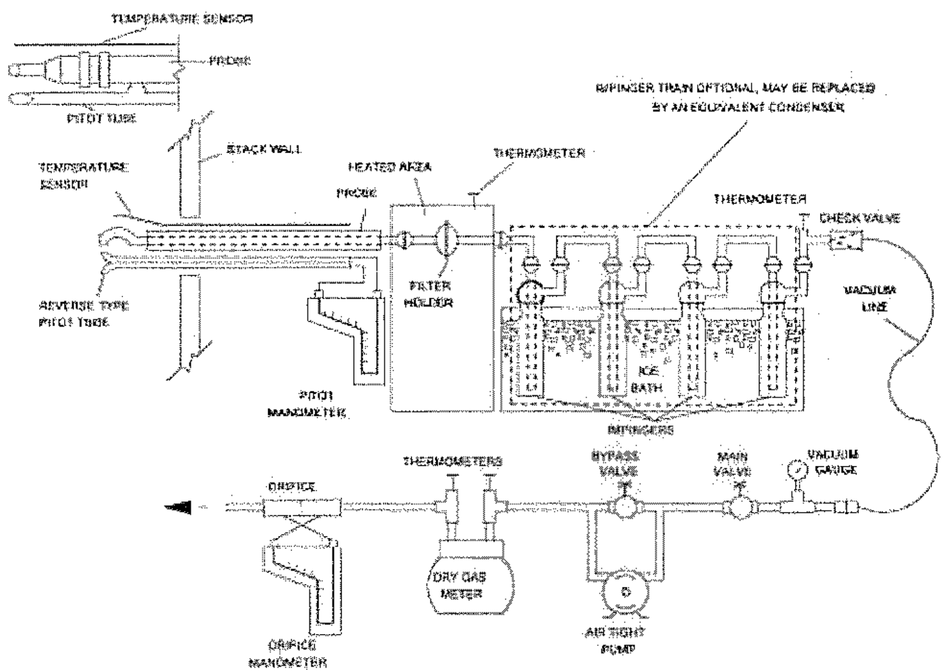

Figure 5-1. Particulate Sampling Train

Note: An unheated jumper was used from the outlet of the filter over to the first impinger.

6.3 MAQS Test Equipment:

6.3.1 Manual Methods:

Equipment Name	Identification
Isokinetic Meter Boxes	CAE Express, Horizon No. 3 & No. 25
Probe Liners	Borosilicate Glass
Pitots and Thermocouples	2-4, 3-5, 3-6, I-30, I-40,I-41 GN-2, OS-51 (oven), JF, MV, PT, JH, BS, JM, JL, BC, CH, PLB, SH
Shortridge Micromanometer	SR #1 and SR #5
Magnehelic Gauge	97
Stainless Steel Nozzles	S-635, S-512
Barometer	Calibrated Barometer

7. DISCUSSION

The results of the testing should be valid in all respects. All quality assurance checks including leak checks, instrument checks, and calibrations, were within method-allowable tolerances. By following the EPA methods referenced for this testing, we expect a 3-run average to sufficiently describe the data as precise, accurate, representative and complete.

APPENDIX

Abbreviations & Acronyms

Abbreviations and Acronyms Used in the Report

AAC	Atmospheric Analysis & Consulting, Inc.
ACDP	Air Contaminant Discharge Permit
ADEC	Alaska Department of Environmental Conservation
ADL	Above Detection Limit
BAAQMD	Bay Area Air Quality Management District
BACT	Best Achievable Control Technology
BCAA	Benton Clean Air Agency
BDL	Below Detection Limit
BHP	Boiler Horsepower
BIF	Boiler and Industrial Furnace
BLS	Black Liquor Solids
C	Carbon
C_3H_8	Propane
CAS	Columbia Analytical Laboratory
CEM	Continuous Emissions Monitor
CEMS	Continuous Emissions Monitoring System
CERMS	Continuous Emissions Rate Monitoring System
CET	Calibration Error Test
CFR	Code of Federal Regulations
CGA	Cylinder Gas Audit
CH_2O	Formaldehyde
CH_4	Methane
Cl_2	Chlorine
ClO_2	Chlorine Dioxide
CNCG	Concentrated Non-Condensable Gas
CO	Catalytic Oxidizer
CO_2	Carbon Dioxide
COC	Chain of Custody
CTM	Conditional Test Method
CTO	Catalytic Thermal Oxidizer
DE	Destruction Efficiency
Dioxins	Polychlorinated Dibenzo-p-dioxins (PCDD's)
DLL	Detection Level Limited
DNCG	Dilute Non-Condensable Gas
dscf	Dry Standard Cubic Feet
EIT	Engineer in Training
EPA	Environmental Protection Agency
ESP	Electrostatic Precipitator
EU	Emission Unit
FID	Flame Ionization Detector
Furans	Polychlorinated Dibenzofurans (PCDF's)
GC	Gas Chromatography
gr/dscf	Grains Per Dry Standard Cubic Feet
H_2S	Hydrogen Sulfide
HAP	Hazardous Air Pollutant
HCl	Hydrogen Chloride
HHV	Higher Heating Value
HRSG	Heat Recovery Steam Generator
IDEQ	Idaho Department of Environmental Quality
lb/hr	Pounds Per Hour
LHV	Lower Heating Value
LRAPA	Lane Regional Air Protection Agency
MACT	Maximum Achievable Control Technology
MDI	Methylene Diphyenyl Diisocyanate
MDL	Method Detection Limit
MEK	Methyl Ethyl Ketone
MeOH	Methanol
MMBtu	Million British Thermal Units
MRL	Method Reporting Limit
MS	Mass Spectrometry
MSF	Thousand Square Feet
NCASI	National Council for Air and Steam Improvement

Abbreviations and Acronyms Used in the Report

NCG	Non-condensable Gases
NCUAQMD	North Coast Unified Air Quality Management District
NDIR	Non-dispersive Infrared
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NMC	Non-Methane Cutter
NMOC	Non-Methane Organic Compounds
NMVOC	Non-Methane Volatile Organic Compounds
NWCAA	Northwest Clean Air Agency
NO_x	Nitrogen Oxides
NPD	Nitrogen Phosphorus Detector
O_2	Oxygen
ODEQ	Oregon Department of Environmental Quality
ORCAA	Olympic Region Clean Air Agency
PAHs	Polycyclic Aromatic Hydrocarbons
PCWP	Plywood and Composite Wood Products
PE	Professional Engineer
PM	Particulate Matter
ppbv	Parts Per Billion by Volume
ppmv	Parts Per Million by Volume
PS	Performance Specification
PSCAA	Puget Sound Clean Air Agency
PSEL	Plant Site Emission Limits
psi	pounds per square inch
PTE	Permanent Total Enclosure
PST	Performance Specification Test
PTM	Performance Test Method
QA/QC	Quality Assurance and Quality Control
QSTI	Qualified Source Testing Individual
RA	Relative Accuracy
RAA	Relative Accuracy Audit
RACT	Reasonably Available Control Technology
RATA	Relative Accuracy Test Audit
RCTO	Rotary Concentrator Thermal Oxidizer
RM	Reference Method
RTO	Regenerative Thermal Oxidizer
SCD	Sulfur Chemiluminescent Detector
SCR	Selective Catalytic Reduction System
SO_2	Sulfur Dioxide
SOG	Stripper Off-Gas
SRCAA	Spokane Regional Clean Air Agency
SWCAA	Southwest Clean Air Agency
TAP	Toxic Air Pollutant
TCA	Thermal Conductivity Analyzer
TCD	Thermal Conductivity Detector
TGNENMOC	Total Gaseous Non-Ethane Non-Methane Organic Compounds
TGNMOC	Total Gaseous Non-Methane Organic Compounds
TGOC	Total Gaseous Organic Compounds
THC	Total Hydrocarbon
TIC	Tentatively Identified Compound
TO	Thermal Oxidizer
TO	Toxic Organic (as in EPA Method TO-15)
TON	ton=2000 pounds
TPH	Tons Per Hour
TRS	Total Reduced Sulfur
TTE	Temporary Total Enclosure
VE	Visible Emissions
VOC	Volatile Organic Compounds
WC	Inches Water Column
WDOE	Washington Department of Ecology

Nomenclature & Drift Correction Documentation

NOMENCLATURE

Constants	Value	Units	Definition	Ref
Pstd(1)	29.92126	inHg	Standard Pressure	CRC
Pstd(2)	2116.22	lbf / ft²		CRC
Tstd	527.67	°R	Standard Temperature	CRC
R	1545.33	ft lbf / lbmol °R	Ideal Gas Constant	CRC
MW-atm	28.96456422	lbm / lbmole	Atmospheric (20.946 %O_2, 0.033% CO_2, Balance N_2+Ar)	
MW-C	12.011	lbm / lbmole	Carbon	CRC
MW-CO	28.0104	lbm / lbmole	Carbon Monoxide	CRC
MW-CO_2	44.0098	lbm / lbmole	Carbon Dioxide	CRC
MW-H_2O	18.01534	lbm / lbmole	Water	CRC
MW-NO_2	46.0055	lbm / lbmole	Nitrogen Dioxide	CRC
MW-O_2	31.9988	lbm / lbmole	Oxygen	CRC
MW-SO_2	64.0628	lbm / lbmole	Sulfur Dioxide	CRC
MW-N_2+Ar	28.15446807	lbm / lbmole (Balance with 98.82% N_2 & 1.18% Ar)	Emission balance	
C1	385.3211297	ft³ / lbmol	Ideal Gas Constant @ Standard Conditions	
C2	816.5455228	inHg in²/ °R ft²	Isokentics units correction constant	
Kp	5129.4	ft / min [(inHg lbm/mole) / (°R inH_2O)] ^½	Pitot tube constant	Ref 2.5.1

Symbol	Units	Definition	Calculating Equation or Source of Data	EPA
As	in²	Area, Stack		
An	in²	Area, Nozzle		
Bws	%	Moisture, % Stack gas	[100 Vw(std) / [Vw(std)+Vm(std)]]	Eq. 5-3
C	ppmv-C	Carbon (General Reporting Basis for Organics)		
C1	ft³/lbmol	Gas Constant @ Standard Conditions	[R Tstd / Pstd(2)]	
C2	inHg in²/ °R ft²		[14,400 Pstd / Tstd]	
Cd	lbm-GAS / MMdscf	Mass of gas per unit volume	[Cgas MWgas / C1]	
cg	gr/dscf	Grain Loading, Actual	[15.432 mn / Vm(std) 1,000]	Eq. 5-6
cg @ X%CO_2	gr/dscf	Grain Loading Corrected to X% Carbon Dioxide	[X% / CO_2%]	
cg @ X%O_2	gr/dscf	Grain Loading Corrected to X% Oxygen	[(20.946-X) / (20.946-O_2)]	
Cgas	ppmv, %	Gas Concentration, (Corrected)		
Cgas @ X%CO_2	ppmv	Gas Concentration Correction to X% Carbon Dioxide	[X% / CO_2%]	
Cgas @ X%O_2	ppmv	Gas Concentration Correction to X% Oxygen	[(20.946-X%) / (20.946-O_2%)]	
Cgas	ppmv		Mgas (lbm/hr) * 1,000,000*385.3211/60*Qsd*mw	
CO	ppmv	Carbon Monoxide		
Co	ft	Outer Circumference of Circular Stack		
Ci	ft	Inner Circumference of Circular Stack		
CO_2	%	Carbon Dioxide		
Cp		Pitot tube coefficient		
Ct	lb/hr	Particulate Mass Emissions	[60 cg Qsd/ 7,000]	
dH	in H_2O	Pressure differential across orifice		
Dn	in	Diameter, Nozzle		
dp^½		Average square root of velocity pressure		
Ds	in	Diameter, Stack		
E	lb / MMBtu	Pollutant Emission Rate	Cgas Fd MWgas (20.946 / (20.946-O_2)) / (1,000,000 C1)	
Fd	dscf / MMBtu	F Factor for Various Fuels		Table 19-1
I	%	Percent Isokinetic	[C2 Ts(abs) Vm(std) / (vs Ps mfg An Ø)]	Eq. 5-8*
Md	lbm / lbmole	Molecular weight, Dry Stack Gas	[(1-%O_2-%CO_2)(MWn2+ar)+(%O_2 MW-O_2)+(%CO_2 MW-CO_2)]	Eq. 3-1*
mfg		Mole fraction of dry stack gas	[1-Bws/100]	
Mgas	lbm/hr	Gaseous Mass Emisisons	[60 Cgas(ppmv) MW Pstd(2) Qsd / 1,000,000 R Tstd]	
mn	mg	Particulate lab sample weight		
Ms	lbm / lbmole	Molecular weight, Wet Stack	[Md mfg +MW-H_2O (1-mfg)]	Eq. 2-5
MW	lbm / lbmole	Molecular Weight		
NO_2	ppmv-NO_2	Nitrogen Dioxide (General Reporting Basis for NOx)		
NOx	ppmv-NO_2	Nitrogen Oxides (Reported as NO_2)		
O_2	%	Oxygen		
OPC	%	Opacity		
Pbar	in Hg	Pressure, Barometric		
Pg	in H_2O	Pressure, Static Stack		
Po	in Hg	Pressure, Absolute across Orifice	[Pbar + dH / 13.5951]	
Ps	in Hg	Pressure, Absolute Stack	[Pbar + Pg / 13.5951]	Eq. 2-6*
Qa	acf/min	Volumetric Flowrate, Actual	[As vs / 144]	
Qsd	dscf/min	Volumetric Flowrate, Dry Standard	[Qa Tstd mfg Ps] / [Pstd(1) Ts(abs)]	Eq 2-10*
Rf	MMBtu/hr		1,000,000 Mgas (20.946-O_2)] / [Cd Fd 20.946]	
SO_2	ppmv-SO_2	Sulfur Dioxide		
t	in	Wall thickness of a stack or duct		
TGOC	ppmv-C	Total Gaseous Organic Concentration (Reported as C)		
Tm	°F	Temperature, Dry gas meter		
Tm(abs)	°R	Temperature, Absolute Dry Meter	[Tm + 459.67]	
Ts	°F	Temperature, Stack gas		
Ts(abs)	°R	Temperature, Absolute Stack gas	[Ts + 459.67]	
Vlc	ml	Volume of condensed water		
Vm	dcf	Volume, Gas sample		
Vm(std)	dscf	Volume, Dry standard gas sample	[Y Vm Tstd Po]/ [Pstd(1) Tm(abs)]	Eq. 5-1
vs	fpm	Velocity, Stack gas	Kp Cp dp^½ [Ts(abs) / (Ps Ms)]^ ½	Eq. 2-9*
Vw(std)	scf	Volume, Water Vapor	0.04707 Vlc	Eq. 5-2
Y		Dry gas meter calibration factor		Fig. 5.6
Ø	min	Time, Total sample		

* Based on equation.

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DRIFT CORRECTION DOCUMENTATION

EPA Drift Equations:

- Method 3A: Oxygen and Carbon Dioxide, Follow Section 12.0 of Method 7E
- Method 6C: Sulfur Dioxide, Follow Section 12.0 of Method 7E
- Method 7E: Nitrogen Oxides, Section 12.0

$$C_{gas} = \frac{C_{ma}(C - C_o)}{(C_m - C_o)} \qquad \text{(Eq. 7E-5b)}$$

- Method 10: Carbon Monoxide, Follow Section 12.0 of Method 7E
- Method 25A: Total Gaseous Organic Concentration (TGOC), this method does not mention correcting for drift although there are established limits.

Horizon Engineering Drift Correction Equations:

$$C_{gas} = \frac{(C_{id} - Z_x)(C_{ma} - C_{oa})}{(S_x - Z_x)} \qquad S_x = \frac{(C_{mf} - C_{mi})(T_x - T_{ci})}{(T_{cf} - T_{ci})} + C_{mi}$$

$$Z_x = \frac{(C_{of} - C_{oi})(T_x - T_{ci})}{(T_{cf} - T_{ci})} + C_{oi} \qquad T_x = \frac{(T_{te} - T_{ts})}{2} + T_{ts}$$

EPA	Definition	Horizon
C_{gas}	Effluent gas concentration, dry basis	C_{gas}
C_{ma}	Actual upscale calibration gas concentration	C_{ma}
C_{oa}	Actual zero/low calibration gas concentration	C_{oa}
C_m	Average of initial and final system upscale calibration bias responses	
	Initial system upscale calibration bias response	C_{mi}
	Final system upscale calibration bias response	C_{mf}
C_o	Average of initial and final system zero/low calibration bias responses	
	Initial system zero/low calibration bias response	C_{oi}
	Final system zero/low calibration bias response	C_{of}
C	Average gas concentration indicated by gas analyzer, dry basis	C_{id}
	Starting test time	T_{ts}
	Ending test time	T_{te}
	Initial system bias calibration response time	T_{ci}
	Final system bias calibration response time	T_{cf}
	Mid-point of test time or gas sampling interval to be analyzed	T_x
	Approximate upscale response at mid-point test time	S_x
	Approximate zero/low response at mid-point test time	Z_x
	Carbon count of TGOC calibration gas. (CH_4=1, C_3H_8=3...)	K
	Carbon response factor basis on a state basis (example Propane carbon basis)	R

Notes or exceptions:
TGOC is first recorded on a wet basis, then corrected to a dry basis
The TGOC instruments used by Horizon have some historic data on instrument response to different hydrocarbons.
06/02/10

PM & Flow Rate

Results & Example Calculations
Field Data
Sample Recovery Field Data & Worksheets
Blank Corrections
Laboratory Results, Worksheets, & COC
Traverse Point Locations
Cyclonic Flow Measurement

Particulate Emissions

Client	BULLSEYE			26-Apr-16 Date		
Source	GLASS FURNACE T7-INLET			SH,JL,JF,BC,JM,CH,JH Operator		
Location	PORTLAND OR					
	ODEQ5				mew Analyist/QA	

Definitions	Symbol	Units	Run 1	Run 2	Run 3	Average
Date, Starting			4/26/16	4/27/16	4/28/16	
Time, Starting			17:30	17:30	17:00	
Time, Ending			9:30	9:30	9:00	
Interval		hrs	16.0	16.0	16.0	
Date, Ending			4/27/16	4/28/16	4/29/16	
Filter, Front			15-8-756	15-8-714	15-8-713	
Volume, Gas sample	Vm	dcf	248.154	244.186	229.429	240.59
Temperature, Dry gas meter	Tm	°F	84.19	80.76	87.31	84.09
Temperature, Stack gas	Ts	°F	147.95	161.49	178.79	162.74
Temperature, Stack Dry Bulb	Tdb	°F	na	na	na	
Temperature, Stack Wet Bulb	Twb	°F	na	na	na	
Pressure differential across orifice	dH	in H2O	0.285	0.236	0.230	0.25
Average square root velocity pressure	dp^½	in H2O^½	0.188	0.169	0.164	
Diameter, Nozzle	Dn	in	0.309	0.309	0.309	
Pitot tube coefficient	Cp		0.8472	0.8363	0.8363	
Dry gas meter calibration factor	Y		0.99916	0.99916	0.99916	
Pressure, Barometric	Pbar	in Hg	29.90	30.10	30.10	
Pressure, Static Stack	Pg	in H2O	-0.3	-0.3	-0.3	
Time, Total sample	Ø	min	820	895	880	865
Stack Area	As	in²	113.1	113.1	113.1	
Nozzle Area	An	in²	0.0750	0.0750	0.0750	
Volume of condensed water	Vlc	ml	135.6	178.7	211.7	175.3
Oxygen		% O2	20.62	20.60	20.74	20.65
Carbon Dioxide		% CO2	1.38	1.46	1.01	1.28
Molecular weight, Dry Stack	Md	lbm / lbmole	29.17	29.18	29.11	29.15
Pressure, Absolute Stack	Ps	in Hg	29.88	30.08	30.08	30.01
Pressure, avg arcoss orifice	Po	in Hg	29.92	30.12	30.12	30.05
Volume, Dry standard gas sample	Vm(std)	dscf	240.56	239.78	222.59	234.31
Volume, Water Vapor	Vw(std)	scf	6.38	8.41	9.97	8.25
Moisture, % Stack (EPA 4)	Bws(1)	%	2.58	3.39	4.29	3.42
Moisture, % Stack (Psychrometry-Sat)	Bws(2)	%	24.07	33.24	49.48	35.60
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	
Moisture, % Stack (Psychrometry)	Bws(4)	%	na	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	na	na	na	
Mole Fraction dry Gas	mfg		97.4%	96.6%	95.7%	96.6%
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.88	28.80	28.64	28.77
Velocity, Stack gas	vs	fpm	685.3	612.6	604.4	634.1
Volumetric Flowrate, Acmal	Qa	acf/min	538.2	481.1	474.7	498.0
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	454.6	396.9	377.5	409.7
Percent Isokinetic	I	%	97.3	101.8	101.1	100.1
Glass production		lb	1,112	1,112	1,112	1,112
		tons/hr	0.0347	0.0347	0.0347	0.0347
		Total PM				
Particulate sample weight-Total	mn	mg	1,199.2	1,294.6	1,376.9	1,290.2
Grain Loading, Actual	cg	gr / dscf	0.0769	0.0833	0.0955	0.0852
		mg / dscm	176.04	190.67	218.45	195.05
Particulate Mass Emissions	Ct	lbm / hr	0.300	0.283	0.309	0.297
		gm / hr	135.98	128.58	140.11	134.89
Production basis		lbm/ton	8.63	8.16	8.89	8.56
		Filterable PM				
Particulate sample weight-Filterable	mn	mg	1,192.1	1,288.9	1,368.6	1,283.2
Grain Loading, Actual	cg	gr / dscf	0.0765	0.0830	0.0949	0.0848
		mg / dscm	175.00	189.83	217.13	193.99
Particulate Mass Emissions	Ct	lbm / hr	0.298	0.282	0.307	0.296
		gm / hr	135.18	128.01	139.26	134.15
Production basis		lbm/ton	8.58	8.12	8.84	8.51
		Condensable PM				
Particulate sample weight-Condensable	mn	mg	7.10	5.70	8.30	7.03
Grain Loading, Actual	cg	gr / dscf	0.000455	0.000367	0.000575	0.000466
		mg / dscm	1.04	0.84	1.32	1.07
Particulate Mass Emissions	Ct	lbm / hr	0.0018	0.0012	0.0019	0.0016
		gm / hr	0.81	0.57	0.84	0.74
Production basis		lbm/ton	0.051	0.036	0.054	0.047

Particulate Emissions

Client	BULLSEYE	26-Apr-16	Date
Source	GLASS FURNACE T7-OUTLET	PT,BS,JH,MV,JF	Operator
Location	PORTLAND OR		
	ODEQ5	mew	Analyist/QA

Definitions	Symbol	Units	Run 1	Run 2	Run 3	Average
Date, Starting			4/26/16	4/27/16	4/28/16	
Time, Starting			17:30	17:30	17:00	
Time, Ending			9:30	9:30	9:00	
Interval		hrs	16.0	16.0	16.0	
Date, Ending			4/27/16	4/28/16	4/29/16	
Filter, Front			15-8-756	15-8-757	15-8-764	
Volume, Gas sample	Vm	dcf	539.204	490.014	486.652	505.29
Temperature, Dry gas meter	Tm	°F	69.28	69.73	73.23	70.75
Temperature, Stack gas	Ts	°F	143.33	141.54	147.00	143.95
Temperature, Stack Dry Bulb	Tdb	°F	130	na	na	
Temperature, Stack Wet Bulb	Twb	°F	120	na	na	
Pressure differential across orifice	dH	in H2O	1.108	0.907	0.945	0.99
Average square root velocity pressure	dp^½	in H2O^½	0.255	0.219	0.224	
Diameter, Nozzle	Dn	in	0.3735	0.3735	0.3735	
Pitot tube coefficient	Cp		0.8378	0.8378	0.8378	
Dry gas meter calibration factor	Y		0.99150	0.99150	0.99150	
Pressure, Barometric	Pbar	in Hg	29.90	30.10	30.10	
Pressure, Static Stack	Pg	in H2O	0.1	0.1	0.1	
Time, Total sample	Ø	min	938	950	930	939
Stack Area	As	in²	120.3	120.3	120.3	
Nozzle Area	An	in²	0.1096	0.1096	0.1096	
Volume of condensed water	Vlc	ml	305.9	334.0	323.2	321.0
Oxygen		% O2	20.62	20.60	20.74	20.65
Carbon Dioxide		% CO2	1.38	1.46	1.01	1.28
Molecular weight, Dry Stack	Md	lbm / lbmole	29.17	29.18	29.11	29.15
Pressure, Absolute Stack	Ps	in Hg	29.91	30.11	30.11	30.04
Pressure, avg arcoss orifice	Po	in Hg	29.98	30.17	30.17	30.11
Volume, Dry standard gas sample	Vm(std)	dscf	534.40	488.23	481.75	501.46
Volume, Water Vapor	Vw(std)	scf	14.40	15.72	15.21	15.11
Moisture, % Stack (EPA 4)	Bws(1)	%	2.62	3.12	3.06	2.93
Moisture, % Stack (Psychrometry-Sat)	Bws(2)	%	21.41	20.32	23.33	21.68
Moisture, % Stack (Theoretical)	Bws(3)	%	na	na	na	
Moisture, % Stack (Psychrometry)	Bws(4)	%	11.19	na	na	
Moisture, % Stack (Predicted)	Bws(5)	%	na	na	na	
Mole Fraction dry Gas	mfg		97.38%	96.88%	96.94%	97.07%
Molecular weight, Wet Stack	Ms	lbm / lbmole	28.87	28.83	28.77	28.83
Velocity, Stack gas	vs	fpm	915.0	782.0	806.7	834.6
Volumetric Flowrate, Actual	Qa	acf/min	764.2	653.1	673.7	697.0
Volumetric Flowrate, Dry Standard	Qsd	dscf/min	650.9	558.8	571.6	593.8
Percent Isokinetic	I	%	96.1	100.9	99.5	98.8
Glass production		lb	1,112	1,112	1,112	1,112
		tons/hr	0.0347	0.0347	0.0347	0.0347
		Total PM				
Particulate sample weight-Total	mn	mg	13.20	8.30	8.50	10.00
Grain Loading, Actual	cg	gr / dscf	0.00038	0.00026	0.00027	0.00031
		mg / dscm	0.872	0.600	0.623	0.699
Particulate Mass Emissions	Ct	lbm / hr	0.00213	0.00126	0.00133	0.00157
		gm / hr	0.96	0.57	0.61	0.71
Production basis		lbm/ton	0.0612	0.0362	0.0384	0.0453
		Filterable PM				
Particulate sample weight-Filterable	mn	mg	1.50	0.30	3.90	1.90
Grain Loading, Actual	cg	gr / dscf	0.00004	0.00001	0.00012	0.00006
		mg / dscm	0.099	0.022	0.286	0.136
Particulate Mass Emissions	Ct	lbm / hr	0.00024	0.00005	0.00061	0.00030
		gm / hr	0.11	0.02	0.28	0.14
Production basis		lbm/ton	0.0070	0.0013	0.0176	0.0086
		Condensable PM				
Particulate sample weight-Condensable	mn	mg	11.70	8.00	4.60	8.10
Grain Loading, Actual	cg	gr / dscf	0.00034	0.00025	0.00015	0.00025
		mg / dscm	0.773	0.579	0.337	0.563
Particulate Mass Emissions	Ct	lbm / hr	0.00188	0.00121	0.00072	0.00127
		gm / hr	0.86	0.55	0.33	0.58
Production basis		lbm/ton	0.0543	0.0349	0.0208	0.0366

INLET						
Filterable Particulate Mass Emissions	Ct	lbm / hr	0.298	0.282	0.307	0.296
Condensable Particulate Mass Emissions			0.0018	0.0012	0.0019	0.0016
Total Particulate Mass Emissons			0.300	0.283	0.309	0.297
Filterable Removal Efficiency			99.92%	99.98%	99.80%	99.90%
Condensable Removal Efficiency			-4.72%	-0.93%	62.00%	18.78%
Total Removal Efficiency			99.29%	99.56%	99.57%	99.47%

Sample Calculations – Basic Method 1-5 Flow, Isokinetics, Concentration, Rate

Client: Bullseye Glass Company Date 4/26-4/29/16

Source Baghouse BH-1 Outlet Project # 5702 Run # 1

Molecular Weights (lb/lbmol):

CO_2=44.0	O_2=32.0	N_2+Ar=28.0	H_2O=18.0	atm=29.0

Constants:

Pstd(1)=29.92129 in Hg	Tstd=527.67 °R	Kp=5129.4	C2=816.5455inHg in²/°R ft²

Pressure, Absolute Stack (Ps):

$$Ps, inHg = P_{Barometric} + \frac{P_{static}}{13.6} = \underline{29.90} inHg + \frac{\underline{0.1} \text{ in H2O}}{13.6} = \underline{29.91} inHg$$

Volume, Dry Standard Gas Sample (Vm[std]): $Tm = \underline{69.28}\ °F + 459.7 = \underline{528.98}\ °R$

$$Orifice\ Press = Pb\ \underline{29.90}\ inHg + \frac{\underline{1.108}\ \Delta H}{13.6} = \underline{29.98}\ inHg$$

$$Vm(std) ft^3 = \frac{Y \times MeterVol \times Tstd \times Orifice\ Pres(Po)}{Pstd(1) \times Tm°R}$$

$$= \frac{\underline{0.99150} \times \underline{539.204}\ ft^3 \times 528°R \times (Po\ \underline{29.98}\ inHg)}{29.92 inHg \times \underline{528.98}\ °R} = \underline{534.70}\ dscf$$

Moisture, % Stack Gas (bws): $V_{wstd} = 0.04706 \times Cond.H2O, ml = 0.04706 \times \underline{305.9} ml = \underline{14.40}\ scf$

$$bws = 100 \times \frac{V_{wstd}}{V_{wstd} + V_{mstd}} = \frac{\underline{14.40}\ scf}{\underline{14.40}\ scf + \underline{534.70}\ dscf} = \underline{2.62}\ \%$$

Mole Fraction Gas (mfg):

$$1 - \frac{bws}{100} = 1 - \frac{\underline{2.62}\%}{100} = \underline{0.9738}$$

Molecular Weight, Dry, Stack (Md):

$$Md \frac{lb}{lbmol} = \left[(1 - \frac{O_2}{100} - \frac{CO_2}{100}) \times MolWtN2Ar\right] + \left[\frac{O_2}{100} \times MolWtO2\right] + \left[\frac{CO_2}{100} \times MolWtCO2\right]$$

$$= \left[(1 - \frac{\underline{20.62}\ \%O_2}{100} - \frac{\underline{1.38}\ \%CO_2}{100}) \times 28.0 \frac{lb}{lbmol}\right] + \left[\frac{\underline{20.62}\ \%O_2}{100} \times 32.0 \frac{lb}{lbmol}\right] +$$

$$\left[\frac{\underline{1.38}\ \%CO_2}{100} \times 44.0 \frac{lb}{lbmol}\right]$$

$$= \underline{29.05}\ \frac{lb}{lbmol}$$

Molecular Weight, Wet, Stack (Ms):

$$Ms \frac{lb}{lbmol} = (Md \times mfg) + (MolWtH_2O \times (1 - mfg)) = \left(\underline{29.05} \frac{lb}{lbmol} \times \underline{0.9738}\right) + (18.0 \times (1 - \underline{0.9738}))$$

$$= \underline{28.76}\ \frac{lb}{lbmol}$$

Client: Bullseye Glass Company Date 4/26-4/29/16

Stack gas (vs): $Ts = \underline{143.33}\ °F + 459.7 = \underline{603.03}\ °R$

$$= vs\frac{feet}{\min} = Kp \times Cp \times dp\sqrt{inH_2O} \times \sqrt{\frac{Ts°R}{Ps \times Ms}}$$

$$= 5129.4 ft/\min ... \times \underline{0.8378} \times \underline{0.255}\ dp\sqrt{inH_2O} \times \sqrt{\frac{603.03°R}{\underline{29.91}\ inHg \times \underline{28.76}\ \frac{lb}{lbmol}}} = \underline{917.5}\ \frac{ft}{\min}$$

Flow Rate, Actual (Qa):

$$Qa\frac{actualCubicFeet}{\min} = \frac{AreaStack \times vs}{144} = \frac{\underline{120.3}\ in^2 \times \underline{917.5}\ \frac{ft}{\min}}{144} = \underline{766.5}\ acfm$$

Flow Rate, Dry Standard (Qsd):

$$Qsd\frac{dryStdFt^3}{\min} = \frac{Qa \times Tstd \times mfg \times Ps}{Pstd(1) \times Ts°R} = \frac{\underline{766.5}\ acfm \times 528°R \times \underline{0.9738} \times \underline{29.91}\ inHg}{29.92 inHg \times \underline{603.03}\ °R}$$

$$= \underline{653.3}\ \frac{dscf}{\min}$$

Percent Isokinetic (I):

$$I\% = \frac{C_2 \times Ts°R \times Vm(std)}{vs \times Ps \times mfg \times An \times \theta}$$

$$= \frac{816.5455 inHg \cdot in^2/°R \cdot ft^2 \times \underline{603.03}\ °R \times \underline{534.70}\ dscf}{\underline{917.5}\ fpm \times \underline{29.91}\ inHg \times \underline{0.9738} \times \underline{0.1096}\ in^2 \times \underline{938}\ \min}$$

$$= \underline{95.8}\ \%$$

Grain Loading, actual (cg):

Total PM

$$cg\frac{gr}{dscf} = \frac{15.432gr}{g} \times \frac{1g}{1000mg} \times \frac{mgSample}{Vm(std)} = \frac{15.432gr}{g} \times \frac{1g}{1000mg} \times \frac{\underline{13.20}\ mg}{\underline{534.70}\ dscf}$$

$$= \underline{0.00038}\ \frac{gr}{dscf}$$

Mass Emissions (Ct):

$$Ct\frac{lb}{hr} = \frac{60 \times cg \times Qsd}{7000 grains/lb} = \frac{60 \times \underline{0.00038}\ \frac{gr}{dscf} \times \underline{653.3}\ dscf/\min}{7000 gr/lb} = \underline{0.00213}\ \frac{lb}{hr}$$

Client: Bullseye Glass Company Source Baghouse BH-1 Outlet
Date 4/26-4/29/16 Project # 5702 Run # 3 Total PM

PM Emissions Production Based: lb/ton glass production:

Measured PM Results, lb/hr 0.00133

Glass Production, lb/batch 1,111.81 lbs

Equation: $$\frac{lbPM}{tonGlass} = \left(\frac{lbPM}{hr}\right) \times \left(\frac{batch}{lbGlass}\right) \times \left(\frac{16hrs}{batch}\right)$$

Calculation:

$$\left(\frac{0.00133\ lbPM}{hr}\right) \times \left(\frac{batch}{1{,}111.81\ lbGlass}\right) \times \left(\frac{16hrs}{day}\right) x(2000lbGlass/1tonGlass) = \frac{0.0383\ lbPM}{tonGlass}$$

% removal efficiency = $\frac{PMin(lb/hr) - PMout(lb/hr)}{PMin(lb/hr)} \times 100$

Total PM Outlet
Run: 2

$= \frac{0.283\ lb/hr - 0.00126\ lb/hr}{0.283\ lb/hr} \times 100$

$= 99.55\%$

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

AH 11

Client: BULLSEYE GLASS
Facility Location: Portland OR
Source: T-7
Sample Location: Inlet

Date 4/26/16
Test Method 5
Concurrent Testing Yes
Run # 1

Glass Nozzle Measurements
1 —
2 — .309
3 —

Probe 3-5 (g/s) Cp .8472 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged) NC
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @3 Post 0 @3
Lo 0 @4 0 @5

Operator SM Support
Temperature, Ambient 80 (Ta)
Moisture — Tdb — Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 84 JL
Stack TC (ID/°F) 84 3-5
Continuity Check ↑ or ↓

Nozzle 5-12 Oven 05-51 Imp. Outlet GN-2
Filter 158756 Heat Set 250 °F
Meter Box L5 dH@ 1.79729 Y .99916
Meter Leak Check Pretest: 0.001 cfm 16 inHg
Post: 0.007 cfm 9 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		1730	522.471				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
1 1	10		526.345	.065	.0498 SM 4/26	.05	130	250	250	67	77	79	1.5
2 2	20		530.402	.067	.524	.52	119	250	250	76	80	79	1.5
3 3	30		534.423	.066	.52	.52	171	250	250	60	85	80	1.5
4 4	40		537.803	.053	.366	.37	195	250	250	55	86	81	1.5
5 5	50		540.918	.045	.311	.31	195	250	249	54	86	82	1
6 6	60		543.952	.041	.295 SM 4/26 ~~.283~~	~~.28~~ .30	162	250	250	53	86	83	1
7 7	1.10	1840/1850	547.456	.053	.399	.40	191	250	250	53	88	84	1.5
8 8	1.20		550.976	.052	.376	.38	166	250	251	56	86	85	1.5
9 9	1.30		554.643	.050	.397	.40	109	250	258	54	89	86	1.5
10 10	1.40		557.754	.039	.310	.31	215	250	250	58	90	87	1.5
11 11	1.50		560.692	.038	.266	.27	186	250	251	61	91	88	1.5
12 12	2.00		563.682	.037	.278	.28	141	250	250	60	91	88	1.5
13 12	2.10		566.856	.041	.309	.31	143	250	245	60	90	89	1.5
14 11	2.20		569.749	.035	.264	.26	150	250	250	59	90	89	1.5
15 10	2.30		572.691	.041	.268	.27	232	250	250	61	91	89	1.5
16 9	2.40		575.566	.035	.256	.26	158	250	250	62	90	89	1.5
17 8	2.50		578.669	.040	.293 SM 4/26 ~~.299~~	~~.295~~ .293	155	250	250	61	90	89	1.5
18 7	3.00		581.571	.036	SM 4/26 0.264	.26	164	250	250	61	90	89	1.5
19 6	3.10		589.518	.037	.276	.28	146	250	250	61	89	88	1.5
20 5	3.20		587.589	.042	.289	.29	196	250	250	59	89	88	1.5
21 4	3.30		590.454	.039	.259	.26	230	250	250	58	88	85	1.5
22 3	3.40		593.499	.043	.286	.29	227	250	250	58	88	85	1.5
23 2	3.50	2130/2155	596.754	.050	.333	.33	220	250	249	58	88	87	1.5
24 1	4.00		600.642	.057	.453	.45	170	250	250	59	87	87	1.5
25 1	4.10		604.554	.056	.460	.46	150	250	250	53	89	87	1.5

Notes: Flows w/ the SRS

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND OR
Source: T-7
Sample Location: INLET

Date 4/26/16
Test Method 5
Concurrent Testing Yes
Run # 1
Operator SH Support JC, JF,
Temperature, Ambient 80 (Ta)
Moisture — Tdb — Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 —
2 — .309
3 —

ALT-011
Std TC (ID/°F) 84 JL
Stack TC (ID/°F) 84 3-5
Continuity Check ↑ or ↓

Probe 3-5 (g/s) Cp .8472 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged) NC
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 3 Post 0 @ 3; Lo 0 @ 4 0 @ 3
Nozzle 5-12 Oven 05-51 Imp. Outlet GN2
Filter 158756 Heat Set 250 °F
Meter Box 25 dH@ 1.79729 Y .99916
Meter Leak Check Pretest: 0.001 cfm 16 inHg; Post: 0.007 cfm 9 inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	Pump Vacuum inHg (Pv)
				—				—	—	—	—	—	—	
1	2	4.20		608.420	.055	~~.045~~	.45	149	250	250	54	90	87	2
2	3	4.30		612.175	.054	.421	.42	182	250	249	54	91	87	3
3	4	4.40 ~~4.440~~	4/26	616.386	.062	.531	.53	125	250	250	55	90	87	3
4	5	4.50		620.003	.051	.390	.39	195	250	257	54	91	87	2.5
5	6	45.00	2257/2308	623.514	.041	.314	.31	196	250	250	54	90	87	2.5
6	7	5.10		626.996	.044	.364	.36	146	250	250	47	85	87	2.5
7	8	5.20		630.638	.044	.394	.39	100	250	250	45	86	87	2.5
8	9	5.30		634.270	.043	.385	.39	100	250	251	45	86	87	2.5
9	10	5.40		637.946	.049	.411	.41	138	250	249	46	87	85	3
10	11	5.50		641.770	.052	.436	.44	140	250	250	46	87	86	3
11	12	6.00		645.202	.042	.360	.36	145	250	250	44	88	85	3
12	12	6.10		648.556	.047	.343	.34	227	250	250	45	88	85	3
13	11	6.20		651.683	.041	.299	.30	206	250	250	45	87	86	3
14	10	6.30		654.876	.042	.306	.31	210	250	250	46	87	85	3
15	9	6.40		658.077	.0395	.318	.32	163	250	250	47	87	85	3
16	8	6.50		661.506	.044	.354	.35	167	250	251	47	88	85	3.5
17	7	7.00		665.524	.057	.485	.49	155	250	250	46	87	86	3.5
18	6	7.10		668.695	.037	.307	.31	144	250	250	45	88	85	3
19	5	7.20		671.595	.035	.262	.26	209	250	250	49	87	86	3
20	4	7.30		674.753	.042	.3146	.31	210	250	250	50	87	85	3.5
21	3	7.40		677.807	.039	.2906	.29	211	250	250	51	~~88~~ 86	85	3.5
22	2	7.50		681.055	.042	.318	.32	200	250	250	52	87	86	3.5
23	1	8.00	~~RD~~	684.549	.046	.366	.37	168	250	250	50	86	65	3.5
24														
25														

Notes: for traverse points 10-12, used stack T from MDL

Leak check from 684.549 to 684.696 @

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland OR
Source: T-7
Sample Location: Inlet

Date 4/27/16
Test Method 5
Concurrent Testing Yes
Run # 1
Operator JM Support BC JF
Temperature, Ambient 80 (Ta)
Moisture - Tdb — Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? NO If yes, avg. null angle < degrees

Glass Nozzle Measurements
1 /
2 / .309
3 /

ALT-011
Std TC (ID/°F) 84 5L
Stack TC (ID/°F) 84 3-5
Continuity Check ↑ or ↓

Probe 3-5 (G)s) Cp .8472 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 3 Post 0 @3
Lo 0 @ 4 0 @ 5
Nozzle 5-12 Oven 0551 Imp. Outlet 6 N2
Filter 15876 Heat Set 250 °F
Meter Box 25 dH@ 1.74729 Y .9916
Meter Leak Check Pretest: 0.001 cfm 16 inHg
Post: 0.007 cfm 9 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		3,50	684.696				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
1	8.10	~~345~~	687.26	.022	.1913	.14	108	259	245	59	80	80	1
2	8.20	414	689.787	.024	.2163	.21	87	250	253	55	79	79	1
3	8.30		692.425	.024	.2185	.22	86	250	250	55	79	79	1
4	8.40		694.859	.022	.199	.20	87	250	250	54	81	81	1
5	8.50		697.660	.027	.2447	.24	86	250	250	54	81	81	1.5
6	9.00		700.513	.028	.2528	.25	88	250	250	53	81	81	2
7	9.10		703.360	.025	.226	.23	87	250	250	52	82	80	3
8	9.20		705.534	.0186	.1560	.16	130	250	250	51	82	80	3
9	9.30		~~708.~~	.0216	.1799	.18	134	250	250	51	82	80	3
10	9.40		710.555	.024	.2013	.20	130	250	250	48	81	81	3
11	9.50		713.065	.025	.1924	.19	183	250	250	49	81	81	3
12	10.00		715.376	.0183	.155	.16	123	250	250	51	81	81	3
12	10.10		717.920	.020	.188	.19	117	250	250	50	81	81	3
11	10.20		720.350	.022	.178	.18	149	250	250	50	81	81	3
10	10.30		722.992	.027	.220	.22	146	250	250	49	80	80	3
9	10.40		725.547	.024	.196	.20	143	250	250	49	80	80	4
8	10.50		728.023	.023	.180	.18	168	250	250	49	79	79	4
7	11.00		730.680	.026	.210	.21	148	250	250	46	79	79	4
6	11.10		733.190	.023	.200	.20	106	250	250	47	79	79	4
5	11.20		735.676	.0228	.199	.20	102	250	250	47	79	79	4
4	11.30		737.911	.0184	.161	.16	103	250	250	49	80	80	4
3	11.40		740.575	.0258	.235	.24	81	250	250	50	79	79	4
2	11.50		743.130	.0236	.214	.21	84	250	250	51	79	79	4
1	12.00		745.747	.0238	.215	.22	86	250	250	54	80	80	4
1	12.10		748.321	.0226	.205	.21	86	250	250	54	82	80	4

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR
Source: T-7
Sample Location: Inlet

Date 4/27/16
Test Method 5
Concurrent Testing Yes
Run # 1
Operator JM Support BC JF
Temperature, Ambient 80 (Ta)
Moisture – Tdb – Twb –
Press., Static (Pstat) -.03 Press., Bar (Pb) 29.0
Cyclonic Flow Expected ? No If yes, avg. null angle – degrees

Glass Nozzle Measurements
1 –
2 –
3 –
.309

ALT-011
Std TC (ID/°F) 84 JL
Stack TC (ID/°F) 84 3-5
Continuity Check ↑ or ↓

Probe 3-5 (g/s) Cp .8472 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged) NC
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @3 Post 0 @3
Lo 0 @4 0 @5
Nozzle 5-12 Oven OS-51 Imp. Outlet 6-2
Filter 15876 1.79729 Heat Set 250 °F
Meter Box 25 dH@ ~~.9996~~ 1.79729 Y .99916
Meter Leak Check Pretest: 0.004 cfm 16 inHg
Post: 0.007 cfm 9 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
			—	.0240									
1 2	12.20		750.942	~~.0240~~ JM 4/27	.2175	.22	89	250	250	55	82	80	4
2 3	12.30		753.560	.0228	.2066	.21	86	250	250	56	82	81	4
3 4	12.40		756.~~1~~406	.0271	.2456	.25	86	250	250	54	82	81	4
4 5	12.50		758.814	.0212	.1787	.18	127	250	250	55	82	81	4
5 6	13.00		761.074	.0191	.1580	.16	138	250	250	56	82	81	4
6 7	13.10		763.465	.0204	.1674	.17	143	250	250	58	82	81	4
7 8	13.20		765.866	.0224	.1797	.18	158	250	250	58	82	81	4
8 9	13.30		768.201	.0210	.1690	.17	156	250	250	59	82	82	4
9 10	13.40	9.30	770.772	.0245	.1997	.20	148	250	250	59	82	82	4
10													
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Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND OR
Source: BLAST FURNACE T-7
Sample Location: INLET

Date 4/27
Test Method 5
Concurrent Testing 0061
Run # 2

Glass Nozzle Measurements
1 —
2 —
3 — 1309

Probe 2-4 (g/s) Cp .8363 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 5, Lo 0 @ 5; Post 0 @ 4, 0 @ 5

Operator SH Support
Temperature, Ambient 83 (Ta)
Moisture 6% Tdb — Twb —
Press., Static (Pstat) -.3 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) SH 72
Stack TC (ID/°F) 2-4 72
Continuity Check (↑) or ↓

Nozzle 512 Oven 05-51 Imp. Outlet 1-30
Filter 158714 Heat Set 250 °F
Meter Box 25 dH@ 1.79729 Y .99916
Meter Leak Check — Pretest: .004 cfm 15 inHg; Post: 0.006 cfm 6 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
		1730	771.425										
1 12	10		774.335	.032	.262	.26	141	261	227	65	76	77	1
2 11	20		777.453	.038	.303	.30	146	250	257	54	79	77	1
3 10	30		780.547	.039	.287	.29	191	250	251	52	82	78	1
4 9	40		783.406	.034	.255	.26	192	250	250	51	83	78	1
5 8	50		786.176	.033	.248	.25	197	250	250	54	85	81	1
6 7	1.00		788.965	.032	.252	.25	162	250	250	52	~~66~~ 86 SH 4/27	82	1.5
7 6	1.10		—	.039	.323	.32	131	250	250	54	86	83	1.5
8 5	1.20		795.415	.046	.337	.34	215	251	250	51	87	84	1.5
9 4	1.30		798.427	.035	.256	.26	222	250	250	49	87	84	1.5
10 3	1.40		801.188	.033	.242	.24	225	250	249	51	86	85	1.5
11 2	1.50		804.298	.036	.286	.29	224	250	249	51	85	84	1.5
12 1	2.00		807.167	.035	.256	.26	226	250	251	49	85	84	1.5
13 1	2.10		810.619	.045	.371	.37	139	250	250	48	85	84	2
14 2	2.20		813.569	.038	.275	.28	222	250	250	47	85	83	2
15 3	2.30		816.684	.042	.304	.30	233	250	250	49	84	83	2
16 4	2.40		819.549	.036	.261	.26	235	250	250	48	83	83	2
17 5	2.50		822.289	.034	.240	.24	240	250	250	49	83	83	2
18 6	3.00		824.926	.030	.223	.22	204	250	250	51	85	83	2
19 7	3.10		827.861	.035	.272	.27	177	249	250	53	85	84	2
20 8	3.20		831.082	.039	.319	.32	143	250	250	51	86	84	2.5
21 9	3.30		834.145	.038	.285	.29	200	250	250	49	86	84	2.5
22 10	3.40		837.191	.04	.285	.29	235	250	250	49	85	84	2.5
23 11	3.50		839.559	.025	.178	.18	239	250	250	49	85	84	2.5
24 12	4.00		842.047	.028	.199	.20	232	250	250	52	84	84	2.5
25													

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND OR
Source: BLAST FURNACE T-7
Sample Location: INLET

Date 4/27
Test Method 5
Concurrent Testing 0061
Run # 2
Operator SH Support
Temperature, Ambient 80 (Ta)
Moisture 8% Tdb – Twb –
Press., Static (Pstat) –.3 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle____degrees

Glass Nozzle Measurements
1 –
2 –
3 – .309

ALT-011
Std TC (ID/°F) SH 72
Stack TC (ID/°F) 24 72
Continuity Check (↑) or ↓

Probe 2-4 (g/s) Cp .8263 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged) NC
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @5 Lo 0 @5 Post 0 @4 0 @5
Nozzle 512 Oven 0S-51 Imp. Outlet 1-30
Filter 158714 Heat Set 250 °F
Meter Box 25 dH@ 1.79729 Y .99916
Meter Leak Check Pretest: .004 cfm 15 inHg Post: 0.006 cfm 6 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			~~844.920~~ ~~842.047~~ 4/27				Amb: –	Amb: –	Amb: –	Amb: –	Amb: –	Amb: –	
1 12	4.10			.034	.259	.26	189	250	250	52	84	84	2.5
2 11	4.20		847.699	.031	.246	.25	163	250	251	50	84	84	2.5
3 10	4.30		850.666	.032	.267	.27	157	250	250	51	84	84	3
4 9	4.40		853.655	.034	.284	.28	151	250	250	50	84	83	3
5 8	4.50		857.060	.040	.355	.36	120	251	250	50	84	83	3.5
6 7	4.60		860.031	.035	.279	.28	186	250	250	48	85	83	3
7 6	5.10		862.660	.029	.220	.22	219	250	250	50	84	83	3
8 5	5.20	2241/2310	865.471	.034	.253	.25	231	250	250	60	80	82	3
9 4	5.30		869.123	.049	.409	.41	156	250	250	51	81	82	4
10 3	5.40		872.755	.048	.401	.40	149	250	250	46	82	82	4
11 2	5.50		876.275	.044	.382	.38	133	250	249	47	82	82	4
12 1	6.00		879.746	.046	.366	.37	187	250	250	46	83	82	4
13 1	6.10		882.862	.039	.299	.30	211	250	249	47	83	81	4
14 2	6.20		885.753	.034	.261	.26	220	250	251	48	83	81	3.5
15 3	6.30		888.371	.029	.217	.22	228	250	250	48	82	81	3.5
16 4	6.40		891.275	.033	.261	.261	191	250	251	50	82	81	3.5
17 5	6.50		894.296	.034	.282	.28	159	250	250	49	82	81	3.5
18 6	7.00		897.594	.041	.34	.34	150	250	251	47	82	81	4
19 7	7.10		900.761	.037	.307	.31	153	251	250	47	82	81	4.5
20 8	7.20		903.841	.035	.309	.30	132	250	251	47	82	81	4.5
21 9	7.30		906.942	.033	.2906	.29	123	250	250	47	82	81	4.5
22 10	7.40		909.728	.031	.237	.24	213	250	250	47	81	80	4.5
23 11	7.50		912.447	.031	.232	.23	225	250	250	47	81	80	4.5
24 12	8.00	2.00 4/28	914.920	.025	.187	.19	226	250	250	48	81	80	4.5
25													

Notes: Leak check from 914.920 to 915.065
Lt Change

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Ballsege Glass
Facility Location: Portland, OR
Source: Blast Furnace T-7
Sample Location: Inlet

Date 4/28/16
Test Method 5
Concurrent Testing 0061
Run # 2
Operator JM Support BC JF
Temperature, Ambient 80 (Ta)
Moisture 6% Tdb — Twb —
Press., Static (Pstat) -.3 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 —
2 —
3 — .309

ALT-011
Std TC (ID/°F) 517 72
Stack TC (ID/°F) 2-4 72
Continuity Check ↑ or ↓

Probe 2-4 (g/s) Cp .8363 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged) NC
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 5 Post 0 @ 4
Lo 0 @ 5 0 @ 5
Nozzle 512 Oven 05-5 Imp. Outlet 1-30
Filter 158714 Heat Set 250 °F
Meter Box 25 dH@ 1.79729 Y .99916
Meter Leak Check Pretest: 0.004 cfm 15 inHg
Post: 0.006 cfm 6 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			915.065				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb:	
1 1	8.10	2.35	918.541	.0406	.368	.37	105	256	262	54	79	79	4.5
2 2	8.20		921.582	.0325	.290	.29	114	248	250	46	80	79	4.5
3 3	8.30		924.332	.0265	.235	.24	118	251	250	45	80	79	4.5
4 4	8.40		927.047	.0255	.226	.23	116	250	250	47	80	79	4.5
5 5	8.50		929.770	.0266	.229	.23	133	250	250	48	80	79	4.5
6 6	9.00		932.312	.0244	.211	.21	133	250	250	48	80	79	4.5
7 7	9.10		934.701	.022	.180	.18	165	250	250	49	80	79	4.5
8 8	9.20		937.191	.023	.189	.19	165	250	250	49	80	79	4.5
9 9	9.30		939.595	.020	.182	.18	158	250	250	48	80	79	4.5
10 10	9.40		941.939	.021	.174	.17	159	250	250	49	79	79	4.5
11 11	9.50		944.356	.021	.175	.18	153	250	250	50	80	79	4.5
12 12	10.00		946.898	.023	.190	.19	159	250	250	50	79	79	4.5
13 12	10.10		949.228	.020	.167	.17	154	250	250	50	79	78	4.5
14 11	10.20		951.555	.021	~~.170~~ .174	.17	161	250	250	50	78	78	4.5
15 10	10.30		953.879	.021	.174 JM 4/28	.17	156	250	250	49	79	78	4.5
16 9	10.40		956.158	.019	.157	.16	159	250	250	50	78	78	4.5
17 8	10.50		958.425	.019	.157	.16	159	250	250	49	78	78	4.5
18 7	11.00		960.650	.018	.149	.15	155	250	250	49	78	78	4.5
19 6	11.10		962.821	.019	.158	.16	157	250	250	49	79	78	4.5
20 5	11.20		965.175	.023	.214	.21	90	250	250	52	78	78	4.5
21 4	11.30		967.999	.027	.253	.25	85	250	250	52	79	78	4.5
22 3	11.40		970.400	.018	.17	.17	79	250	250	50	79	78	4.5
23 2	11.50		972.694	.017	.161	.16	80	250	250	50	79	78	4.5
24 1	12.00		975.039	.018	.170	.17	80	250	250	50	79	78	4.5
25 1	12.10		977.552	.021	.198	.20	81	250	249	51	79	78	4.5

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Date: 4/28/16
Test Method: 5
Concurrent Testing: 0061
Run #: 2
Operator: JM Support: BC JF
Temperature, Ambient: 80 (Ta)
Moisture: 6% Tdb: — Twb: —
Press., Static (Pstat): -.3 Press., Bar (Pb): 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 —
2 —
3 — .309

ALT-011
Std TC (ID/°F): SH 72
Stack TC (ID/°F): 2-4 72
Continuity Check ↑ or ↓

Client: Ballsege Glass
Facility Location: Portland, OR
Source: Blast Furnace T-7
Sample Location: Inlet

Probe 2-4 (g/s) Cp .8363 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O: Pre: Hi 0 @ 5 Lo 0 @ 5; Post 0 @ 4, 0 @ 5
Nozzle 512 Oven 05-51 Imp. Outlet 1-30
Filter 158714 Heat Set 250 °F
Meter Box 25 dH@ 1.79724 Y .99716
Meter Leak Check: Pretest: 0.004 cfm 15 inHg; Post: 0.006 cfm 6 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts) Amb: —	PROBE °F (Tp) Amb: —	OVEN Filter °F (To) Amb: —	IMPINGER Outlet °F (Ti) Amb: —	METER Inlet/Avg. °F (Tm-in) Amb: —	METER Outlet °F (Tm-out) Amb: —	Pump Vacuum inHg (Pv)
1 2	12.20		979.827	.017	.161	.16	80	250	250	50	78	78	5
2 3	12.30		982.145	.018	.170	.17	80	250	250	52	78	78	5
3 4	12.40		984.775	.023	.218	.22	79	250	250	53	78	78	5
4 5	12.50		987.207	.0201	.179	.18	139	250	250	53	78	78	5
5 6	13.00		989.590	.0199	.170	.17	139	250	250	54	79	78	5
6 7	13.10		992.036	.0215	.182	.18	144	250	250	57	79	78	5
7 8	13.20		994.422	.0208	.176	.18	144	250	250	57	78	78	5
8 9	13.30		996.623	.0183	.154	.15	148	250	250	56	79	79	5
9 10	13.40		998.998	.0210	.178	.18	144	250	250	56	79	78	5
10 11	13.50		001.201	.0175	.148	.15	143	250	250	55	77	77	5
11 12	14.00		003.325	.0165	.139	.14	143	250	250	56	77	77	5
12 12	14.10		005.380	.0152	.128	.13	146	250	250	56	77	77	5
13 11	14.20		007.652	.0194	.164	.16	144	250	250	57	72	77	5
14 10	14.30		009.954	.0182	.155	.16	139	250	250	58	77	77	5
15 9	14.40		012.266	.0190	.163	.16	135	250	250	58	78	78	5
16 8	14.50		014.555	.0187	.161	.16	134	250	250	60	79	78	5
17 7	14.55.02	9.30	015.756	.0194	.167	.17	136	250	250	61	79	79	5
18													
19													
20													
21													
22													
23													
24													
25													

Notes:

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYEGLASS
Facility Location: PORTLAND OR
Source: BLAST FURNACE T-7
Sample Location: INLET

Date 4/28/16	
Test Method 5	
Concurrent Testing 0061	
Run # 3	
Operator GAT	Support
Temperature, Ambient 81 (Ta)	
Moisture 3	Tdb — Twb —
Press., Static (Pstat) -0.31	Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO	If yes, avg. null angle — degrees

Glass Nozzle Measurements

1	—	
2	—	.309
3	—	

ALT-011
Std TC (ID/°F) SL 81
Stack TC (ID/°F) 2-4 81
Continuity Check ↑ or ↓

Probe 2-4	(g / s) Cp 0.8365	Heat Set 250 °F
Post-Test Pitot Inspection		(NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O	Pre: Hi 0 @ 5 Lo 0 @ 5	Post 0 @ 9, 0 @ 8
Nozzle 512	Oven 05-51	Imp. Outlet 1-910
Filter 158713		Heat Set 250 °F
Meter Box 25	dH@ 1.79729	Y .99916
Meter Leak Check	Pretest: 0.006 cfm 15 inHg	Post: 0.002 cfm 8 inHg

Row	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
								Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
			1700	021.567										
1	1	10		25.163	.049	.416	.42	151	260	258	66	86	86	2
2	2	20		28.717	.045	.382	.38	153	253	252	55	88	87	2
3	3	30		31.847	.039	.308	.31	197	249	250	53	89	87	2
4	4	40		35.010	.041	.316	.32	212	245	250	55	90	88	2
5	5	50		38.066	.039	.301	.30	222	249	250	50	91	88	2
6	6	1-00		40.650	.027	.208	.21	196	250	251	49	92	89	1.5
7	7	1.10		43.562	.032	.270	.27	222	250	249	51	93	96	2
8	8	1-20		46.455	.036	.273	.27	223	250	250	50	93	90	2
9	9	1-30		49.386	.035	.266	.27	205	250	250	51	93	90	2
10	10	1-40		52.264	.034	.258	.26	207	251	249	50	93	92	2
11	11	1-50		55.219	.035	.288	.29	173	250	250	50	94	93	2
12	12	2-00		58.200	.033	.284	.28	142	250	250	53	95	93	2
13	12	2-10		61.382	.035	.318	.32	118	250	250	53	94	93	2.5
14	11	2-20		64.493	.037	.311	.31	169	250	250	51	94	93	2.5
15	10	2-30		67.398	.032	.269	.27	170	250	250	50	93	93	2.5
16	9	2-40		70.205	.030	.252	.25	180	250	250	52	93	93	2.5
17	8	2-50		73.184	.033	.278	.28	178	250	250	52	93	93	2.5
18	7	3-00		76.076	.032	.269	.27	163	250	250	50	92	92	2.5
19	6	3-10		79.989	.034	.290	.29	158	250	250	50	92	92	2.5
20	5	3-20		82.566	.046	.393	.39	140	258	257	50	91	91	~~2~~ 3 GAT 4/28
21	4	3-30		85.910	.045	.350	.35	214	250	250	46	92	91	3
22	3	3-40		89.011	.041	.307	.31	241	250	250	47	91	90	3
23	2	3-50		91.818	.035	.262	.26	249	250	249	49	91	90	3
24	1	4-00	2051/2101	95.167	.044	.349	.35	206	250	250	59	86	88	3.5
25														

Notes:

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND OR
Source: BLAST FURNACE T-7
Sample Location: INLET

Date 4/28/16
Test Method 5
Concurrent Testing 0061
Run # 3
Operator GH Support
Temperature, Ambient 81 (Ta)
Moisture 3 Tdb — Twb —
Press., Static (Pstat) -.31 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 —
2 —
3 — .309

ALT-011 GH 4/28
Std TC (ID/°F) GH JL 81
Stack TC (ID/°F) 2-4 81
Continuity Check ↑ or ↓

Probe 2-4 (g / s) Cp .8363 Heat Set 250 °F
Post-Test Pitot Inspection (N=no change, D=damaged) N
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 5 Post 0 @ 4
Lo 0 @ 5 0 @ 8
Nozzle 512 Oven 65-51 Imp. Outlet 1-40
Filter 158719 Heat Set 250 °F
Meter Box 25 dH@ 1.79279 Y .99916
Meter Leak Check Pretest: 0.006 cfm 15 inHg
Post: 0.002 cfm 8 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
1 1	4.10		97.991	.032	.254	.25	147	250	250	47	87	88	3
2 2	4.20		101.635	.049	.420	.42	152	250	250	49	87	87	4
3 3	4.30		104.818	.038	.316	.32	172	250	251	45	89	87	3.5
4 4	4.40		107.491	.030	.225	.23	238	250	250	48	90	87	3
5 5	4.50		109.936	.027	.203	.20	248	250	250	52	89	88	3
6 6	4.00		112.376	.025	.188	.19	256	250	250	54	89	88	3
7 7	GH 4/28 65.10		115.409	.038	.299	.30	207	249	250	53	89	88	4
8 8	5.20		118.675	.042	.330	.33	182	250	249	51	90	88	4
9 9	5.30		122.125	.043	GH .361 ~~.338~~	.36	165	250	250	49	91	89	4.5
10 10	5.40		125.655	.045	.378	.38	160	250	250	50	91	89	4.5
11 11	5.50		129.489	.051	.454	.45	130	249	250	48	91	89	5
12 12	6.00		133.054	.047	.392	.39	170	250	250	47	91	89	5
13 12	6.10		136.295	.043	.331	.33	222	250	250	49	91	89	4.5
14 11	6.20		139.366	.038	.292	.29	232	250	249	50	91	89	4.5
15 10	6.30		142.296	.035	.262	.26	240	250	250	50	90	89	4
16 9	6.40		145.299	.038	.301	.3	202	250	250	51	90	89	4.5
17 8	6.50		148.431	.037	.307	.31	172	250	250	49	89	89	4.5
18 7	7.00		151.871	.043	.364	.36	160	250	250	47	89	89	5
19 6	7.10		GH 4/28 ~~149.971~~	.035	.296	.30	157	250	250	47	89	89	5
20 5	7.20		158.597	.043	.385	.39	126	250	250	48	90	89	5.5
21 4	7.30		161.713	.038	.317	.32	170	249	250	45	89	88	6
22 3	7.40		164.556	.034	.264	.26	214	250	250	44	87	86	5
23 2	7.50		167.632	.038	.296	.30	220	250	250	46	86	87	5
24 1	8.00	1:30	170.445	.033	.254	.25	214	250	250	47	87	86	5
25													

Notes:

Leak Check ~~For~~ At pause from 170.445
Leak check good

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Blast Furnace T-7
Sample Location: Inlet

Date	4/29/16
Test Method	5
Concurrent Testing	0061
Run #	3
Operator	JM
Support	BC CH
Temperature, Ambient (Ta)	81
Moisture	3
Tdb	-
Twb	-
Press., Static (Pstat)	-.31
Press., Bar (Pb)	30.1
Cyclonic Flow Expected ?	No
If yes, avg. null angle ___ degrees	/

Glass Nozzle Measurements

1	/
2	/
3	/

.309

ALT-011

Std TC (ID/°F)	JL 81
Stack TC (ID/°F)	2-4 81
Continuity Check ↑ or ↓	↑

Probe	2-4
(g / s) Cp	.8363
Heat Set	250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)	NC
Pitot Lk Rate in H2O@in H2O	Pre: Hi 0 @5 Lo 0 @5; Post 0 @9, 0 @8
Nozzle	5/2
Oven	O-5
Imp. Outlet	I-40
Filter	158713
Heat Set	250 °F
Meter Box	25
dH@	1.79275
Y	.9996
Meter Leak Check	Pretest: 0.006 cfm 15 inHg; Post: 0.002 cfm 8 inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
				170.519				Amb: -	Amb: -	Amb: -	Amb: -	Amb: -	Amb: -	
1	1	8:10	8:20	173.420	.0360	.303	.30	154	266	250	50	84	85	4.5
2	2	8:20		176.080	.0343	.288	.29	154	250	255	50	84	85	4.5
3	3	8.30		178.940	.0315	.267	.27	149	250	251	49	84	85	4.5
4	4	8.40		181.191	.0210	.1768	.18	153	250	250	49	86	85	5
5	5	8.50		183.310	.0202	.162	.16	183	250	250	54	86	85	4.0
6	6	9.00		185.649	.0205	.168	.17	167	250	250	54	85	85	4
7	7	9.10		187.820	.0199	.154 ~~.223~~	.16 ~~.22~~	168	250	250	51	85	85	4.5
8	8	9.20		189.984	.0190	.155	.16	171	250	249	50	85	85	4.5
9	9	9.30		192.147	.0180	.147	.15	171	250	250	53	85	85	4.5
10	10	9.40		194.118	.0160	.132	.13	166	250	250	55	84	84	4.5
11	11	9.50		196.006	.0151	.121	.12	182	250	250	57	84	85	4.5
12	12	10.00		197.986	.0177	.143	.14	177	250	250	57	84	84	4.5
13	12	10.10		199.818	.0144	.116	.12	176	250	250	57	85	85	4.5
14	11	10.20		201.628	.0145	.118	.12	176	250	250	57	85	85	4.5
15	10	10.30		203.664	.0167	.135	.14	175	250	250	56	83	84	4.5
16	9	10.40		205.545	.0145	.117	.12	178	250	250	54	83	84	4.5
17	8	10.50		207.417	.0156	.122	.12	196	250	250	53	83	84	4.3
18	7	11.00		209.270	.0149	.122	.12	170	250	250	53	83	84	4.5
19	6	11.10		211.288	.0166	.134	.14	165	250	250	53	83	84	4.5
20	5	11.20		213.242	.0156	.128	.13	167	250	250	53	84	84	4.5
21	4	11.30		215.043	.0140	.115	.12	167	250	250	54	84	84	4.5
22	3	11.40		216.814	.0138	.111	.11	183	250	250	54	83	84	4.5
23	2	11.50		218.775	.0164	.135	.14	167	250	250	54	83	84	4.5
24	1	12.00		220.656	.0148	.123	.12	162	250	250	55	83	84	5
25	1	12.10		222.459	.0127	~~.127~~ .106 JM 4/29	.11	156	250	250	57	83	84	5

Notes: JM 4/29

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Blast Furnace T-7
Sample Location: Inlet

Date: 4/29/16
Test Method: 5
Concurrent Testing: 0061
Run #: 3

Glass Nozzle Measurements
1 —
2 —
3 — .309

Probe 2-4 (g / s) Cp .8363 Heat Set 250 °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 5 Post 0 @ 9; Lo 0 @ 5 0 @ 8

Operator JM Support RC CH
Temperature, Ambient 81 (Ta)
Moisture 3 Tdb — Twb —
Press., Static (Pstat) -.31 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) JL 81
Stack TC (ID/°F) 2-4 81
Continuity Check ↑ or ↓

Nozzle 512 Oven 0s-5) Imp. Outlet 1-40
Filter 158713 Heat Set 250 °F
Meter Box 25 dH@ 1.79275 Y .99816
Meter Leak Check — Pretest: 0.006 cfm 15 inHg; Post: 0.002 cfm 8 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			—				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
1 2	12.20		224.402	.0141	.121	.12	162	250	250	56	83	83	5
2 3	12.30		226.308	.0144	.119	.12	161	250	250	56	83	83	5
3 4	12.40		228.209	.0146	.121	.12	163	250	250	58	83	83	5
4 5	12.50		230.101	.0147	.122	.12	162	250	250	56	82	83	5
5 6	13.00		232.080	.0153	.127	.13	161	250	250	59	84	83	5
6 7	13.10		233.906	.0127	.105	.11	166	250	250	60	83	83	5
7 8	13.20		235.570	.0121	~~.0998~~ .0998	.10	169	250	250	62	83	84	5
8 9	13.30		237.367	.0176	.144	.14	169	250	250	64	84	84	5
9 10	13.40		239.469	.0149	.123	.12	166	250	250	62	84	84	5
10 11	13.50		241.307	.0134	.111	.11	163	250	250	58	85	85	5
11 12	14.00		243.144	.0136	.1084	.11	189	250	250	57	85	85	5
12 12	14.10		245.066	.0148	.124	.12	158	250	250	58	86	86	5
13 11	14.20		247.172	.0151	.132	.13	134	250	250	58	86	86	5
14 10	14.30		249.019	.0135	.116	.12	143	250	250	58	86	86	5
15 9	14.40		250.886	.0133	.11	.11	166	250	250	59	86	86	5
16 8	~~14.50~~	9.00	251.070	.0126	.0988	.10	201	250	250	59	86	86	5
17	1440.0	4/29											
18													
19													
20													
21													
22													
23													
24													
25													

Notes:
B:\Shared files\Field\Data Sheets\Method 5\Method 5_v2.pdf

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye
Facility Location: Portland
Source: outlet
Sample Location: Roof P6

Date 4/26/16
Test Method OM5
Concurrent Testing YES
Run # 1
Operator TDD Support —
Temperature, Ambient (Ta) —
Moisture 3% Tdb 130 Twb 120
Press., Static (Pstat) ✓ Press., Bar (Pb) 29.9
Cyclonic Flow Expected ?____ If yes, avg. null angle____ degrees

Glass Nozzle Measurements
1 ______
2 ______
3 .3735

ALT-011
Std TC (ID/°F) 62 TDD
Stack TC (ID/°F) 61
Continuity Check ↑ or ↓

Probe 3-6 (g / s) Cp .8472 Heat Set 250 °F
Post-Test Pitot Inspection 8378 (NC=no change, D=damaged)
Pitot Lk Rate Pre: Hi 0 @12 Post 0 @6
in H2O@in H2O Lo 0 @10 0 @5
Nozzle T-40635 Oven 62349 Imp. Outlet T-40
Filter 158758 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99156
Meter Pretest: 0.001 cfm 16" inHg
Leak Check Post: .008 cfm 11" inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
	17:31	5:31	950.104	.08	1.2935	1.3	Amb: 102	Amb: 250	Amb: 263	Amb: 57	Amb: 67	Amb: 67	4
1	10		956.295	.14	2.2636	2.2	120	251	263	53	72	67	4
2	20		964.440	.14	2.2636	2.3	123	253	246	60	74	69	4
3	30		972.785	.11	1.7785	1.8	150	250	256	57	76	74	4
4	40		980.16	.10	1.6169	1.6	160	254	244	56	70	69	4
5	50		987.235	.09	1.4552	1.4	166	250	250	56	72	70	3.5
6	60		993.800	.09	1.4552	1.5	148	253	243	53	68	66	3
7	70		1000.47	.06	.9701	.97	168	249	244	54	64	63	3
8	80		1005.900	.05	.8084	.81	174	250	260	52	64	63	2.5
9	90		1010.97	.05	.8084	.81	179	250	244	56	65	62	2
10	100		1015.875	.05	.8084	.81	172	254	265	54	63	62	2
11	110		1020.805	.05	.8084	.80	152	250	248	56	63	62	2
12	120		1025.63	.05	.8084	.80	164	250	258	53	64	62	2
12	130		1030.475	.05	.8084	.81	175	250	255	52	64	61	2
11	140		1035.310	.05	.8084	.81	184	249	241	54	66	62	2
10	150		1040.200	.05	.8084	.81	186	249	261	54	66	62	2
9	160		1045.695	.05	.8084	.81	181	250	246	54	65	62	2
8	170		1049.985	.05	.8084	.81	169	253	263	52	66	61	2
7	180		1054.915	.06	.9701	.97	159	249	251	51	66	62	3
6	190		1060.380	.07	1.1318	1.1	144	252	250	51	66	62	3
5	200		1066.100	.07	1.1318	1.1	111	251	255	53	67	66	3
4	210		1071.740	.07	1.1318	1.1	173	253	246	52	68	62	3
3	220		1077.365	.07	1.14	1.1	176	253	246	53	68	65	3
2	230		1082.985	.10	1.6367	1.6	171	255	245	53	68	64	3
1	240		1089.975	.10	1.6367	1.6	149	250	258	51	66	62	3
1	250		1096.995	.10	1.6367	1.6	148	253	251	52	69	64	3

PF 4/26

Notes: * Paused @ 69.17 in run RSC 18:50

B:\Shared files\Field\Data Sheets\Method 5\Method 5_PDX-v1.pdf

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Glass Nozzle Measurements
1 —
2 —
3 .3735

Client: Bullseye
Facility Location: Portland OR
Source: OUTLET T-7
Sample Location: outlet

Date 4/26/16
Test Method ODEQ 5
Concurrent Testing Bag
Run # R-1
Operator PF Support —
Temperature, Ambient (Ta) —
Moisture 3% Tdb 130 Twb 120
Press., Static (Pstat) . 1 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 62 PF
Stack TC (ID/°F) 61
Continuity Check ↑ or ↓

Probe 3-6 (g/s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 12 Post 0 @ 6; Lo 0 @ 10 0 @ 7
Nozzle S-635 Oven 621349 Imp. Outlet I-40
Filter 158758 Heat Set 250 °F
Meter Box dH@ 1.8884 Y .9950
Meter Leak Check Pretest: 0.001 cfm 16" inHg; Post: .0084 cfm 11" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
				1104.00 PF 4/26/16				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1 2	260	22:00	~~1103.00~~	.11	1.7938	1.8	138	254	256	53	67	63	3.5
	2 3	270		1111.350	.12	1.9568	1.9	136	255	244	52	69	64	4
	3 4	280		1118.945	.11	1.7938	1.8	137	249	252	48	76	64	4
	4 5	290		1126.370	.10	1.6307	1.6	158	257	250	47	73	66	4
5	5 6	300	*	1133.405	.08	1.3046	1.3	170	251	251	44	71	65	3
	6 7	310		1139.780	.02	.3261	.33	159	254	254	50	69	66	1
	7 8	320		1142.830	.07	1.1415	1.1	170	253	248	50	67	65	~~8~~ 3 PF 4/26/16
	8 9	330		1148.400	.06	.9784	.98	168	248	261	49	69	66	3
	9 10	340		1153.885	.06	.9784	.98	155	247	254	48	69	65	3
	10 11	350		1159.345	.07	1.1415	1.1	147	254	260	47	68	65	3
6	11 12	360		1165.070	.06	.9784	.98	143	252	248	47	68	65	3
	12	370		1170.780	.06	.9784	.98	152	251	250	47	68	65	3
	13 11	380		1176.235	.05	.8154	.81	173	252	258	49	68	64	3
	14 10	390		1181.190	.05	.8154	.81	179	252	241	50	68	64	3
1/27	15 9	400	00:24	1186.100	.06	.9784	.98	182	252	264	50	68	64	3
	16 8	410		1191.530	.06	.9784	.98	173	250	244	49	69	65	3
7	17 7	420		1196.985	.09	1.4676	1.4	154	251	263	49	72	66	4
	18 6	430		1203.570	.09	1.4676	1.4	148	250	243	49	73	66	3
	19 5	440		1210.180	.09	1.4676	1.4	136	257	262	49	73	68	3
	20 4	450		1216.79	.06	.9784	.98	120	242	249	49	74	68	3
	21 3	460		1222.855	.05	.8154	.81	115	256	264	50	74	69	3
	22 2	470		1227.790	.04	.6523	.65	114	253	243	50	73	69	3
change 8	23 1	480		~~1232.113~~ 1232.155	.09	1.47	1.5	177	245	250	50	72	71	3
start 20152	24 2	490	238.28	~~238.7~~	.08	1.30	1.3	164	249	249	49	76	74	3
	25 3	500		1245.21	.07	1.14	1.1	151	253	254	49	75	74	3

Notes: * 22:42 Paused no flow flow @ .02 when came back
Restart @ 22:44 Cont. to Run @ 1.3 until point
300.17 into Run
315 into Run

2 of 4

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Glass Nozzle Measurements
1 —
2 —
3 .3235

Client: Bullseye
Facility Location: Portland OR
Source: outlet T-7
Sample Location: outlet

Date 4/27/16
Test Method ODEQ 5
Concurrent Testing Bags
Run # R-1
Operator BS Support JH
Temperature, Ambient (Ta) —
Moisture 3% Tdb 130 Twb 120
Press., Static (Pstat) .2 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 65 PF
Stack TC (ID/°F) 65
Continuity Check ↑ or ↓

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 12 Lo 0 @ 10 Post 0 @ 6 0 @ 7
Nozzle 5-635 Oven 6213 Imp. Outlet 250 I 41 PF
Filter 158757 Heat Set 250 °F
Meter Box 7 dH@ 1.8884 Y .9950
Meter Leak Check Pretest: 0.002 cfm 20" inHg; PT Post: 0.002 cfm 11" inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		4:48	1251.216				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
1	510	1257.0	~~1251.216~~	.07	1.19	1.2	146	254	257	49	75	73	3
2	520	5	1262.601	.06	1.02	1.0	143	256	259	49	75	72	3
3	530	6	1268.034	.05	.86	.86	138	254	250	49	74	69	3
9 4	540	7	1272.988	.05	.86	.86	137	254	256	50	74	71	3
5	550	8	1277.991	.05	.86	.86	125	252	255	51	73	71	3
6	560	9	1283.816	.06	1.02	1.0	119	250	243	48	73	69	3
7	570	10	1288.324	.06	1.02	1.0	115	253	251	49	74	69	3
8	580	11	1294.320	.05	.88	.88	~~143~~ 119	251	244	49	73	72	2
9	590	12	1299.557	.05	.88	.88	136	255	257	48	73	69	2
10 10	600		1304.167	.04	.71	.71	135	252	246	49	72	68	2
11	610	11	1309.342	.05	.88	.88	114	250	247	49	73	72	2
12	620	10	~~1314.602~~	.05	.88	.88	126	251	251	49	72	71	2
13	630	9	1314.602	.04	.71	.71	123	253	257	49	72	71	2
14	640	8	1319.198	.05	.88	.88	124	250	254	49	71	69	2
15	650	9	1324.612	.05	.88	.88	124	253	258	49	71	67	2
11 16	660	6	1330.618	.07	1.24	1.2	140	255	260	49	71	70	2
17	670	5	1336.752	.07	1.24	1.2	143	252	251	49	72	71	2
18	680	4	1343.246	.08	1.41	1.4	135	251	255	49	72	71	2
19	690	3	1349.143	.07	1.24	1.2	133	251	247	51	72	71	2
20	700	2	—	.08	1.41	1.4	132	255	255	49	72	71	3
21	710	1	1361.732	.07	1.24	1.2	140	252	244	49	73	72	3
12 22	720		1367.990	.08	1.41	1.4	136	253	256	49	72	68	3
23	730	2	1374.517	.08	1.41	1.4	132	254	251	49	71	66	3
24	740	3	1380.499	.07	1.24	1.2	131	252	252	49	73	72	3
25	750	4	1386.166	.06	1.06	1.1	130	251	254	49	71	67	3

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Date	4/27/16
Test Method	ODEQ 5
Concurrent Testing	Bags
Run #	R-1
Operator	BS
Support	JH
Temperature, Ambient (Ta)	—
Moisture	3%
Tdb	130
Twb	~120
Press., Static (Pstat)	~~1~~
Press., Bar (Pb)	30.1
Cyclonic Flow Expected ?	N
If yes, avg. null angle	— degrees

Glass Nozzle Measurements

1	—
2	—
3	.3735

ALT-011
Std TC (ID/°F) 65 PT
Stack TC (ID/°F) 65
Continuity Check (↑) or ↓

Client:	Bullseye
Facility Location:	Portland OR
Source:	F2
Sample Location:	outlet T27
Probe	3-6 (g/s)
Cp	.8378
Heat Set	250 °F
Post-Test Pitot Inspection	NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O	Pre: Hi 0 @ 12, Lo 0 @ 12; Post 0 @ 6, 0 @ 7
Nozzle	5-635
Oven	621349
Imp. Outlet	I-41
Filter	158757
Heat Set	250 °F
Meter Box	3
dH@	1.8884
Y	~~.995~~ PT .99150
Meter Leak Check	Pretest: 0.001 cfm 16" inHg; Post: .004 cfm 11" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
				—				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1	760	5	1391.851	.06	1.06	1.1	132	251	255	50	71	70	3
	2	770	6	1397.261	.05	.88	.88	133	253	258	51	72	71	3
13	3	780	7	1402.671	.06	1.06	1.1	132	251	243	53	72	68	3
	4	790	8	1407.782	.05	.88	.88	130	249	251	~~7~~ 53	73	71	3
	5	800	9	1413.001	.05	.88	.88	121	253	243	54	72	67	3
	6	810	10	1417.834	.04	.71	.71	117	254	257	50	72	67	3
	7	820	11	1423.141	.05	.88	.88	115	251	244	48	71	68	3
	8	830	12	1428.444	.05	.88	.88	118	255	260	51	73	70	2
14	9	840		1433.038	.04	.71	.71	117	248	249	51	74	71	2
	10	850	11	1438.667	.05	.88	.88	120	252	257	51	73	71	2
	11	860	10	1443.781	.05	.88	.88	130	252	252	49	74	73	3
	12	870	9	1449.469	.06	1.06	1.1	131	252	249	49	74	73	3
	13	880	8	1455.301	.06	1.06	1.1	129	253	253	50	74	73	3
	14	890	7	1461.174	.06	1.08	1.1	128	251	247	50	75	69	3
15	15	900	6	1466.412	.05	.88	.88	128	250	256	50	75	74	3
	16	910	5	1472.571	.07	1.24	1.2	128	249	246	50	76	75	3
	17	920	4	1478.555	.07	1.24	1.2	133	250	255	50	77	74	3
	18	930	3	1484.313	.06	~~.88~~ 1.03	1.03 ~~.88~~	142	252	247	51	76	75	3
	19	940	2	1489.350	.08	1.39	1.4	133	253	258	51	77	76	3
	20	950	1											
16	21	960												
	22	970												
	23	980												
	24	990												
	25													

2nd P 1930, 38 min. test

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye
Facility Location: Portland
Source: outlet T-7
Sample Location: Roof

Date 4/27/16
Test Method ODEQ 5
Concurrent Testing Yes
Run # 2

Glass Nozzle Measurements
1 —
2 —
3 .3735

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 5 Lo 0 @ 7 — Post 0 @ 3 pr, 0 @ 5

Operator PR Support JH
Temperature, Ambient (Ta)
Moisture 3% Tdb — Twb —
Press., Static (Pstat) √ Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 65 PR
Stack TC (ID/°F) 65
Continuity Check ↑ or ↓

Nozzle 5635 Oven 621349 Imp. Outlet I-41
Filter 158757 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99150
Meter Leak Check Pretest: 0.001 cfm 20" inHg
~~See Post~~ pr 0.002 cfm 9" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			17:30	489.715	.03	.5247	.53	Amb: 71	Amb: 252	Amb: 242	Amb: 57	Amb: 71	Amb: 70	1
	1	10		493.605	.03	.5247	.52	133	255	228	55	73	71	1
	2	20		497.465	.03	.5247	.52	142	250	269	58	75	71	1
	3	30		501.345	.03	.5247	.53	156	252	244	59	79	73	1
	4	40		505.280	.04	.6996	.70	164	252	261	59	80	75	2
	5	50		509.865	.03	.5247	.52	165	251	251	60	86	76	2
1	6	60		513.825	.04	.6996	.70	143	253	246	59	78	76	2
	7	70		518.430	.06	1.0494	1.0	151	252	258	59	79	76	2
	8	80		523.980	.06	1.0494	1.0	168	257	243	58	79	75	2
	9	90		529.580	.08	1.3992	1.4	177	255	257	57	80	79	3
	10	100		536.200	.08	1.3992	1.4	181	248	247	57	80	75	3
	11	110		542.795	.09	1.5741	1.5	178	258	258	56	79	75	3
2	12	120		549.640	.09	1.5741	1.5	155	247	242	55	78	75	3
	13 12	130		556.470	.09	1.5741	1.56	160	255	259	55	79	76	3
	14 11	140		563.505	.08	1.3992	1.4	177	253	242	53	79	74	3
	15 10	150		570.205	.08	1.3992	1.4	185	256	258	52	78	75	3
	16 9	160		576.880	.07	1.2243	1.2	191	251	242	53	78	73	3
	17 8	170		582.900	.06	1.0082	1.0	189	256	260	53	77	73	3
3	18 7	180		588.485	.05	.8402	.84	171	249	240	53	77	72	2
	19 6	190		593.610	.04	.6722	.67	159	251	264	53	76	73	2
	20 5	200		598.165	.03	.5300	.53	144	250	243	53	75	71	2
	21 4	210		602.095	.03	.5163	.52	162	250	265	54	74	73	2
	22 3	220		605.950	.02	.3329	.33	175	255	246	54	73	70	1
	23 2	230		608.935	.02	.3329	.33	181	248	258	54	71	70	1
4	24 1	240		611.890	.03	.4994	.50	181	255	256	53	70	70	1
	25 1	250		615.730	.04	.6765	.68	165	252	241	52	72	69	1

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Date	4/27/16	Glass Nozzle Measurements	
Test Method	ODEQ 5	1	—
Concurrent Testing	Rags	2	—
Run #	2	3	.3735

Client: Bullseye
Facility Location: Portland OR
Source: Outlet T-7
Sample Location: Outlet

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 5 Post 0 @ 6 3 PT; Lo 0 @ 7 0 @ 5

Operator PT Support JH
Temperature, Ambient — (Ta) —
Moisture 3% Tdb — Twb ~~30.1~~ PT
Press., Static (Pstat) .1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 65 PT
Stack TC (ID/°F) 65
Continuity Check (↑) or ↓

Nozzle 5-635 Oven 621349 Imp. Outlet I-41
Filter 158757 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99150
Meter Leak Check — Pretest: .001 cfm 20" inHg; Post: .002 cfm 9" inHg

Margin	Row	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
									Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1	2	260		620.265	.03	.5182	.52	152	256	260	51	71	69	1
	2	3	270		624.195	.03	.5566	.56	144	252	244	52	70	68	1
	3	4	280		628.230	.03	.5566	.56	140	255	265	52	71	68	1
	4	5	290		632.270	.04	.7636	.76	127	253	241	51	71	68	2
5	5	6	300		637.040	.06	1.0915	1.0	156	255	261	51	71	68	2
*	6	7	310		642.585	.08	1.4281	1.4	171	249	242	51	73	68	3
	7	8	320		649.170	.05	.8837	.88	173	255	255	51	71	68	2
	8	9	330		654.380	.05	.8837	.88	172	252	240	57	71	69	2
	9	10	340		659.575	.09	1.6479	1.6	152	252	263	57	72	68	3
	10	11	350		666.620	.09	1.6479	1.6	150	253	244	57	72	68	3
6	11	12	360		673.725	.08	1.4692	1.4	142	247	259	51	72	68	3
	12		370		680.350	.09	1.6922	1.7	136	256	241	51	72	68	4
	13	11	380		687.635	.09	1.7094	1.7	130	251	254	51	72	68	3
	14	10	390		694.930	.09	1.6399	1.6	155	250	245	57	73	67	3
	15	9	400		702.000	.08	1.4275	1.4	168	256	260	51	71	67	3
	16	8	410		708.645	.06	1.0555	1.1	177	255	243	52	71	66	2
7	17	7	420		714.470	.06	1.0555	1.1	177	250	259	51	71	67	2
	18	6	430		720.170	.03	.5402	.54	160	252	246	52	71	66	1
	19	5	440		724.145	.03	.5536	.55	145	257	261	52	69	66	1
	20	4	450		728.180	.02	.3772	.37	132	250	254	52	69	66	1
	21	3	460		731.385	.02	.3952	.39	105	251	250	53	68	66	1
mk	22	2	470		734.730	.02	.3952	.39	103	251	264	51	67	66	1
#8	23	1	480		~~737.974~~ 738.027	.08	1.42 ~~1.58~~	1.4 ~~1.6~~	168	251	259	50	67	66	1
start	24	1	490		744.970	.08	1.42	1.4	177	256	260	51	69	64	1
140	25	2	500		751.485	.07	1.24	1.2	174	251	258	51	70	64	1

Notes: * Timer 316 Purge - flow drop to .02 ~~ttt~~ Keep Running @ 1.4
Back up @ 319 - 334 Flow Jumped up to 1.0
Cont. to Run @ .88

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Client: Bullseye Glass
Facility Location: Portland OR
Source: outlet
Sample Location: outlet T7

Date	4/28/16
Test Method	ODEQ 5
Concurrent Testing	Bags
Run #	2
Operator	BS
Support	TH
Temperature, Ambient (Ta)	—
Moisture	3% Tdb — Twb —
Press., Static (Pstat)	-.1
Press., Bar (Pb)	30.1
Cyclonic Flow Expected ?	N; If yes, avg. null angle ___ degrees

Glass Nozzle Measurements

1	—
2	—
3	.3735

ALT-011
Std TC (ID/°F) 65 PR
Stack TC (ID/°F) 65
Continuity Check ↑ or ↓

Probe	3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection	NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O	Pre: Hi 0 @5 Lo 0 @7; Post 0 @ ~~5~~ 3 PT, 0 @ 5
Nozzle	S-635 Oven 621349 Imp. Outlet I-41
Filter	158757 Heat Set 250 °F
Meter Box	3 dH@ 1.8884 Y .99150
Meter Leak Check	Pretest: .001 cfm 20" inHg; Post: .002 cfm 9" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
								Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1 3	510		758.066	.06	1.06	1.1	157	249	252	52	71	70	2
	2 4	520		764.634	.06	~~1.06~~ 1.13	1.1	134	251	260	53	71	66	2
	3 5	530		770.371	.05	.94	.94	138	252	255	53	70	69	1
9	4 6	540		775.580	.06	1.06	1.1	141	253	259	53	70	69	2
	5 7	550		781.355	.05	.94	.94	141	249	246	54	72	71	2
	6 8	560		786.731	.04	.76	.76	139	253	249	54	68	66	1
	7 9	570		791.577	.05	.94	.94	138	253	244	53	69	65	2
	8 10	580		797.241	.04	.75	.75	133	252	248	55	70	68	1
	9 11	590		802.011	.04	.75	.75	118	250	243	51	69	66	1
10	10 12	600		806.781	.03	.59 ~~.56~~	.59 ~~.56~~	105	250	251	50	69	65	1
	11	610		810.954	.03	.59	.59	105	248	247	49	69	65	1
	12 11	620		815.188	.03	.58	.58	113	250	256	49	67	65	1
	13 10	630		819.343	.04	.75	.75	113	248	250	49	67	66	1
	14 9	640		824.295	.03	.58	.58	111	255	260	48	68	67	1
	15 8	650		828.422	.03	.58	.58	112	253	248	49	67	64	1
11	16 7	660		832.614	.04	.76	.76	129	252	255	48	66	65	1
	17 6	670		836.851	.04	.76	.76	131	253	248	49	67	64	1
	18 5	680		842.066	.05	.94	.94	131	253	258	49	68	66	2
	19 4	690		847.511	.05	.94	.94	131	255	250	47	68	64	2
	20 3	700		852.992	.06	1.14	1.1	130	249	254	49	68	63	2
	21 2	710		858.934	.06	1.14	1.1	131	250	249	48	68	63	2
12	22 1	720		864.621	.07	1.32	1.3	132	254	257	49	68	63	2
	23	730		870.954	.08	1.51	1.5	131	250	249	49	69	67	3
	24 2	740		877.677	.07	1.32	1.3	132	254	258	49	69	68	2
	25 3	750		883.902	.06	1.14	1.1	130	251	249	50	68	64	2

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Glass Nozzle Measurements
1 —
2 —
3 .3735

Client: Bullseye Glass
Facility Location: Portland OR
Source: Outlet
Sample Location: #7 outlet

Date 9/28/16
Test Method ODEQ 5
Concurrent Testing RASS
Run # 2
Operator BS Support JH
Temperature, Ambient — (Ta) —
Moisture 3% Tdb — Twb —
Press., Static (Pstat) .1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 65 PG
Stack TC (ID/°F) 65
Continuity Check (↑) or ↓

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0@5 Lo 0@7 Post 0@3 0@5
Nozzle 5635 Oven 621349 Imp. Outlet I-41
Filter 158757 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99150
Meter Leak Check Pretest: .002 cfm 20" inHg Post: .007 cfm 9" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
				~~889.631~~				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1	760	4	889.631	.06	1.13	1.1	128	254	259	50	68	67	2
	2	770	5	895.321	.05	.94	.94	127	249	247	50	68	67	2
13	3	780	6	900.628	.05	.94	.94	125	254	249	50	68	67	2
	4	790	7	906.06	.04	.77	.77	115	250	251	51	68	67	2
	5	800	8	911.542	.04	.77	.77	114	250	260	51	67	63	1
	6	810	9	916.441	.03	.58	.58	108	250	247	52	67	66	1
	7	820	10	920.704	.04	.77	.77	111	252	257	52	67	66	1
	8	830	11	925.641	.03	.58	.58	113	256	249	52	67	65	1
14	9	840	12	929.847	.03	.58	.58	106	249	260	53	67	64	1
	10	850		933.561	.03	.58	.58	107	252	250	53	66	63	1
	11	860	11	937.712	.02	.39	.39	108	254	259	53	67	65	1
	12	870	10	941.198	.03	.58	.58	105	251	251	53	67	66	1
	13	880	9	945.412	.03	.58	.58	121	254	251	55	68	67	1
	14	890	8	949.608	.03	.58	.58	115	249	257	55	68	67	1
15	15	900	7	953.762	.03	.58	.58	113	252	249	56	68	67	1
	16	910	6	957.941	.04	.77	.77	120	258	252	55	69	68	1
	17	920	5	962.718	.05	.96	.96	121	255	246	56	68	67	1
	18	930	4	967.788	.06	1.15	1.2	119	253	256	56	68	67	2
	19	940	3	973.824	.06	1.13	1.2	118	251	248	57	71	70	2
	20	950	2	979.782	—	—	—	—	—	—	—	—	—	—
16	21	960	1											
	22													
	23													
	24													
	25													

Notes:

End @ 0930, 950 min test

4 of 4

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye
Facility Location: Portland
Source: T-7 outlet
Sample Location: Roof

Date 4/28/16
Test Method ODEQ 5
Concurrent Testing YES
Run # 3

Glass Nozzle Measurements
1 —
2 —
3 .3735

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 6 Post 0 @ 6
Lo 0 @ 5 0 @ 6

Operator BG Support LH MV
Temperature, Ambient (Ta) 63
Moisture 3% Tdb — Twb —
Press., Static (Pstat) .1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) BG 63
Stack TC (ID/°F) 63
Continuity Check ↑ or ↓

Nozzle .635 Oven 62849 Imp. Outlet ~~I-4~~ GN-2
Filter 1.58764 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99150
Meter Leak Check: .002 PT; Pretest: 0.004 cfm 15" inHg; ~~SEE Page 4~~ cfm 6" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			~~1608~~	980.136	.07	1.3431	1.3	Amb: 116	Amb: 257	Amb: 241	Amb: 60	Amb: 71	Amb: 71	2
	1	10	17:08	986.350	.07	1.3431	1.3	134	249	261	65	71	71	1
	2	20	PG	992.540	.04	.7469	.75	136	256	244	64	71	71	1
	3	30	5/6/16	997.325	.04	.7469	.75	131	252	259	58	74	72	1
	4	40		1002.050	.04	.7238	.72	153	250	252	57	75	71	1
	5	50		1006.686	.06	1.0735	1.1	162	254	247	55	77	72	2
	6	60		1012.370	.04	.7156	.71	158	254	257	58	80	74	1
	7	70		1017.065	.04	.7074	.70	174	248	244	59	81	75	1
	8	80		1021.500	.04	.7074	.70	188	255	262	60	80	75	1
	9	90		1026.230	.05	.8611	.86	191	250	242	60	82	76	1
	10	100		1031.390	.05	.8643	.86	187	256	263	58	82	77	1
	11	110		1036.605	.06	1.0718	1.1	170	255	242	59	78	76	2
2	12	120		1042.390	.06	1.0718	1.1	161	254	265	58	77	75	2
	13 12	130		1048.200	.07	1.2309	1.2	190	255	244	57	77	75	2
	14 11	140		1054.225	.06	1.0436	1.0	187	250	261	58	76	73	2
	15 10	150		1059.805	.06	1.0309	1.0	195	250	246	59	76	72	2
	16 9	160		1065.360	.05	.8950	.89	197	251	265	59	75	71	2
	17 8	170		1070.685	.05	.8670	.86	189	250	248	59	75	71	2
3	18 7	180		1076.125	.05	.8670	.86	165	258	268	59	74	71	2
	19 6	190		1081.045	.07	1.2129	1.3	149	253	256	59	74	72	3
	20 5	200		1087.350	.03	.5463	.55	158	253	250	58	76	72	1
	21 4	210		1091.350	.02	.3778	.37	137	249	263	59	73	71	1
	22 3	220		1094.550	.02	.3777	.37	127	254	246	59	73	70	1
K 4	23 2	230		1097.755	.01	.1895	.19	125	256	283	59	73	71	1
4	24 1	240		1099.851	.01	.1980	.20	100	250	253	62	71	71	1
	25 1	250		1101.980	~~.08~~	.9348	.93	133	252	243	61	73	72	1

Notes:

Fan Kicked Down @ 229 into Run Kick Back up @ 245 into Run → .05 PG 4/28/16 2.69

VP PG 4/28/16

1847

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Glass Nozzle Measurements
1 —
2 —
3 .3735

Client: Bullseye
Facility Location: Portland OR
Source: T-7 outlet
Sample Location: Outlet

Date 4/28/16
Test Method ODEQ 5
Concurrent Testing BAAS
Run # 3

Probe 3-6 (g/s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0@6 Lo 0@5 — Post 0@6 0@6

Operator PT Support JH MV
Temperature, Ambient — (Ta) 63
Moisture 3% Tdb — Twb —
Press., Static (Pstat) -.1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 63
Stack TC (ID/°F) 63
Continuity Check (↑) or ↓

Nozzle 635 Oven 621349 Imp. Outlet GN-2
Filter 158764 Heat Set 250 °F
Meter Box 3 dH@ 1.8884 Y .99150
Meter Leak Check — Pretest: 0.004 cfm 15" inHg — Post: .002 cfm 6" inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
				—				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb:	
1	2	260	21:28	1107.270	.03	.5609	.56	122	253	266	58	77	71	1
2	3	270		1111.330	.03	.5609	.56	126	248	248	59	75	71	1
3	4	280		1115.370	.04	.7478	.75	120	251	259	58	76	75	1
4	5	290		1120.130	.03	.5609	.56	116	254	261	60	76	75	1
5 5	6	300		1124.145	.03	.5525	.55	142	257	241	60	75	74	1
6	7	310		1128.135	.04	.6929	.69	180	258	268	60	75	72	1
7	8	320		1132.760	.05	.8515	.85	191	255	245	57	75	72	2
8	9	330		1137.830	.06	1.0410	1.0	179	249	261	54	75	71	2
9	10	340		1143.435	.06	1.0410	1.0	160	249	242	55	75	71	2
10	11	350		1149.020	.07	1.266	1.3	153	250	261	55	76	73	3
6 11	12	360		1155.370	.07	1.2806	1.3	146	249	245	54	75	71	3
12		370		1161.755	.07	1.3183	1.3	132	249	258	55	74	70	3
13	11	380		1168.125	.06	1.0885	1.1	154	250	248	57	73	70	3
14	10	390		1173.815	.06	1.0652	1.1	168	253	257	57	73	70	3
15	9	400		1179.460	.05	.8724	.87	179	252	253	57	74	70	2
16	8	410		1184.575	.05	.8669	.86	183	254	252	57	74	69	2
7 17	7	420		1189.700	.05	.8877	.88	168	255	254	57	75	70	2
18	6	430		1194.915	.05	.9035	.90	157	253	241	57	75	70	2
19	5	440		1200.195	.04	.7371	.74	145	251	262	58	75	70	2
20	4	450		1204.910	.04	.7470	.74	137	254	241	57	75	70	2
21	3	460		1209.610	.03	.5747	.57	122	255	268	58	73	70	1
22	2	470		1213.685	.02	.3831	.38	127	252	246	58	74	70	1
8 23	1	480		~~1216.946~~ 1217.004	.11	2.11	2.1	122	254	241	60	70	68	3
24	1	490		1225.224	.10	1.91	1.9	156	253	247	52	71	70	3
25	2	500		1233.062	.05	.96	.96	145	247	255	57	73	72	3

Notes: Port change Leak ✓ 0.004 @ 10"

B:\Shared files\Field\Data Sheets\Method 5\Method 5_PDX-v1.pdf

0133 restart after PC

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

SEE PAGE 1

Glass Nozzle Measurements
1 —
2 —
3 .3735

Client: Bullseye
Facility Location: Portland OR
Source: T7 Outlet
Sample Location: Outlet

Date 4/28/16
Test Method ODEQ5
Concurrent Testing Bags
Run # 3

Probe 3-6 (g / s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 6 Post 0 @ 6 Lo 0 @ 5 0 @ 6

Operator BS Support JH MV
Temperature, Ambient (Ta) 63
Moisture 3% Tdb — Twb —
Press., Static (Pstat) -.1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 63
Stack TC (ID/°F) 63
Continuity Check (↑) or ↓

Nozzle S-635 Oven 2349 Imp. Outlet SN-2
Filter 158764 Heat Set 250 °F
Meter Box dH@ 1.8884 Y .9950
Meter Leak Check Pretest: .004 cfm 15" inHg
Post: .002 cfm 6" inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			~~1238.731~~				Amb: —	Amb: —	Amb: —	Amb: —	Amb:	Amb: —	
1 2	510		1238.731	.06	1.14	1.1	137	249	252	58	73	72	2
2 3	520		1244.504	.10	1.84	1.8	146	249	256	58	73	70	3
3 4	530		1251.729	.10	1.84	1.8	144	247	256	60	74	73	3
4 5	540		1259.266	.08	1.47	1.5	142	252	256	59	73	68	2
5 6	550		1265.921	.07	1.29	1.3	142	236	249	59	75	68	2
6 7	560		1272.107	.06	1.10	1.1	140	255	254	59	75	70	2
7 8	570		1278.449	.05	.92	.92	145	257	245	59	75	74	2
8 9	580		1283.698	.05	.92	.92	147	250	254	59	74	73	2
9 10	590		1289.039	.06	1.10	1.1	146	252	248	59	77	74	2
10 11	600		1294.987	.04	.74	.74	144	249	255	59	76	72	2
11 12	610		1300.545	.04	.74	.74	143	251	259	60	74	73	1
12	620		1304.912	.04	.74	.74	143	250	248	54	74	71	1
13 11	630		1309.652	.04	.74	.74	147	254	255	55	74	73	1
14 10	640		1314.554	.05	.92	.92	145	251	250	55	75	74	1
15 9	650		—	.05	.92	.92	145	254	256	54	75	76	1
16 8	660		1324.910	.05	.92	.92	144	252	247	54	74	73	1
17 7	670		1330.475	.04	.74	.74	144	251	256	53	76	70	1
18 6	680		1335.377	.05	.92	.92	145	250	251	53	74	76	2
19 5	690		—	.05	.92	.92	147	251	258	53	74	72	2
20 4	700		1346.039	.06	1.10	1.1	144	255	249	54	75	74	3
21 3	710		1352.045	.07	1.29	1.3	141	255	257	55	74	72	3
22 2	720		1358.061	.07	1.29	1.3	140	249	253	55	74	69	3
23 1	730		1364.487	.08	1.47	1.5	139	250	250	55	74	69	3
24	740		1371.324	.08	1.47	1.5	132	255	249	56	73	72	3
25 2	750		1378.274	.07	1.29	1.3	134	251	253	56	72	71	2

9
10
11
12

Notes:

Field Data Sheet

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
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SEE PAGE 1

Glass Nozzle Measurements

1 —
2 —
3 .3735

Client: Bullseye
Facility Location: Portland OR
Source: T2
Sample Location: outlet

Date 4/29/16
Test Method ODEQ 5
Concurrent Testing Bugs
Run # 3

Probe 3-6 (g/s) Cp .8378 Heat Set 250 °F
Post-Test Pitot Inspection NC (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 6 Lo 0 @ 5 — Post 0 @ 6, 0 @ 6

Operator BS Support JH MV
Temperature, Ambient (Ta) 63
Moisture 3% Tdb — Twb —
Press., Static (Pstat) ~ Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) BS 63
Stack TC (ID/°F) 63
Continuity Check ↑ or ↓

Nozzle S-635 Oven 621349 Imp. Outlet GV-2
Filter 158764 Heat Set 250 °F
Meter Box 3 dH@ 1.8804 Y .99150
Meter Leak Check — Pretest: .004 cfm 15" inHg — Post: .002 cfm 6 inHg

		Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
					—				Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	Amb: —	
	1	3	760		1384.100	.07	1.29	1.3	139	251	253	56	71	70	2
	2	4	770		1390.466	.06	1.14	1.1	135	253	249	56	74	70	2
	3	5	780		—	.06	1.14	1.1	134	250	247	55	73	69	2
	4	6	790		1401.864	.05	.94	.94	134	250	246	56	74	69	2
13	5	7	800		1407.664	.06	1.14	1.1	133	256	259	~~69~~ 57	73	69	2
	6	8	810		1413.412	.05	.94	.94	134	253	248	56	74	70	2
~~13~~	7	9	820		1418.761	.05	.94	.94	135	251	259	56	74	69	2
	8	10	830		1423.971	.04	.74	.74	136	248	250	55	73	69	2
	9	11	840		1433.415	.04	.74	.74	136	247	251	55	74	71	1
	10	12	850		1438.138	.04	.74	.74	136	248	253	56	74	73	1
14	11		860		~~1442.909~~	.04	.74	.74	136	251	248	56	75	74	1
	12	11	870		1442.909	.04	.74	.74	136	253	254	57	75	74	1
	13	10	880		1447.654	.03	.56	.56	133	250	246	58	76	74	1
	14	9	890		151.762	.04	.74	.74	131	254	250	59	76	75	1
	15	8	900		—	.05	.94	.94	127	255	257	59	77	74	2
	16	7	910		1460.342	.04	.74	.74	127	253	249	59	76	75	1
15	17	6	920		1465.718	.04	.74	.74	130	253	257	59	78	77	1
	18	5	930	0900	1466.846	—	—	—	—	—	—	—	—	—	—
	19	4	940	*											
	20	3	950												
	21	2	960												
	22	1	970												
16	23	2	980												
	24														
	25														

Notes:
B:\Shared files\Field\Data Sheets\Method 5\Method 5_v2.pdf

4/29/16

Sample Recovery / Moisture Catch

BULLSEYE
GLASS FURNACE T7-INLET
PORTLAND OR
ODEQ5

26-Apr-16
SH,JL,JF,BC,JM,CH,JH

mew

Definitions		Symbol	Units	Run 1	Run 2	Run 3
Impinger Contents						
		Impinger, Contents,Condensate & Rinse	g	1,039.20	1,080.00	778.13
		Impinger, Contents & Condensate	g	866.10	900.00	651.00
	spg (g/ml)	Impinger	g	557.10	555.00	279.00
	0.99823	H2O	ml	200.00	200.00	200.00
		Condensate	g	109.35	145.35	172.35
		Sample Correction Volume	ml	373.41	380.32	327.36
		Sample sent to lab	ml	482.95	525.93	500.02
		Sample received by lab	ml	472.00	554.00	500.00
		Diff		-2.3%	5.3%	0.0%
Silica Gel Impinger		Final weight	g	546.00	553.00	882.00
		Initial weight	g	520.00	520.00	843.00
		Gain	g	26.00	33.00	39.00
Total Moisture Gain		Condensate + Silica Gel gain	g	135.35	178.35	211.35
Vlc		**Net Moisture Gain**	ml	135.60	178.68	211.74
General Remarks		Sample Appearance		clr	clr	clr
		Container Marked		yes	yes	yes
Filter ID & Remarks		Front		15-8-756	15-8-714	15-8-713
		Appearance		green	green	green

ODEQ 56

MONTROSE AIR QUALITY SERVICES
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www.montrose-env.com

Sample Recovery Worksheet

Client: Bullseye
Facility Location: Portland, OR
Operator: JF JH
Date: 4/26-4/29/16
Source: Glass Furnace T7
Sample Location: Inlet

Balance Calibration (1000, 500, 200 g) Tolerance must be within ± 1.0%
Need one per each 3-run test: 998 / 499 / 200

IMPINGER CONTENTS	**RUN 1** -31	**RUN 2** -31	**RUN 3**
Container, condensate & rinse, grams	677.2/362	622/458	
Container & condensate, grams	591/279.1	622/279	651
Empty container, grams	279/278.1	277/278	279/278
Initial volume, ml	200	200	200
Initial contents	DI H_2O	DI H_2O	DI H_2O
Initial concentration	100%	100%	100%
Net water gain, ml			
Condensate appearance	clear	clear	clear
Level marked on container	yes	yes	yes
pH of condensate			
Rinsed with	DI H_2O/Acetone →	→	→
Solvent Name and Lot No.	DI H_2O: 2122 →	→	→
Solvent Name and Lot No.	Acetone: 15070138		

SILICA GEL (w/impinger, top off)			
Final weight, grams	546	553	882
Initial weight, grams	520	520	~~520~~ 843
Net gain, grams			

TOTAL MOISTURE GAIN			
Impingers and silica gel, grams			

FILTERS			
Front filter number	158756	158714	158713
Front filter appearance	green, moisture spot, when water tube a water drop.	green	green
Back filter number		NA	NA

Sample Recovery / Moisture Catch

BULLSEYE
GLASS FURNACE T7-OUTLET
PORTLAND OR

26-Apr-16
PT,BS,JH,MV,JF

mew

Definitions		Symbol	Units	Run 1	Run 2	Run 3
Impinger Contents						
		Impinger, Contents,Condensate & Rinse	g	1167.00	1205.20	*1153.99*
		Impinger, Contents & Condensate	g	1024.00	1040.00	1032.30
	spg (g/ml)	Impinger	g	557.00	557.00	555.00
	0.99823	H2O	ml	200.00	200.00	200.00
		Condensate	g	267.35	283.35	277.65
		Sample Correction Volume	ml	343.25	365.49	*321.90*
		Sample sent to lab	ml	611.08	649.35	600.05
		Sample received by lab	ml	619.00	670.00	600.00
		Diff		1.3%	3.2%	0.0%
Silica Gel Impinger		Final weight	g	870.00	570.00	565.00
		Initial weight	g	832.00	520.00	520.00
		Gain	g	38.00	50.00	45.00
Total Moisture Gain		Condensate + Silica Gel gain	g	305.35	333.35	322.65
Vlc		**Net Moisture Gain**	ml	305.90	333.96	323.24
Filter ID & Remarks		Front		15-8-758	15-8-757	15-8-764
		Appearance		white	white	white

ODEQ 58 5

MONTROSE AIR QUALITY SERVICES

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Sample Recovery Worksheet

Client: Bullseye
Facility Location: Portland, OR
Operator: JF JH

Date: 4/26-4/~~27~~ 29/16
Source: Glass Furnace T7
Sample Location: Outlet

Balance Calibration (1000, 500, 200 g) Tolerance must be within ± 1.0%
Need one per each 3-run test: 998 / 499 / 200

IMPINGER CONTENTS	**RUN 1**	**RUN 2**	**RUN 3**
Container, condensate & rinse, grams	645 / 522	626 / 577.2 (-24)	
Container & condensate, grams	629 / 395	625 / ~~[illegible]~~ 494	600.3 / 432 (lost ~5 ml)
Empty container, grams	279 / 278	279 / 278	277 / 278
Initial volume, ml	200	200	200
Initial contents	DI H_2O	DI H_2O	DI H_2O
Initial concentration	100%	100%	100%
Net water gain, ml			
Condensate appearance			
Level marked on container			
pH of condensate			
Rinsed with	DI H_2O / Acetone →	→	→
Solvent Name and Lot No.	DI H_2O: 2122		
Solvent Name and Lot No.	Acetone:		

SILICA GEL (w/impinger, top off)			
Final weight, grams	JF 4/27 ~~6~~ 870	570	565
Initial weight, grams	~~520~~ 832	520	520
Net gain, grams			

TOTAL MOISTURE GAIN			
Impingers and silica gel, grams			

FILTERS			
Front filter number	158758	158757	15-8-764
Front filter appearance	White	White	* White
Back filter number	—	—	—

* Filter blank

Blank Correction

BULLSEYE
GLASS FURNACE T7-INLET
PORTLAND OR

26-Apr-16
SH,JL,JF,BC,JM,CH,JH

mew

BLANKS			
Acetone	120 ml	0.0000 gm	0.00 mg/100ml
Acetone	**Acceptable Limit**		**0.80** mg/100ml
	Applicable Correction		**0.00** mg/100ml
H2O, Residue	100 ml	0.0000 gm	0.00
H2O, DCM	100 ml	0.0000 gm	0.00
H2O, Combined	100 ml	0.0000 gm	0.00
H2O, Combined	**Acceptable Limit**		**1.00**
H2O, Residue	Applicable Correction		0.00
H2O, DCM	Applicable Correction		0.00
Filter-Front	15-8-765 ID	0.0002 gm	

RUNS			Run 1	Run 2	Run 3
ACETONE-Front	Volume	ml	96	46	116
	Weight	mg	8.7	10.3	10.7
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	8.70	10.30	10.70
ACETONE-Back	Volume	ml	132	154	100
	Weight	mg	2.8	1.9	2.6
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	2.80	1.90	2.60
IMP WATER-Residue	Volume	ml	373.4	380.3	327.4
	Weight	mg	4.2	3.6	5.7
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	4.20	3.60	5.70
IMP WATER-Extract (DCM)	Volume	ml	373.4	380.3	327.4
	Weight	mg	0.1	0.2	0.0
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	0.10	0.20	0.00
FILTER-Front	ID		15-8-756	15-8-714	15-8-713
	Weight	mg	1183.4	1278.6	1357.9
FRONT HALF TOTAL		mg	1192.10	1288.90	1368.60
BACK HALF TOTAL		mg	7.10	5.70	8.30
TOTAL	mn	mg	1199.20	1294.60	1376.90
PERCENT BACK HALF		%	0.6%	0.4%	0.6%

Blank Correction

BULLSEYE
GLASS FURNACE T7-OUTLET
PORTLAND OR

26-Apr-16
PT,BS,JH,MV,JF

mew

BLANKS			
Acetone	120 ml	0.0000 gm	0.00 mg/100ml
Acetone	**Acceptable Limit**		**0.80** mg/100ml
	Applicable Correction		**0.00** mg/100ml
H2O, Residue	100 ml	0.0000 gm	0.00
H2O, DCM	100 ml	0.0000 gm	0.00
H2O, Combined	100 ml	0.0000 gm	0.00
H2O, Combined	**Acceptable Limit**		**1.00**
H2O, Residue	Applicable Correction		0.00
H2O, DCM	Applicable Correction		0.00
Filter-Front	15-8-765 ID	0.0002 gm	

RUNS			Run 1	Run 2	Run 3
ACETONE-Front	Volume	ml	76	54	62
	Weight	mg	1.2	0.3	1.4
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	1.20	0.30	1.40
ACETONE-Back	Volume	ml	108	155	22
	Weight	mg	1.7	2.0	0.0
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	1.70	2.00	0.00
IMP WATER-Residue	Volume	ml	343.3	365.5	321.9
	Weight	mg	10.0	5.9	4.3
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	10.00	5.90	4.30
IMP WATER-Extract (DCM)	Volume	ml	343.3	365.5	321.9
	Weight	mg	0.0	0.1	0.3
	Blank	mg/100ml	0.00	0.00	0.00
	Correction	mg	0.00	0.00	0.00
	Net	mg	0.00	0.10	0.30
FILTER-Front	ID		15-8-758	15-8-757	15-8-764
	Weight	mg	0.3	0.0	2.5
FRONT HALF TOTAL		mg	1.50	0.30	3.90
BACK HALF TOTAL		mg	11.70	8.00	4.60
TOTAL	mn	mg	13.20	8.30	8.50
PERCENT BACK HALF		%	88.6%	96.4%	54.1%

ANTECH
Analysis/Technology

Mr. David Bagwell
MONTROSE ENVIRONMENTAL
13585 NE Whitaker
Portland OR 97230

May 13, 2016
Job# 1612400-06
Method: ODEQ 5

Identification : Bullseye Glass #5702
Received: 5/3/16

Sample #	12400	12401	12402	12403	12404	12405
Identification	GFT7 In Run 1	GFT7 In Run 2	GFT7 In Run 3	GFT7 Out Run 1	GFT7 Out Run 2	GFT7Out Run 3
Front Water:						
Volume (mls)	96	46	116	76	54	62
Residue (g)	0.0087	0.0103	0.0107	0.0012	0.0003	0.0014
Back Acetone						
Volume (mls)	132	154	100	108	155	22
Residue (g)	0.0028	0.0019	0.0026	0.0017	0.0020	0.0000
Impinger water:						
Volume (mls)	472	554	500	619	670	600
Residue (g)	0.0042	0.0036	0.0057	0.0100	0.0059	0.0043
Dichloromethane:						
Volume (mls)	150	150	150	150	150	150
Residue (g)	0.0001	0.0002	-0.0004	-0.0001	0.0001	0.0003
Filters:						
Number:	15-8-756	15-8-714	15-8-713	15-8-75~~6~~8 MF617	15-8-757	15-8-764
Residue(g):	1.1834	1.2786	1.3579	0.0003	-0.0002	0.0025

Respectfully submitted:
ANTECH
Diana Tracy
Diana Tracy, president

ANTECH
Analysis/Technology

Mr. David Bagwell
MONTROSE ENVIRONMENTAL
13585 NE Whitaker
Portland OR 97230

May 13, 2016
Job# 1612400-06
Method: ODEQ 5

Identification : Bullseye Glass #5702
Received: 5/3/16

Sample #	12406
Identification	Blanks
Acetone:	
Volume (mls):	120
Residue (g):	-0.0001
Water:	
Volume (mls):	100
Residue (g):	-0.0001
DCM:	
Volume (mls):	150
Residue (g):	-0.0001
Filters:	
Number:	15-8-765
Residue:	0.0002

Respectfully submitted:
ANTECH

Diana Tracy
Diana Tracy
president

501 N.E. THOMPSON MILL ROAD
CORBETT, OREGON 97019
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E-mail: antech@cascadeaccess.com

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9:15A

page 1 of 12

Montrose
5702

ANTECH
SAMPLE DATA: EPA RESIDUES
Analyst: MS reviewer:
Job# 1612400-06 Identification: Bullseye Glass

FRONT ACETONE:

	12400		12401		12402	
Sample #	12400		12401		12402	
Sample ID	GFT7I R1	16B415	GFT7I R2	16B416	GFT7I R3	16B417
vol mark	✓		✓		✓	
Date/time Into dessicator	5-4 11A		5-4 11A		5-4 11A	
Vol(mls)	96	date/time weighed	46	date/time weighed	116	date/time weighed
GWt1(g)	124.8479	5-5 10A	109.9187	5-5 10A	115.5520	5-5 10A
GWt2(g)	124.8478	5-6 7A	109.9190	5-6 7A	115.5521	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	124.8479		109.9189		115.5521	
*Tare (g)	124.8392	5-3 1P	109.9086	5-3 1P	115.5414	5-3 1P
Net (g)	0.0087		0.0103		0.0107	

COPY

BACK ACETONE:

	12400		12401		12402	
Sample #	12400		12401		12402	
Sample ID	GFT7I R1	16B421	GFT7I R2	16B422	GFT7I R3	16B423
vol mark	✓		✓		✓	
Date/time Into dessicator	5-5 7A		5-5 7A		5-5 7A	
Vol(mls)	132	date/time weighed	154	date/time weighed	100	date/time weighed
GWt1(g)	114.4280	5-5 10A	107.1615	5-5 10A	116.5003	5-5 10A
GWt2(g)	114.4280	5-6 7A	107.1610	5-6 7A	116.4998	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	114.4280		107.1613		116.5001	
*Tare (g)	114.4252	5-3 1P	107.1594	5-3 1P	116.4975	5-3 1P
Net (g)	0.0028		0.0019		0.0026	

ANTECH
SAMPLE DATA: EPA RESIDUES

Montrose 5702

Analyst: [illegible] reviewer:
Job# 16 12400-06 Identification: Bullseye Glass

FRONT ACETONE:

Sample #	12403		12404		12405	
Sample ID	GFT70R1	16B418	GFT70R2	16B419	GFT70R3	16B420
vol mark	✓		✓		none	
Date/time Into dessicator	5-4 11A		5-4 11A		5-4 11A	
Vol(mls)	76	date/time weighed	54	date/time weighed	62	date/time weighed
GWt1(g)	127.7761	5-5 10A	105.1312	5-5 10A	107.0150	5-5 10A
GWt2(g)	127.7753	5-6 7A	105.1303	5-6 7A	107.0142	5-6 7A
GWt3(g)	127.7758	5-8 8A	105.1308	5-8 8A	107.0147	5-8 8A
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	127.7756		105.1306		107.0145	
*Tare (g)	127.7744	5-3 1P	105.1303	5-3 1P	107.0131	5-3 1P
Net (g)	0.0012		0.0003		0.0014	

COPY

BACK ACETONE:

Sample #	12403		12404		12405	
Sample ID	GFT70R1	16B424	GFT70R2	16B425	GFT70R3	16B426
vol mark	✓		✓		none	
Date/time Into dessicator	5-5 7A		5-5 7A		5-4 11A	
Vol(mls)	108	date/time weighed	155	date/time weighed	22	date/time weighed
GWt1(g)	111.5457	5-5 10A	104.0353	5-5 10A	109.7738	5-5 10A
GWt2(g)	111.5448	5-6 7A	104.0344	5-6 7A	109.7727	5-6 7A
GWt3(g)	111.5462	5-8 8A	104.0354	5-8 8A	109.7732	5-8 8A
GWt4(g)	111.5459	5-9 7A	104.0358	5-9 7A		
GWt5(g)						
GWt6(g)						
Average	111.5461		104.0356		109.7730	
*Tare (g)	111.5444	5-3 1P	104.0336	5-3 1P	109.7730	5-3 1P
Net (g)	0.0017		0.0020		~~0.0000~~ 0.0000	

Montrose
5702

ANTECH ID 1612400-06
SAMPLE DATA: EPA RESIDUE

IMPINGER WATER:

Sample #	12400		12401		12402	
Sample ID	GFT7IR1	16B427	GFT7R2	16B428	GFT7R3	16B429
vol mark	✓		✓		✓	
Date/time Into dessicator	5-5 7A		5-5 7A		5-5 7A	
Vol(mls)	472	date/time Weighed	554	date/time weighed	500	date/time weighed
GWt1(g)	141.5855	5-5 10A	125.5154	5-5 10A	159.9210	5-5 10A
GWt2(g)	141.5847	5-6 7A	125.5151	5-6 7A	159.9199	5-6 7A
GWt3(g)	141.5858	5-8 8A			159.9213	5-8 8A
GWt4(g)	141.5863	5-9 7A			159.9214	5-9 7A
GWt5(g)						
GWt6(g)						
Average	141.5862		125.5153		159.9214	
*Tare (g)	141.5820	5-3 1P	125.5117	5-3 1P	159.9157	5-3 1P
Net (g)	0.0042		0.0036		0.0057	

DICHLOROMETHANE:

Sample #	12400		12401		12402	
Sample ID		16B433		16B434		16B435
vol mark						
Date/time Into dessicator	5-4 11A		5-5 7A		5-5 7A	
Vol(mls)	(150)	date/time Weighed	(150)	date/time weighed	(150)	date/time weighed
GWt1(g)	88.9214	5-5 10A	99.3003	5-5 10A	88.8493	5-5 10A
GWt2(g)	88.9212	5-6 7A	99.3001	5-6 7A	88.8494	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	88.9213		99.3002		88.8494	
*Tare (g)	88.9212	5-3 1P	99.3000	5-3 1P	88.8498	5-3 1P
Net (g)	0.0001		0.0002		-0.0004	

Montrose
5702

ANTECH ID 16 12400-06
SAMPLE DATA: EPA RESIDUE

IMPINGER WATER:

Sample #	12403		12404		12405	
Sample ID	GFT70R1	16B430	GFT70R2	16B431	GFT70R3	16B432
vol mark	✓		✓		✓	
Date/time Into dessicator	5-5 7A		5-5 7A		5-5 7A	
Vol(mls)	619	date/time Weighed	670	date/time weighed	600	date/time weighed
GWt1(g)	164.4956	5-5 10A	170.0870	5-5 10A	142.7271	5-5 10A
GWt2(g)	164.4945	5-6 7A	170.0862	5-6 7A	142.7262	5-6 7A
GWt3(g)	164.4950	5-8 9A	170.0865	5-8 9A	142.7266	5-8 9A
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	164.4948		170.0864		142.7264	
*Tare (g)	164.4848	5-3 1P	170.0805	5-3 1P	142.7221	5-3 1P
Net (g)	0.0100		0.0059		0.0043	

COPY

DICHLOROMETHANE:

Sample #	12403		12404		12405	
Sample ID		16B436		16B437		16B438
vol mark						
Date/time Into dessicator	5-5 7A		5-5 7A		5-5 7A	
Vol(mls)	(150)	date/time Weighed	(150)	date/time weighed	(150)	date/time weighed
GWt1(g)	98.9021	5-5 10A	120.9662	5-5 10A	100.5051	5-5 10A
GWt2(g)	98.9019	5-6 7A	120.9663	5-6 7A	100.5052	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	98.9020		120.9663		100.5052	
*Tare (g)	98.9021	5-3 1P	120.9662	5-3 1P	100.5049	5-3 1P
Net (g)	-0.0001		0.0001		0.0003	

Montrose
5702

ANTECH ID 1612400-06
SAMPLE DATA: EPA RESIDUES

FILTERS:						
Sample #	12400		12401		12402	
Sample ID	GFT7IR1		GFT7IR2		GFT7IR3	
Filter #	15-8-756		15-8-714		15-8-713	
Date/time In dessicator	5-3 11A	Date/time	5-3 11A	Date/time	5-3 11A	Date/time
GWt1(g)	1.4770	5-5 10A	1.6312	5-5 10A	1.6171	5-5 10A
GWt2(g)	1.4790	5-6 7A	1.6319	5-6 7A	1.6253	5-6 7A
GWt3(g)	1.5368	5-8 9A			1.7134	5-8 9A
GWt4(g)	1.5355	5-9 7A			1.7139	5-9 7A
Average	1.5362		1.6316		1.7137	
Tare (g)	.3528	12-4-15	.3530	12-4-15	.3558	12-4-15
Net (g)	1.1834		1.2786		1.3579	

FILTERS:						
Sample #	12403		12404		12405	
Sample ID	GFT7OR1		GFT7OR2		GFT7OR3	
Filter #	15-8-758		15-8-757		15-8-764	
Date/time In dessicator	5-3 11A	Date/time	5-3 11A	Date/time	5-3 11A	Date/time
GWt1(g)	.3563	5-5 10A	.3565	5-5 10A	.3574	5-5 10A
GWt2(g)	.3562	5-6 7A	.3565	5-6 7A	.3554	5-6 7A
GWt3(g)					.3564	5-8 9A
GWt4(g)					.3566	5-9 7A
Average	.3563		.3565		.3565	
Tare (g)	.3560	12-4-15	.3567	12-4-15	.3540	12-4-15
Net (g)	0.0003		-0.0002		0.0025	

COPY

ANTECH
SAMPLE DATA: EPA RESIDUES

Montrose 5702

Analyst: [signature] reviewer:
Job# 1612400-06 Identification: Bullseye Glass

BLANKS:

	ACETONE:	date/time weighed	IMPINGER WATER:	date/time weighed	DCM:	date/time weighed
Sample #	12406	16B439	12406		12406	16B441
Sample ID	GFT7Bl		GFT7Bl	16B440		
vol mark	✓		✓			
Date/time	5-4 11A		5-4 11A		5-4 11A	
Into dessicator Vol(mls)	120		100		(150)	
GWt1(g)	117.6593	5-5 10A	132.3452	5-5 10A	118.9348	5-5 10A
GWt2(g)	117.6589	5-6 7A	132.3449	5-6 7A	118.9345	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	117.6591		132.3451		118.9347	
*Tare (g)	117.6592	5-3 1P	132.3452	5-3 1P	118.9348	5-3 1P
Net (g)	-0.0001		-0.0001		-0.0001	

COPY

	FILTER:	date/time weighed	FILTER:	date/time weighed		date/time weighed
Sample #	12406					
Sample ID	GFT7Bl					
Filter #	15-8-765					
Date/time	5-3 11A					
Into dessicator Vol(mls)						
GWt1(g)	.3530	5-5 10A				
GWt2(g)	.3531	5-6 7A				
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	.3531					
*Tare (g)	.3529	12-4-15				
Net (g)	0.0002					

ANTECH
SAMPLE DATA: EPA RESIDUES
Analyst: [signature] reviewer: ______ Montrose 5702
Job# 1612400-06 Identification: Bullseye Glass

HOUSE BLANKS:

	ACETONE:	date/time weighed	IMPINGER WATER:	date/time weighed	DCM:	date/time weighed
Sample #	124		124		124 lab blank	
Sample ID	lab blank		lab blank			16B444
vol mark		16B442		16B443		
Date/time Into dessicator	5-4 11A		5-4 11A		5-4 11A	
Vol(mls)	(100)		(100)		(150)	
GWt1(g)	104.2690	5-5 10A	162.0684	5-5 10A	118.7342	5-5 10A
GWt2(g)	104.2694	5-6 7A	162.0684	5-6 7A	118.7339	5-6 7A
GWt3(g)						
GWt4(g)						
GWt5(g)						
GWt6(g)						
Average	104.2692		162.0684		118.7341	
*Tare (g)	104.2690	5-3 1P	162.0685	5-3 1P	118.7341	5-3 1P
Net (g)	0.0002		-0.0001		0.0000	

	FILTER:	date/time weighed	FILTER:	date/time weighed	EMPTY:	date/time weighed
Sample #					124	
Sample ID					lab blank	
Filter #						
Date/time Into dessicator					5-4 11A	
Vol(mls)					empty	
GWt1(g)					105.3499	5-5 9A
GWt2(g)					105.3493	5-6 7A
GWt3(g)					105.3498	5-8 8A
GWt4(g)					105.3495	5-9 7A
GWt5(g)						
GWt6(g)						
Average					105.3497	
*Tare (g)					105.3496	5-3 1P
Net (g)					0.0001	

COPY

ODEQ5

page 8 of 12

ANTECH
SAMPLE DATA:
Analyst: [illegible]
Job# 1612400-06

RESIDUES
reviewer:
Identification: Bullseye Glass

Montrose
5702

QC DATA:					
Date/time	5-3	5-5	5-6	5-8	5-9
Balance calibrated	✓	✓	✓	✓	✓
(NTIS cert wts)	✓	✓	✓	✓	✓
Date/time	1P	8A	7A	7A	7A
Temp/temp	70	70	68	70	68
Relative humidity (%)	32	32	31	34	32
Date/time					
Balance calibrated					
(NTIS cert wts)					
Date/time					
Temp/temp					
Relative humidity (%)					

COPY

Reagent Tracking:

Reagent:	Brand:	Lot #	Expiration Date:
DCM	CP	DN388	
acetone	CP	DP050	
DI H_2O	Ricca	1501A48	

balance # 50505744

1612400-06

ANALYTICAL BALANCE CALIBRATION FORM

Balance name Sartorius Number 50505744

Classification of standard weights

Date	0.500 g	1.0000 g	10.0000 g	50.0000 g	100.0000 g	Analyst
3-18-16	0.0999	1.0001g.			100.0000	[illegible]
3-20-16	0.1000g.	1.0001g.			100.0000g	[illegible]
3-21-16	0.1000g.	1.0001g.			100.0001g.	[illegible]
calibrated 3-22-16	0.1000g.	1.0001g			100.0001g.	[illegible]
3-23-16	0.1000g	1.0000g			100.0000g.	[illegible]
3-24-16	0.0999g	1.0001g.			100.0000g.	[illegible]
3-27-16	0.1000g.	1.0001g.			100.0000g.	[illegible]
3-28-16	0.1000g.	1.0000g.			100.0000g.	[illegible]
4-1-16	0.1000g	1.0001g.			100.0000g.	[illegible]
4-3-16	0.1000g	1.0000g.			100.0000g	[illegible]
4-4-16	0.1001g.	1.0001g.			100.0000g.	[illegible]
4-7-16	0.1000g.	1.0000g.			100.0001g.	[illegible]
4-8-16	0.1000g	1.0001g.			100.0001g.	[illegible]
4-11-16	0.1001g	1.0001g.			100.0000g	[illegible]
4-12-16	0.1001g.	1.0001g.			100.0001g.	[illegible]
4-13-16	0.1000g	1.0000g.			100.0001g.	[illegible]
4-14-16	0.1001g.	1.0001g.			100.0000g.	[illegible]
4-15-16	0.1000g	1.0001g.			100.0000g.	[illegible]
4/16/16	0.1000g	1.0000g			100.0001g	DG
4-25-16	0.1000g.	1.0001g.			100.0001g	[illegible]
4-26-16	0.0999g.	1.0000g.			100.0000g.	[illegible]
4-27-16	0.1000g.	1.0000g.			100.0000g.	[illegible]
4-28-16	0.1000g.	1.0001g.			100.0000g.	[illegible]
4-29-16	0.1000g	1.0001g.			100.0000g	[illegible]
5-1-16	0.1001g.	1.0000g.			100.0000g.	[illegible]
5-2-16	0.1000g.	1.0001g.			100.0001g.	[illegible]
5-3-16	0.1000g.	1.0000g.			100.0001g.	[illegible]
5-4-16	0.0999g.	1.0000g.			100.0001g.	[illegible]
5-5-16	0.1000g.	1.0000g.			100.0001g.	[illegible]
5-6-16	0.1000g.	1.0000g.			100.0000g.	[illegible]
5-8-16	0.1001g.	1.0001g.			100.0001g.	[illegible]
5-9-16	0.1008	1.0001g			100.0000g	[illegible]

Quality Assurance Handbook M5-5.2

COPY

	RH23 11-30	RH25 12-3	RH30 12-4	AVE
15-8-701	.3533	.3533	.3534	.3533
702	.3558	.3558	.3558	.3558
703	.3519	.3520	.3521	.3520
B ~~704~~	~~.3558~~	~~.3558~~	~~.3558~~	~~.3558~~
705	.3539	.3539	.3540	.3539
15-8-706	.3532	.3533	.3533	.3533
707	.3596	.3595	.3596	.3596
708	.3558	.3557	.3558	.3558
709	.3581	.3582	.3581	.3581
710	.3565	.3565	.3566	.3565
15-8-711	.3558	.3560	.3559	.3559
712	.3568	.3568	.3568	.3568
~~713~~	~~.3558~~	~~.3558~~	~~.3558~~	~~.3558~~
~~714~~	~~.3530~~	~~.3530~~	~~.3531~~	~~.3530~~
715	.3522	.3521	.3522	.3522
15-8-716	.3534	.3534	.3534	.3534
717	.3541	.3542	.3542	.3542
718	.3513	.3514	.3515	.3514
719	.3526	.3526	.3527	.3526
720	.3529	.3529	.3529	.3529
15-8-721	.3525	.3525	.3525	.3525
722	.3542	.3543	.3543	.3543
723	.3520	.3520	.3519	.3520
~~724~~	~~.3539~~	~~.3539~~	~~.3539~~	~~.3539~~
725	.3560	.3560	.3560	.3560

VG
- ~~.1090~~
- ~~1095~~
- ~~1083~~
- ~~.1104~~

AVG
- ~~.3515~~
- ~~.3569~~
- .3534
- .3557
- .3598
- .3570
- .3578
- .3563
- .3537
- .3546
- .3547
- .3527
- .3541
- .3533
- .3530
- .3525
- .3539
- .3517
- .3512
- .3541
- .3525

16124 00-06

Page 10 of

AVE		RH23 11-30	RH25 12-3	RH30 12-4	AVE
.3525	~~15-8-751~~	~~.3515~~	~~.3516~~	~~.3517~~	~~.3516~~
.3540	752	.3528	.3528	.3528	.3528
.3534	753	.3539	.3539	.3540	.3539
.3530	~~754~~	~~.3525~~	~~.3525~~	~~.3525~~	~~.3525~~
.3580	~~755~~	~~.3558~~	~~.3559~~	~~.3559~~	~~.3559~~
.3545	~~15-8-756~~	~~.3528~~	~~.3529~~	~~.3528~~	~~.3528~~
.3580	~~757~~	~~.3567~~	~~.3567~~	~~.3567~~	~~.3567~~
.3564	~~758~~	~~.3560~~	.3561	~~.3560~~	~~.3560~~
.3556	759	.3573	.3573	.3573	.3573
.3583	760	.3577	.3578	.3578	.3578
~~.3575~~	15-8-761	.3582	.3582	.3582	.3582
~~.3548~~	762	.3569	.3570	.3570	.3570
~~.3558~~	763	.3560	.3560	.3561	.3560
.3526	~~764~~	~~.3539~~	~~.3541~~	.3541	~~.3540~~
.3509	B ~~765~~	~~.3529~~	~~.3529~~	~~.3530~~	~~.3529~~
.3515	15-8-766	.3540	.3541	.3542	.3541
.3512	767	.3527	.3527	.3527	.3527
.3525	768	.3528	.3528	.3528	.3528
.3506	769	.3517	.3518	.3518	.3518
.3506	770	.3506	.3506	.3506	.3506
.3543	~~15-8-771~~	~~.3539~~	~~.3539~~	~~.3539~~	~~.3539~~
.3551	772	.3558	.3559	.3558	.3558
.3542	773	.3562	.3563	.3563	.3563
.3541	774	.3555	.3555	.3555	.3555
.3491	775	.3515	.3516	.3516	.3516

COPY

4-25 RH30	16B 401	123.6717		16B 426	109.7730
	402	105.5274		427	141.5820
	403	109.9200		428	125.5117
	404	120.4775		429	159.9157
	405	107.3002		430	164.4848
	16B 406	103.9335		16B 431	170.0805
	407	97.2730		432	143.7221
4-29 RH33	408	103.6724		433	88.9212
	409	116.7660		434	99.3000
	410	103.9369		435	88.8498
	16B 411	87.1556		16B 436	98.9021
	412	105.6080		437	120.9662
	413	111.5222		438	100.5049
	414	103.3506		439	117.6592
5-3 RH32	415	124.8392		440	132.3452
	16B 416	109.9086		16B 441	118.9348
	417	115.5414		442	104.2690
	418	127.7744		443	162.0685
	419	105.1303		444	118.7341
	420	107.0131		445	105.3496
	16B 421	114.4252		16B 446	113.1254
	422	107.1594	5-4 RH34	447	67.7602
	423	116.4975		448	72.7309
	424	111.5444		449	66.0372
	425	104.0336		450	65.5801

QUALITY CONTROL SERVICES

Established 1974

LABORATORY EQUIPMENT • SALES • SERVICE • CALIBRATION • REPAIRS
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75
ACCREDITED
Calibration Services
Certificate Number: 1550.01
Laboratory code: 115953

Antech Lab
501 N.E. Thompson Mill Rd.
Corbett, OR 97019

Report Number: ANTL0150505744160322

COPY

A2LA ACCREDITED CERTIFICATE OF CALIBRATION WITH DATA

INSTRUMENT INFORMATION

Item	Make	Model	Serial Number	Customer ID	Location
Balance	Sartorius	BP210S	50505744	N/A	Lab
Units	**Readability**	**SOP**	**Cal Date**	**Last Cal Date**	**Cal Due Date**
g	0.0001	QC012	3/22/16	3/24/15	3/2017

FUNCTIONAL CHECKS

ECCENTRICITY
Test Wt: 100 Tol: 0.0003
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

LINEARITY
Test Wt: 50x4 Tol: 0.0002
As-Found: Pass: ☑ Fail: ☐
As-Left: Pass: ☑ Fail: ☐

STANDARD DEVIATION
Test Wt: 100 Tol: 0.0001

1. 100.0003	5. 100.0004	9. 100.0003
2. 100.0005	6. 100.0002	10. 100.0002
3. 100.0004	7. 100.0003	**Result**
4. 100.0003	8. 100.0002	0.00009

ENVIRONMENTAL CONDITIONS
☐ Good ☑ Fair ☐ Poor
Temperature: 21.1°C

A2LA ACCREDITED SECTION OF REPORT

Standard	As-Found	As-Left	Expanded Uncertainty
200	200.0009	200.0006	0.00023
100	100.0006	100.0003	0.00023
50	50.0003	50.0002	0.00023
10	10.0002	10.0000	0.00022
1	1.0000	1.0000	0.00022
0.1	0.1000	0.1000	0.00022

CALIBRATION STANDARDS

Item	Make	Model	Serial Number	Cal Date	Cal Due Date	NIST ID
Weight Set	Rice Lake	20 kg to 1mg	2831W	12/8/15	12/2016	20152429

Permanent Information Concerning this Equipment:
Unit needs software repair for linearity and repeatability.

Comments/Info Concerning this Calibration:

Report prepared/reviewed by: J. Colacchio **Date:** 3/22/16

Technician: J. Colacchio
Signature:

The uncertainty is calculated according to the ISO Guide to the Expression of Uncertainty in Measurement and includes the uncertainty of standards used combined with the observed standard deviation and readability of the unit under test. The uncertainty is expanded with a k factor of 2 for an approximate 95% level of confidence. Instruments listed above were calibrated using standards traceable to the National Institute of Standards and Technology (NIST). Calibration data reflect results at the time and location of calibration. Calibration data should be reviewed to insure that the instrument is performing to its required accuracy. Calibrations comply with ISO/IEC 17025 and ANSI/Z540-1-1994 quality standards.

Member: National Conference of Standards Laboratories and Weights & Measures

HORIZON ENGINEERING 16-5702

PT ID: ANTL01

Particulate Matte. Chain of Custody

1612400-06

MONTROSE AIR QUALITY SERVICES

Page: 1 of 1

Client: Bullseye Glass

Laboratory: Antech
501 N.E. Thompson Mill Road
Corbett, Oregon 97019

Montrose Job No ~~[illegible]~~ 5702

Antech Job No. ______

Field Personnel JF/JH/CH

Office Personnel ______

			Front Acetone Rinse	Back Acetone Rinse	Impinger H2O	Filter - Front		CPM Cont. 1	CPM Cont. 2	CPM Cont. 3
METHOD: specify>>								EPA 202	EPA 202	EPA 202
Source	Run #	Test Date								
T7 Inlet	1	4/27	1	1	2	1		—	—	—
"	2	4/28	"	"	"	"				
"	3	4/29	"	"	"	"				
T7 Outlet	1	4/27	"	"	"	"				
"	2	4/28	"	"	"	"				
"	3	4/29	"	"	"	"				
Blanks		4/29	1	—	1	1				
Field Train Recovery										
Field Train Proof										

Return Samples to Montrose ASAP for Further Analysis? ___

RUSH ✓
Normal ___

Notes: 33 total Samples. Please Rush!

Relinquished by: [signature] CH Date/Time 5/2/16 1123

Received by: [signature] Date/Time 5/3 9:30

Relinquished by: ______ Date/Time ______

Received by: ______ Date/Time ______

Bill To:

- ☑ **Horizon Engineering, LLC**
  13585 NE Whitaker Way
  Portland, OR 97230
- ☐ **AmTest Air Quality**
  4150 'B' Place NW, Suite 106
  Auburn, WA 98001
  Phone: 253.480.3800
- ☐ **The Avogadro Group**
  2825 Verne Roberts Circle
  Antioch, CA 94509
- ☐ **The Avogadro Group**
  13585 NE Whitaker Way
  Portland, OR 97230
- ☐ **Montrose Air Quality Services**
  11327 E. Montgomery Bay #1
  Spokane Valley, WA 99206
- ☐ **Montrose Air Quality Services**
  2285 Deerfield Lane
  Helena, MT 89601
- ☐ **Other** ______

LABORATORY REPORT

May 18, 2016

Jason French
Horizon Engineering, LLC
4150 'B' Place Northwest, Suite 106
Auburn, WA 98001

RE: Bullseye Glass / 5702

Dear Jason:

Enclosed are the results of the samples submitted to our laboratory on May 4, 2016. For your reference, these analyses have been assigned our service request number P1602318.

All analyses were performed according to our laboratory's NELAP and DoD-ELAP-approved quality assurance program. The test results meet requirements of the current NELAP and DoD-ELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP and DoD-ELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. Results are intended to be considered in their entirety and apply only to the samples analyzed and reported herein.

If you have any questions, please call me at (805) 526-7161.

Respectfully submitted,

ALS | Environmental

Kate Aguilera

By Kate Aguilera at 10:31 am, May 18, 2016

Kate Aguilera
Project Manager

Client: Horizon Engineering, LLC
Project: Bullseye Glass / 5702

Service Request No: P1602318

CASE NARRATIVE

The samples were received intact under chain of custody on May 4, 2016 and were stored in accordance with the analytical method requirements. The samples were received past the recommended holding time for all of the analyses. The analyses were performed as soon as possible after receipt by the laboratory. The data is flagged to indicate the holding time exceedance. Please refer to the sample acceptance check form for additional information. The results reported herein are applicable only to the condition of the samples at the time of sample receipt.

Ethane and Propane Analysis

The samples were analyzed per modified EPA Method TO-3 for ethane and propane using a gas chromatograph equipped with a flame ionization detector (FID). This procedure is described in laboratory SOP VOA-TO3C1C6. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP accreditation.

Fixed Gases Analysis

The samples were also analyzed for fixed gases (oxygen, nitrogen, carbon monoxide, methane and carbon dioxide) according to modified EPA Method 3C (single injection) using a gas chromatograph equipped with a thermal conductivity detector (TCD). This procedure is described in laboratory SOP VOA-EPA3C. This method is included on the laboratory's DoD-ELAP scope of accreditation, however it is not part of the NELAP or AIHA-LAP accreditation.

The results of analyses are given in the attached laboratory report. All results are intended to be considered in their entirety, and ALS Environmental (ALS) is not responsible for utilization of less than the complete report.

ALS Environmental - Simi Valley

CERTIFICATIONS, ACCREDITATIONS, AND REGISTRATIONS

Agency	Web Site	Number
AIHA	http://www.aihaaccreditedlabs.org	101661
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0694
DoD ELAP	http://www.pjlabs.com/search-accredited-labs	L15-398
Florida DOH (NELAP)	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E871020
Maine DHHS	http://www.maine.gov/dhhs/mecdc/environmental-health/water/dwp-services/labcert/labcert.htm	2014025
Minnesota DOH (NELAP)	http://www.health.state.mn.us/accreditation	977273
New Jersey DEP (NELAP)	http://www.nj.gov/dep/oqa/	CA009
New York DOH (NELAP)	http://www.wadsworth.org/labcert/elap/elap.html	11221
Oregon PHD (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	4068-003
Pennsylvania DEP	http://www.depweb.state.pa.us/labs	68-03307 (Registration)
Texas CEQ (NELAP)	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704413-15-6
Utah DOH (NELAP)	http://www.health.utah.gov/lab/labimp/certification/index.html	CA016272015-5
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C946

Analyses were performed according to our laboratory's NELAP and DoD-ELAP approved quality assurance program. A complete listing of specific NELAP and DoD-ELAP certified analytes can be found in the certifications section at www.alsglobal.com, or at the accreditation body's website.

Each of the certifications listed above have an explicit Scope of Accreditation that applies to specific matrices/methods/analytes; therefore, please contact the laboratory for information corresponding to a particular certification.

ALS ENVIRONMENTAL

DETAIL SUMMARY REPORT

Client: Horizon Engineering, LLC

Project ID: Bullseye Glass / 5702

Service Request: P1602318

Date Received: 5/4/2016

Time Received: 09:35

Client Sample ID	Lab Code	Matrix	Date Collected	Time Collected	TO-3 Modified - C1C6+ Bag	3C Modified - Fxd Gases Bag
1-A	P1602318-001	Air	4/27/2016	00:00	X	X
1-B	P1602318-002	Air	4/27/2016	00:00	X	X
1-C	P1602318-003	Air	4/27/2016	00:00	X	X
1-D	P1602318-004	Air	4/27/2016	00:00	X	X
1-E	P1602318-005	Air	4/27/2016	00:00	X	X
1-F	P1602318-006	Air	4/27/2016	00:00	X	X
1-G	P1602318-007	Air	4/27/2016	00:00	X	X
2-A	P1602318-008	Air	4/28/2016	00:00	X	X
2-B	P1602318-009	Air	4/28/2016	00:00	X	X
2-C	P1602318-010	Air	4/28/2016	00:00	X	X
2-D	P1602318-011	Air	4/28/2016	00:00	X	X
2-E	P1602318-012	Air	4/28/2016	00:00	X	X
2-F	P1602318-013	Air	4/28/2016	00:00	X	X
3-A	P1602318-014	Air	4/29/2016	00:00	X	X
3-B	P1602318-015	Air	4/29/2016	00:00	X	X
3-C	P1602318-016	Air	4/29/2016	00:00	X	X
3-D	P1602318-017	Air	4/29/2016	00:00	X	X
3-E	P1602318-018	Air	4/29/2016	00:00	X	X

Air - Chain of Custody Record & Analytical Service Request

2655 Park Center Drive, Suite A
Simi Valley, California 93065
Phone (805) 526-7161
Fax (805) 526-7270

Requested Turnaround Time in Business Days (Surcharges) please circle
1 Day (100%) 2 Day (75%) 3 Day (50%) 4 Day (35%) 5 Day (25%) 10 Day-Standard

ALS Project No. P1602318

ALS Contact:

Company Name & Address (Reporting Information): Thomas Rhodes / Horizon Engineering (Same as Billing Address)

Project Name: Bullseye Glass

Project Number: 5702

Project Manager: Jason French

P.O. # / Billing Information: 13585 NE Whitaker Way, Portland OR 97230

Phone: 503-255-5050

Fax: 503-255-0505

Email Address for Result Reporting: trhodes@montrose-env.com

Sampler (Print & Sign): Chris Hinson

Analysis Method: 3C

Client Sample ID	Laboratory ID Number	Date Collected	Time Collected	Canister ID (Bar code # - AC, SC, etc.)	Flow Controller ID (Bar code # - FC #)	Canister Start Pressure "Hg	Canister End Pressure "Hg/psig	Sample Volume	Analysis Method		Comments e.g. Actual Preservative or specific instructions
1A-G		4/27	Various								
2A-F		4/28	"						All Bags analyzed		
3A-E		4/29	"						for N_2/O_2/CO_2/		
									CO/CH_4/C_2H_6/		
									C_3H_8 only		

Report Tier Levels - please select
Tier I - Results (Default if not specified) ____
Tier II (Results + QC Summaries) X
Tier III (Results + QC & Calibration Summaries) ____
Tier IV (Data Validation Package) 10% Surcharge ____

EDD required Yes / No
Type: ____ Units: ____

Chain of Custody Seal: (Circle)
INTACT BROKEN ABSENT

Project Requirements (MRLs, QAPP)

Relinquished by: (Signature)	Date: 5/2/16	Time: 1200	Received by: (Signature)	Date: 5/4/16	Time: 0935
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Cooler / Blank Temperature ____ °C

HORIZON ENGINEERING 16-5702

ALS Environmental
Sample Acceptance Check Form

Client: Horizon Engineering, LLC   Work order: P1602318
Project: Bullseye Glass / 5702
Sample(s) received on: 5/4/16   Date opened: 5/4/16   by: KKELPE

Note: This form is used for all samples received by ALS. The use of this form for custody seals is strictly meant to indicate presence/absence and not as an indication of compliance or nonconformity. Thermal preservation and pH will only be evaluated either at the request of the client and/or as required by the method/SOP.

		Yes	No	N/A
1	Were **sample containers** properly marked with client sample ID?	☐	☒	☐
2	Did **sample containers** arrive in good condition?	☐	☒	☐
3	Were **chain-of-custody** papers used and filled out?	☒	☐	☐
4	Did **sample container labels** and/or tags agree with custody papers?	☐	☒	☐
5	Was **sample volume** received adequate for analysis?	☒	☐	☐
6	Are samples within specified holding times?	☐	☒	☐
7	Was proper **temperature** (thermal preservation) of cooler at receipt adhered to?	☐	☐	☒
8	Were **custody seals** on outside of cooler/Box/Container?	☐	☒	☐
	Location of seal(s)? ________ Sealing Lid?	☐	☐	☒
	Were signature and date included?	☐	☐	☒
	Were seals intact?	☐	☐	☒
9	Do containers have appropriate **preservation**, according to method/SOP or Client specified information?	☐	☐	☒
	Is there a client indication that the submitted samples are **pH** preserved?	☐	☐	☒
	Were **VOA vials** checked for presence/absence of air bubbles?	☐	☐	☒
	Does the client/method/SOP require that the analyst check the sample pH and if necessary alter it?	☐	☐	☒
10	**Tubes:** Are the tubes capped and intact?	☐	☐	☒
11	**Badges:** Are the badges properly capped and intact?	☐	☐	☒
	Are dual bed badges separated and individually capped and intact?	☐	☐	☒

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1602318-001.01	5.0 L Tedlar Bag					
P1602318-002.01	5.0 L Tedlar Bag					
P1602318-003.01	5.0 L Tedlar Bag					
P1602318-004.01	5.0 L Tedlar Bag					
P1602318-005.01	5.0 L Tedlar Bag					
P1602318-006.01	5.0 L Tedlar Bag					
P1602318-007.01	5.0 L Tedlar Bag					
P1602318-008.01	5.0 L Tedlar Bag					
P1602318-009.01	5.0 L Tedlar Bag					
P1602318-010.01	5.0 L Tedlar Bag					
P1602318-011.01	5.0 L Tedlar Bag					
P1602318-012.01	5.0 L Tedlar Bag					
P1602318-013.01	5.0 L Tedlar Bag					
P1602318-014.01	5.0 L Tedlar Bag					
P1602318-015.01	5.0 L Tedlar Bag					

Explain any discrepancies: (include lab sample ID numbers):
Chain of Custody is missing time collected

ALL SAM

RSK - MEEPP, HCL (pH<2); RSK - CO2, (pH 5-8); Sulfur (pH>4)

ALS Environmental

Sample Acceptance Check Form

Client: Horizon Engineering, LLC Work order: P1602318

Project: Bullseye Glass / 5702

Sample(s) received on: 5/4/16 Date opened: 5/4/16 by: KKELPE

Lab Sample ID	Container Description	Required pH *	Received pH	Adjusted pH	VOA Headspace (Presence/Absence)	Receipt / Preservation Comments
P1602318-016.01	5.0 L Tedlar Bag					
P1602318-017.01	5.0 L Tedlar Bag					
P1602318-018.01	5.0 L Tedlar Bag					

Explain any discrepancies: (include lab sample ID numbers):

RSK - MEEPP, HCL (pH<2); RSK - CO_2, (pH 5-8); Sulfur (pH>4)

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **1-A**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-001

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.7**	0.10	
7727-37-9	**Nitrogen**	**77.2**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.16**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **1-B**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-002

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.5**	0.10	
7727-37-9	**Nitrogen**	**76.9**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.56**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **1-C**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-003

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.3**	0.10	
7727-37-9	**Nitrogen**	**76.7**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**2.01**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
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H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-D**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-004

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.4**	0.10	
7727-37-9	**Nitrogen**	**76.8**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.81**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **1-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-005

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.6**	0.10	
7727-37-9	**Nitrogen**	**77.3**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.12**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-F**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-006

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.6**	0.10	
7727-37-9	**Nitrogen**	**77.3**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.11**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-G**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-007

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.7**	0.10	
7727-37-9	**Nitrogen**	**77.4**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**0.874**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
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H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **2-A**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-008

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.3**	0.10	
7727-37-9	**Nitrogen**	**76.5**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbou Dioxide**	**2.11**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
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H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **2-B**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-009

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.5**	0.10	
7727-37-9	**Nitrogen**	**77.0**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.55**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **2-C**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-010

Test Code:	EPA Method 3C Modified
Instrument ID:	HP5890 II/GC1/TCD
Analyst:	Wade Henton
Sample Type:	5.0 L Tedlar Bag
Test Notes:	**H3**

Date Collected:	4/28/16
Date Received:	5/4/16
Date Analyzed:	5/4/16
Volume(s) Analyzed:	0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.4**	0.10	
7727-37-9	**Nitrogen**	**76.7**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.80**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**2-D**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-011

Test Code:	EPA Method 3C Modified	Date Collected:	4/28/16
Instrument ID:	HP5890 II/GC1/TCD	Date Received:	5/4/16
Analyst:	Wade Henton	Date Analyzed:	5/4/16
Sample Type:	5.0 L Tedlar Bag	Volume(s) Analyzed:	0.10 ml(s)
Test Notes:	**H3**		

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.6**	0.10	
7727-37-9	**Nitrogen**	**77.2**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.23**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **2-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-012

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.6**	0.10	
7727-37-9	**Nitrogen**	**77.2**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.18**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **2-F**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-013

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.7**	0.10	
7727-37-9	**Nitrogen**	**77.4**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**0.900**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**3-A**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-014

Test Code:	EPA Method 3C Modified	Date Collected:	4/29/16
Instrument ID:	HP5890 II/GC1/TCD	Date Received:	5/4/16
Analyst:	Wade Henton	Date Analyzed:	5/4/16
Sample Type:	5.0 L Tedlar Bag	Volume(s) Analyzed:	0.10 ml(s)
Test Notes:	**H3**		

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.4**	0.10	
7727-37-9	**Nitrogen**	**76.7**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.88**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-B**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-015

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**22.0**	0.10	
7727-37-9	**Nitrogen**	**77.9**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	Carbon Dioxide	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-C**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-016

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**22.0**	0.10	
7727-37-9	**Nitrogen**	**77.7**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**0.331**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-D**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-017

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygeu***	**21.4**	0.10	
7727-37-9	**Nitrogen**	**77.0**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.50**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-018

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	**Oxygen***	**21.5**	0.10	
7727-37-9	**Nitrogen**	**77.1**	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	**Carbon Dioxide**	**1.35**	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **Method Blank**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160504-MB

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/04/16
Volume(s) Analyzed: 0.10 ml(s)

CAS #	Compound	Result %, v/v	MRL %, v/v	Data Qualifier
7782-44-7	Oxygen*	ND	0.10	
7727-37-9	Nitrogen	ND	0.10	
630-08-0	Carbon Monoxide	ND	0.10	
124-38-9	Carbon Dioxide	ND	0.10	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Horizon Engineering, LLC**
Client Sample ID: **Lab Control Sample**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160504-LCS

Test Code: EPA Method 3C Modified
Instrument ID: HP5890 II/GC1/TCD
Analyst: Wade Henton
Sample Type: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/04/16
Volume(s) Analyzed: NA ml(s)

CAS #	Compound	Spike Amount ppmV	Result ppmV	% Recovery	ALS Acceptance Limits	Data Qualifier
7782-44-7	Oxygen*	25,000	**26,500**	**106**	84-121	
7727-37-9	Nitrogen	50,000	**52,200**	**104**	88-122	
630-08-0	Carbon Monoxide	50,000	**53,000**	**106**	87-118	
124-38-9	Carbon Dioxide	50,000	**51,600**	**103**	84-117	

* = The oxygen result may include argon due to coelution. Ambient air includes 0.93% argon.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-A**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-001

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**3.8**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**1-B**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-002

Test Code:	EPA TO-3 Modified	Date Collected:	4/27/16
Instrument ID:	HP5890 II/GC8/FID	Date Received:	5/4/16
Analyst:	Adam McAfee	Date Analyzed:	5/4/16
Sampling Media:	5.0 L Tedlar Bag	Volume(s) Analyzed:	1.0 ml(s)
Test Notes:	**H3**		

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**5.3**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-C**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-003

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**5.5**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-D**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-004

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**6.0**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **1-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-005

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**6.6**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client: **Horizon Engineering, LLC**
Client Sample ID: **1-F**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-006

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/27/16
Date Received: 5/4/16
Date Analyzed: 5/4/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.6**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**1-G**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-007

Test Code:	EPA TO-3 Modified	Date Collected:	4/27/16
Instrument ID:	HP5890 II/GC8/FID	Date Received:	5/4/16
Analyst:	Adam McAfee	Date Analyzed:	5/5/16
Sampling Media:	5.0 L Tedlar Bag	Volume(s) Analyzed:	1.0 ml(s)
Test Notes:	**H3**		

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**3.7**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client: **Horizon Engineering, LLC**
Client Sample ID: **2-A**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-008

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	Result ppmV	MRL ppmV	Data Qualifier
Methane	**4.2**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **2-B**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-009

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.6**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**2-C**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-010

Test Code:	EPA TO-3 Modified	Date Collected:	4/28/16
Instrument ID:	HP5890 II/GC8/FID	Date Received:	5/4/16
Analyst:	Adam McAfee	Date Analyzed:	5/5/16
Sampling Media:	5.0 L Tedlar Bag	Volume(s) Analyzed:	1.0 ml(s)
Test Notes:	**H3**		

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**5.7**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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RESULTS OF ANALYSIS
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Client:	**Horizon Engineering, LLC**		
Client Sample ID:	**2-D**	ALS Project ID:	P1602318
Client Project ID:	**Bullseye Glass / 5702**	ALS Sample ID:	P1602318-011

Test Code:	EPA TO-3 Modified	Date Collected:	4/28/16
Instrument ID:	HP5890 II/GC8/FID	Date Received:	5/4/16
Analyst:	Adam McAfee	Date Analyzed:	5/5/16
Sampling Media:	5.0 L Tedlar Bag	Volume(s) Analyzed:	1.0 ml(s)
Test Notes:	**H3**		

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.7**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **2-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-012

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.2**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determiued by the referenced method.
H3 = Sample was received and analyzed past holding time.

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RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **2-F**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-013

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/28/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.0**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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RESULTS OF ANALYSIS
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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-A**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-014

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.3**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-B**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-015

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**2.7**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-C**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-016

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**3.0**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

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Client: **Horizon Engineering, LLC**
Client Sample ID: **3-D**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-017

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**4.0**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **3-E**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P1602318-018

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes: **H3**

Date Collected: 4/29/16
Date Received: 5/4/16
Date Analyzed: 5/5/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	**3.8**	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.
H3 = Sample was received and analyzed past holding time.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **Method Blank**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160504-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/04/16
Volume(s) Analyzed: 1.0 ml(s)

Componud	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	ND	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **Method Blank**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160505-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/05/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	ND	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Client: **Horizon Engineering, LLC**
Client Sample ID: **Method Blank**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160505-MB

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/05/16
Volume(s) Analyzed: 1.0 ml(s)

Compound	**Result ppmV**	MRL ppmV	Data Qualifier
Methane	ND	0.50	
Ethane	ND	0.50	
Propane	ND	0.50	

ND = Compound was analyzed for, but not detected above the laboratory reporting limit.
MRL = Method Reporting Limit - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY
Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **Lab Control Sample**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160504-LCS

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/04/16
Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits	Data Qualifier
Methane	1,020	**1,010**	**99**	83-107	
Ethane	1,010	**1,040**	**103**	77-111	
Propane	1,010	**1,100**	**109**	78-110	

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Page 1 of 1

Client: **Horizon Engineering, LLC**
Client Sample ID: **Lab Control Sample**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160505-LCS

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/05/16
Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits	Data Qualifier
Methane	1,020	**945**	**93**	83-107	
Ethane	1,010	**974**	**96**	77-111	
Propane	1,010	**1,020**	**101**	78-110	

ALS ENVIRONMENTAL

LABORATORY CONTROL SAMPLE SUMMARY

Client: **Horizon Engineering, LLC**
Client Sample ID: **Lab Control Sample**
Client Project ID: **Bullseye Glass / 5702**

ALS Project ID: P1602318
ALS Sample ID: P160505-LCS

Test Code: EPA TO-3 Modified
Instrument ID: HP5890 II/GC8/FID
Analyst: Adam McAfee
Sampling Media: 5.0 L Tedlar Bag
Test Notes:

Date Collected: NA
Date Received: NA
Date Analyzed: 5/05/16
Volume(s) Analyzed: NA ml(s)

Compound	Spike Amount ppmV	**Result ppmV**	**% Recovery**	ALS Acceptance Limits	Data Qualifier
Methane	1,020	**1,010**	**99**	83-107	
Ethane	1,010	**1,040**	**103**	77-111	
Propane	1,010	**1,090**	**108**	78-110	

Traverse Point Locations

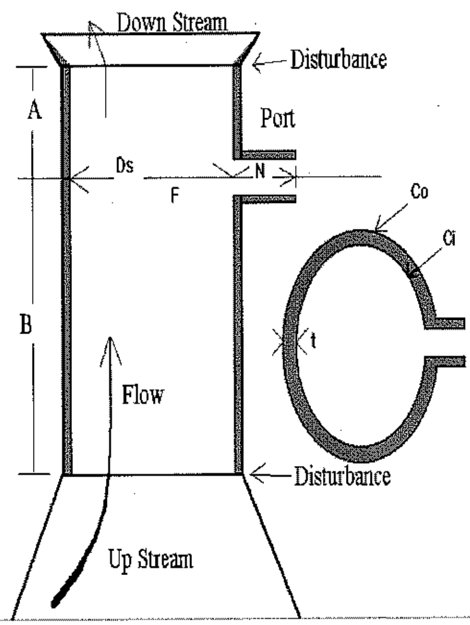
BULLSEYE
GLASS FURNACE T7-OUTLET
PORTLAND OR

4/26 - 4/29 2016
PT,BS,JH,MV,JF

mew

EAST

Outer Circumference	Co	in	
Wall thickness	t	in	
INSIDE of FAR WALL to OUTSIDE of Nipple	F	in	14.13
INSIDE of NEAR WALL to OUTSIDE of Nipple	N	in	1.625
STACK WALL to to OUTSIDE of Nipple	N-t	in	
DOWNstream Disturb	A	in	57.0
UPstream Disturb	B	in	39.5
Inner Diameter	Ds	in	12.5
Area	As	sqin	122.7
DOWNstream Ratio	A/Ds		4.56
UPstream Ratio	B/Ds		3.16
Minimum #Pts (Particulate)			24
Minimum #Pts/Diameter			12
Minimum #Pts (NON-Particulate)			16
Minimum #Pts/Diameter			8
Actual Points per Diameter			12
Actual Points Used			



Trav Pt #No	Fract Stk ID (f)	Stack ID (Ds)	Actual Points (Dsxf)	Nearest 8ths (TP)	Adjusted Points (TP)	Traverse Points (TP + N)	Traverse Points (TP + N)
1	2.13%	12.5	0.3	0.25	0.5	2.125	2 1 / 8
2	6.70%	12.5	0.8	0.875	0.875	2.5	2 1 / 2
3	11.81%	12.5	1.5	1.5	1.5	3.125	3 1 / 8
4	17.73%	12.5	2.2	2.25	2.25	3.875	3 7 / 8
5	25.00%	12.5	3.1	3.125	3.125	4.75	4 3 / 4
6	35.57%	12.5	4.4	4.5	4.5	6.125	6 1 / 8
7	64.43%	12.5	8.1	8	8	9.625	9 5 / 8
8	75.00%	12.5	9.4	9.375	9.375	11	11
9	82.27%	12.5	10.3	10.25	10.25	11.875	11 7 / 8
10	88.19%	12.5	11.0	11	11	12.625	12 5 / 8
11	93.30%	12.5	11.7	11.625	11.625	13.25	13 1 / 4
12	97.87%	12.5	12.2	12.25	12	13.625	13 5 / 8

Traverse Point Locations

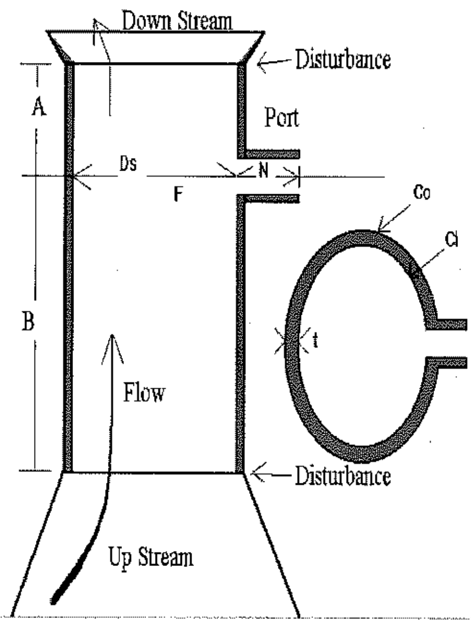
BULLSEYE
GLASS FURNACE T7-OUTLET
PORTLAND OR

4/26 - 4/29 2016
PT,BS,JH,MV,JF

mew

WEST

Outer Circumference	Co	in	
Wall thickness	t	in	
INSIDE of FAR WALL to OUTSIDE of Nipple	F	in	13.88
INSIDE of NEAR WALL to OUTSIDE of Nipple	N	in	1.625
STACK WALL to to OUTSIDE of Nipple	N-t	in	
DOWNstream Disturb	A	in	57.0
UPstream Disturb	B	in	39.5
Inner Diameter	Ds	in	12.25
Area	As	sqin	117.9
DOWNstream Ratio	A/Ds		4.65
UPstream Ratio	B/Ds		3.22
Minimum #Pts (Particulate)			24
Minimum #Pts/Diameter			12
Minimum #Pts (NON-Particulate)			16
Minimum #Pts/Diameter			8
Actual Points per Diameter			12
Actual Points Used			



Trav Pt #No	Fract Stk ID (f)	Stack ID (Ds)	Actual Points (Dsxf)	Nearest 8ths (TP)	Adjusted Points (TP)	Traverse Points (TP + N)	Traverse Points (TP + N)
1	2.13%	12.3	0.3	0.25	0.5	2.125	2 1 / 8
2	6.70%	12.3	0.8	0.875	0.875	2.5	2 1 / 2
3	11.81%	12.3	1.4	1.5	1.5	3.125	3 1 / 8
4	17.73%	12.3	2.2	2.125	2.125	3.75	3 3 / 4
5	25.00%	12.3	3.1	3.125	3.125	4.75	4 3 / 4
6	35.57%	12.3	4.4	4.375	4.375	6	6
7	64.43%	12.3	7.9	7.875	7.875	9.5	9 1 / 2
8	75.00%	12.3	9.2	9.25	9.25	10.875	10 7 / 8
9	82.27%	12.3	10.1	10.125	10.125	11.75	11 3 / 4
10	88.19%	12.3	10.8	10.75	10.75	12.375	12 3 / 8
11	93.30%	12.3	11.4	11.375	11.375	13	13
12	97.87%	12.3	12.0	12	11.75	13.375	13 3 / 8

MONTROSE
AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505
www.montrose-env.com

EPA METHOD 1
TRAVERSE POINT LOCATIONS

Client: Bullseye Glass Facility Location: Portland OR
Source: T-7 Baghouse outlet Sample Location: Roof
Date: 6/6/16 Initials: Pc

Bottom Ports

Traverse Point Number	Traverse Point Location (inches)
1	2 1/8
2	2 1/2
3	3 1/8
4	3 3/4
5	4 3/4
6	6
7	9 1/2
8	10 7/8
9	11 3/4
10	12 3/8
11	13
12	13 3/8

Duct Dimensions and Port Locations E W

Inside of far wall to outside of nipple, F 14 1/8 | 13 7/8
Inside of near wall to outside of nipple, N 1 5/8 | 1 5/8
Nearest downstream disturbance, A 57
Nearest upstream disturbance, B 39 1/2
Circular: Inside Diameter, F-N 12 1/2 | 12 1/4
Rectangular: Width______" Depth______"
Rectangular Equiv. Diameter: (2*W*D)/(W+D)________"
Number of Ports: 2

Duct characteristics:

Construction: Steel PVC Fiberglas Other ________
Shape: Circular Rectangular Elliptical
Orientation: Vertical Horizontal Diagonal (~ angle: ___°)
Flow straighteners: Yes No
Stack Extension: Yes No
Cyclonic Flow Expected: Yes No
Cyclonic Flow Measured & Documented: Yes No
Average Null Angle <20°: Yes No N/A
Meets EPA M-1 Criteria: Yes No (If "No", explain why)

Test port sketch or comments

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Cyclonic Flow Measurement

Run(s): N/A
Time: 1457

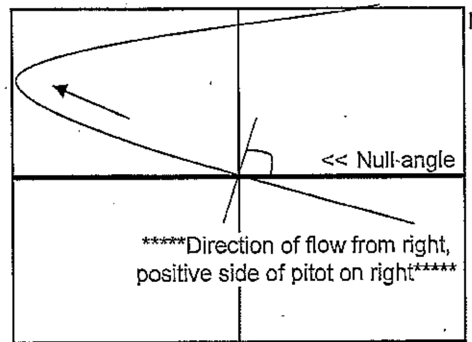
Client: Bullseye Glass
Source: I-7
Sample Location: ~~I-7~~ I-7 outlet
Pitot: 3-6
5/13/16

Date: 4/26/16
Facility Location: Portland, OR
Operator: BS
Magnehelic: 97
BS 5/13/16

Null angles measured from horizontal

Port	Traverse Point	Null Angle (Δp = 0)	Direction of Rotation (CW or CCW)	90° from Null Angle	Direction of Rotation (CW or CCW)	Δp
NW	1	0				
	2	0				
	3	0				
	4	0				
	5	0				
	6	0				
	7	0				
	8	0				
	9	0				
	10	0				
	11	0				
	12	0				
NE	1	0				
	2	0				
	3	0				
	4	0				
	5	0				
	6	0				
	7	0				
	8	0				
	9	0				
	10	0				
	11	0				
	12	0				
	Average	0				

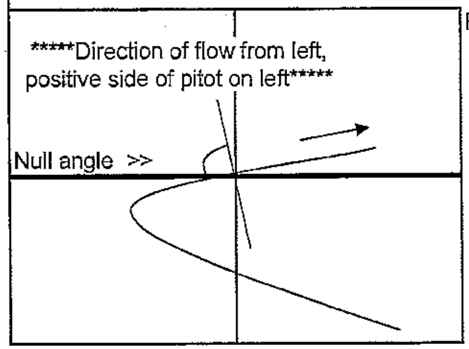
EXAMPLES:



Near side of stack

Null Angle (Δp = 0)	Direction of Rotation (CW or CCW)
72	CCW

90° from Null Angle	Direction of Rotation (CW or CCW)
18	CW



Far side of stack

Null Angle (Δp = 0)	Direction of Rotation (CW or CCW)
76	CW

90° from Null Angle	Direction of Rotation (CW or CCW)
14	CCW

Production/Process Data

Raw Material Information

Amount of total chromium in the batch (lbs)

Type and quantity of material being processed

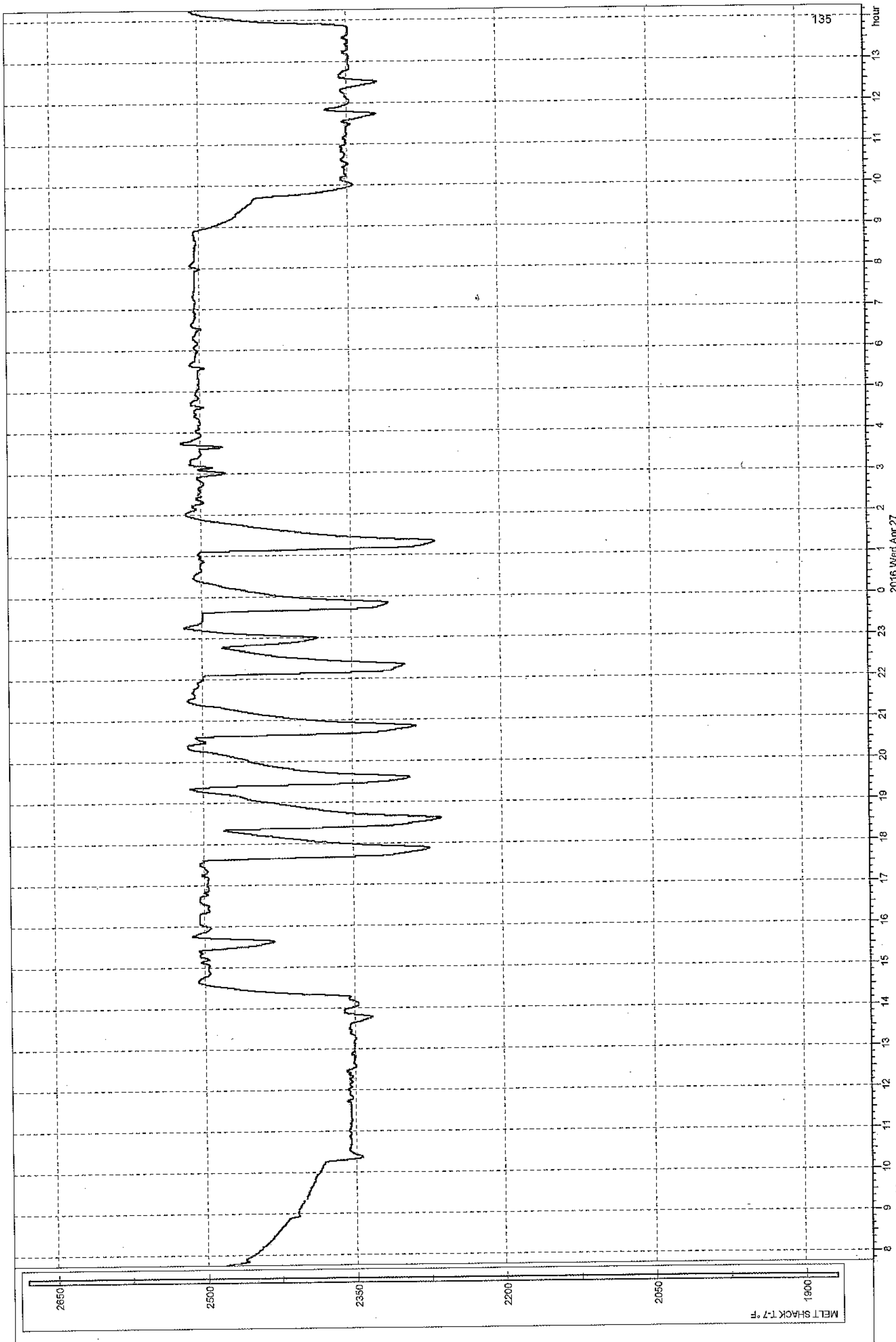
Weight of finished product (lbs)

Weight of charges during each batch (lbs)

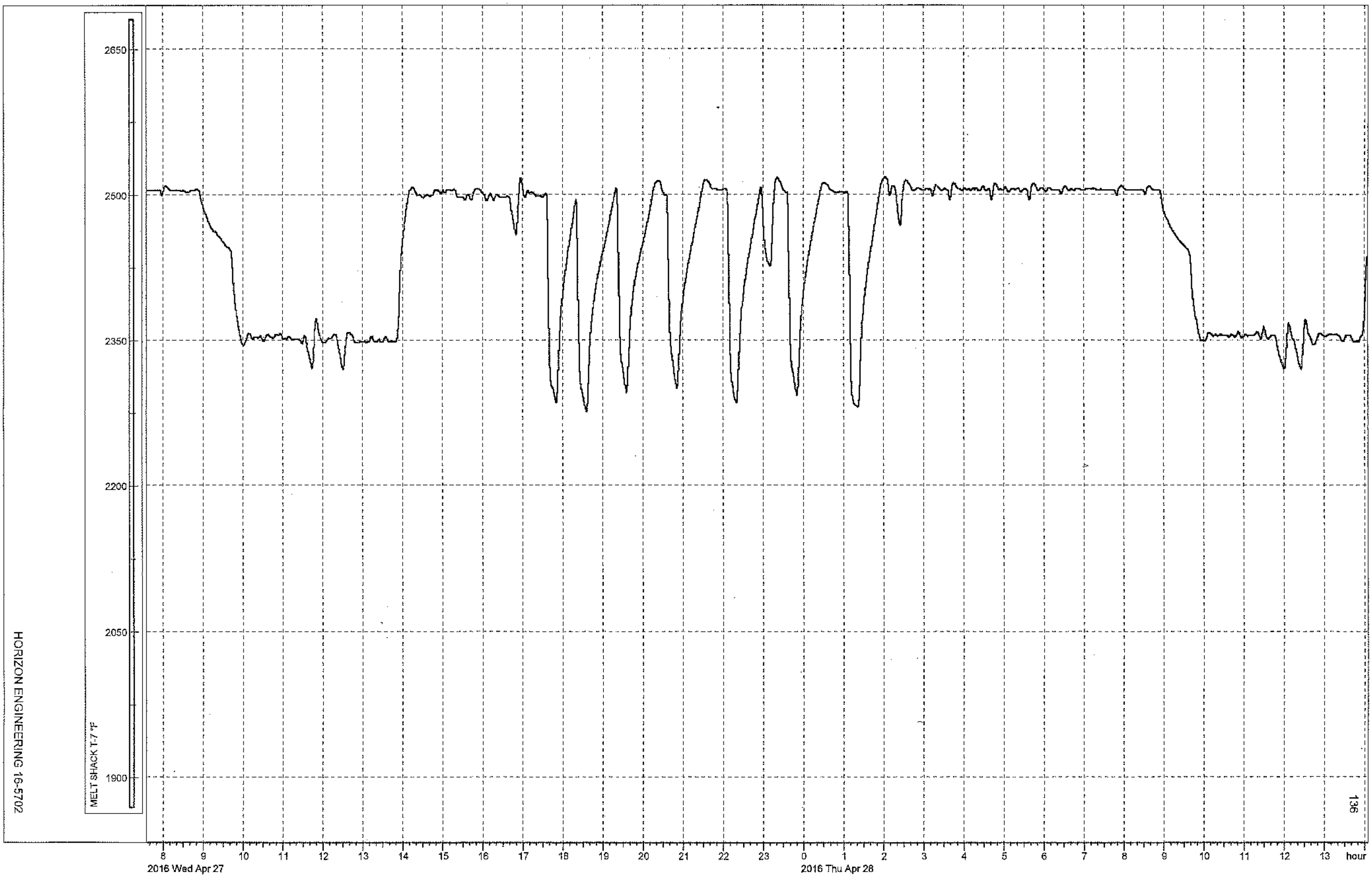
Batch tickets providing this information was provided to DEQ prior to testing and no changes to the approved formulations were made. Glass formulation information is Confidential Business information.

Bag House purging cycle - **Note: All Purging cycles to be done in low fire**

Date	Time	Oxy%	Gas %	BH DP inWC Magnahelic pre - purge	Hz Pre - purge	Close Pm and close slide gate (note location)and clamp damper door	Hz @ purge cycle	Cycles (1 cycle = 4 pulses)	Open Pm and Open slide gate (set to last location) and clamp damper door	Reset Hz to orignal set point	BH DP inWC Magnehelic	Notes
4/24/2016	8:55	980	515	5.5/4.8	45	open PM/close DD	60	5min	Close PM/open	45	5.1/4.5	6
4/24/2016	9:40	707	670	5.5/4.7	45	open PM/close DD	60	10min	Close PM/open	45	5.2/4.5	
	11:15p			5.5/4.8	45	open PM/close DD	60	10min	Close PM/open	45	5.2/4.5	
4/25/2016	230a	920	488	6.8/6.1	50	open PM/close DD	60	10min	Close PM/open	50	6.4/5.6	
4/25/2016	500a	535	280	7/6.3	50	open PM/close DD	60	10min	Close PM/open	50	6.5/5.6	
4/25/2016	110p	433	227	5.9/5.4	45	open PM/close DD	60	10min	Close PM/open	45	5.5/4.7	
4/25/2016	140p	422	230	5.7/4.9	45	open PM/close DD	60	15min	Close PM/open	45	5.5/4.8	
4/25/2016	515p	522	275	5.9/5.	45	open PM/close DD	60	15min	Close PM/open	45	5.5/4.9	
4/25/2016	905p	977	514	6.7/6.1	50	open PM/close DD	60	15min	Close PM/open	50	6.5/5.7	
4/26/2016	215a	807	426	5.8/5.3	45	open PM/close DD	60	10min	Close PM/open	45	5.5/4.9	
4/26/2016	600a	526	274	5.9/5.4	45	open PM/close DD	60	10min	Close PM/open	45	5.7/5.0	
4/26/2016	130p	296	157	6.0/5.5	45	open PM/close DD	45	10min	Close PM/open	45	5.4/4.8	
4/26/2016	315p	598	314	5.5/5.	45	open PM/close DD	45	15min	Close PM/open	45	5.4/4.9	
4/26/2016	430p	498	262	5.5/4.9	45	open PM/close DD	25	15min	Close PM/open	45	5.1/4.7	
4/26/2016	1040p	978	515	6.6/6.2	50	open PM/close DD	25	15min	Close PM/open	50	6/5.4	lowered to 45 hz. Mag 5.1/4.8
4/27/2016	250a	295	154	4.8/4.3	40	open PM/close DD	25	5min	Close PM/open	40	4.5/4.1	
4/27/2016	1130a	297	154	4.8/4.4	45	open PM/close DD	60	10min	close PM/open	40	4.6/4.1	
4/27/2016	1215p	297	158	4.7/4.1	40	open PM/close DD	60	10min	Close PM/open	40	4.6/4.1	
4/27	335p	578	309	4.9/4.3	40	open PM/close DD	30	15min	Close PM/open	40	4.5/4.	
4/27	435p	294	155	4.5/4.1	40	open PM/close DD	30	10min	Close PM/open	40	4.4/4	
4/27	10:40p	294	155	6.5/6.	47.5	open PM/close DD	30	15min	Close PM/open	47.5	5.6/5.2	lowered to 45 hz. Mag 5.1/4.8
4/28	215a	294	155	4.8/4.4	40	open PM/close DD	40/50/60	5min	Close PM/open	40	4.7/4.3	
4/28	1145am	293	155	6.0/5.8	45	open PM/close DD	60	10min	Close PM/open	40	4.8/4.4	
4/28	1215pm	296	156	4.8/4.4	40	open PM/close DD	60	10min	Close PM/open	40	4.8/4.4	
4/28	4:00p	574	292	5.5/4.9	40	open PM/close DD	30	15min	Close PM/open	40	4.5/4.2	
4/28	9:50p	291	153	7.1/6.6	50	open PM/close DD	30	15min	Close PM/open	50	6.5/6	
4/29	155	291	153	7.1/6.7	50	open PM/close DD	30	10	Close PM/open	50	6.7/6.2	
5/1	845p	288	145	8.1/7.6	55	open PM/close DD	30	12	Close PM/open		7.6/6.7	
5/2	1200p	288	148	4.9/4.6	40	open PM/close DD	30	15	Close PM/open	40	4.5/4	
5/2	2:30	561	288	5.5/5.2	45	open PM/close DD	30	15	Close PM/open	45	4.5/4.6	
5/2	830p	535	429	7/6.4	50	open PM/close DD	30	15	Close PM/open	45	5.5/5	



HORIZON ENGINEERING 16-5702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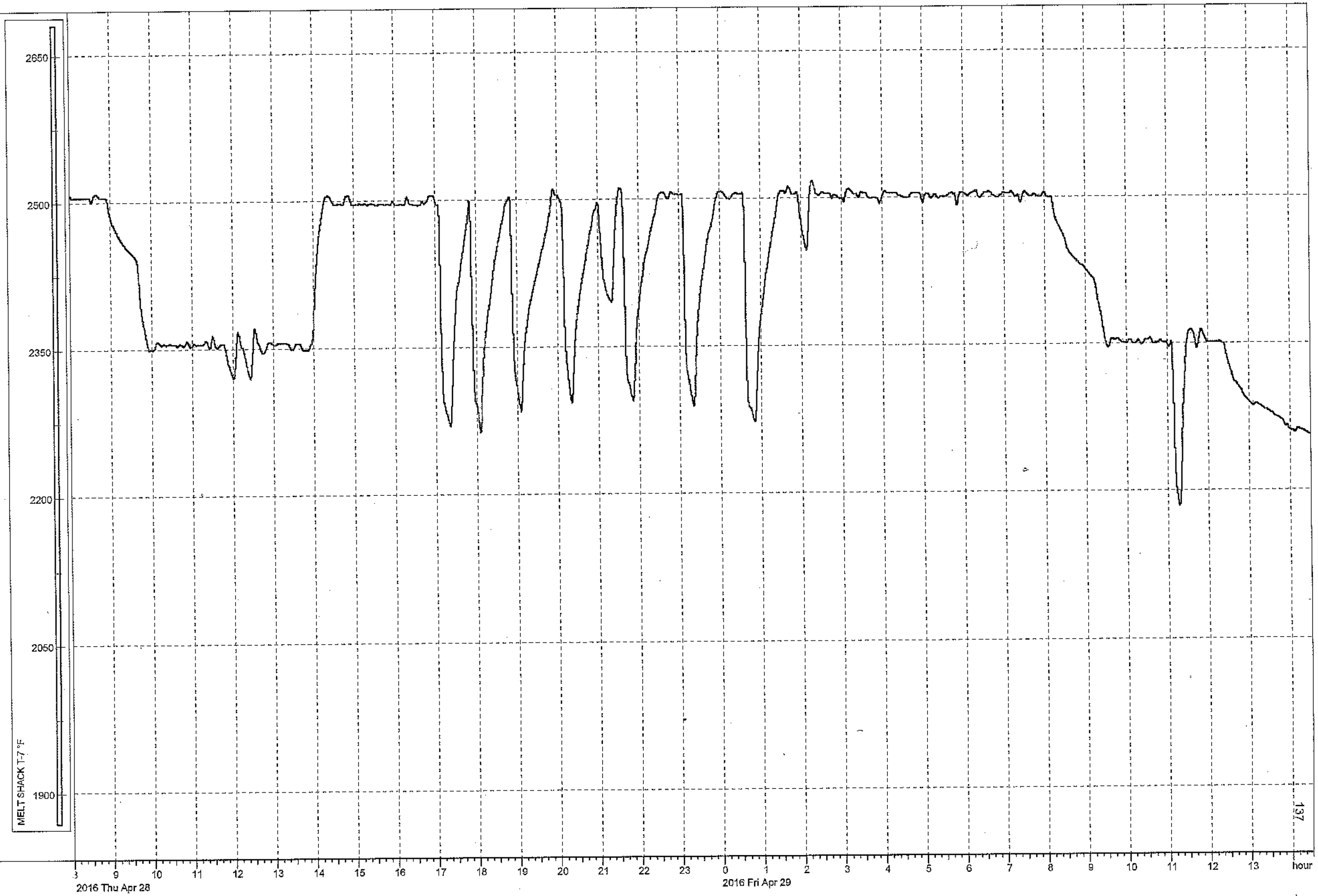
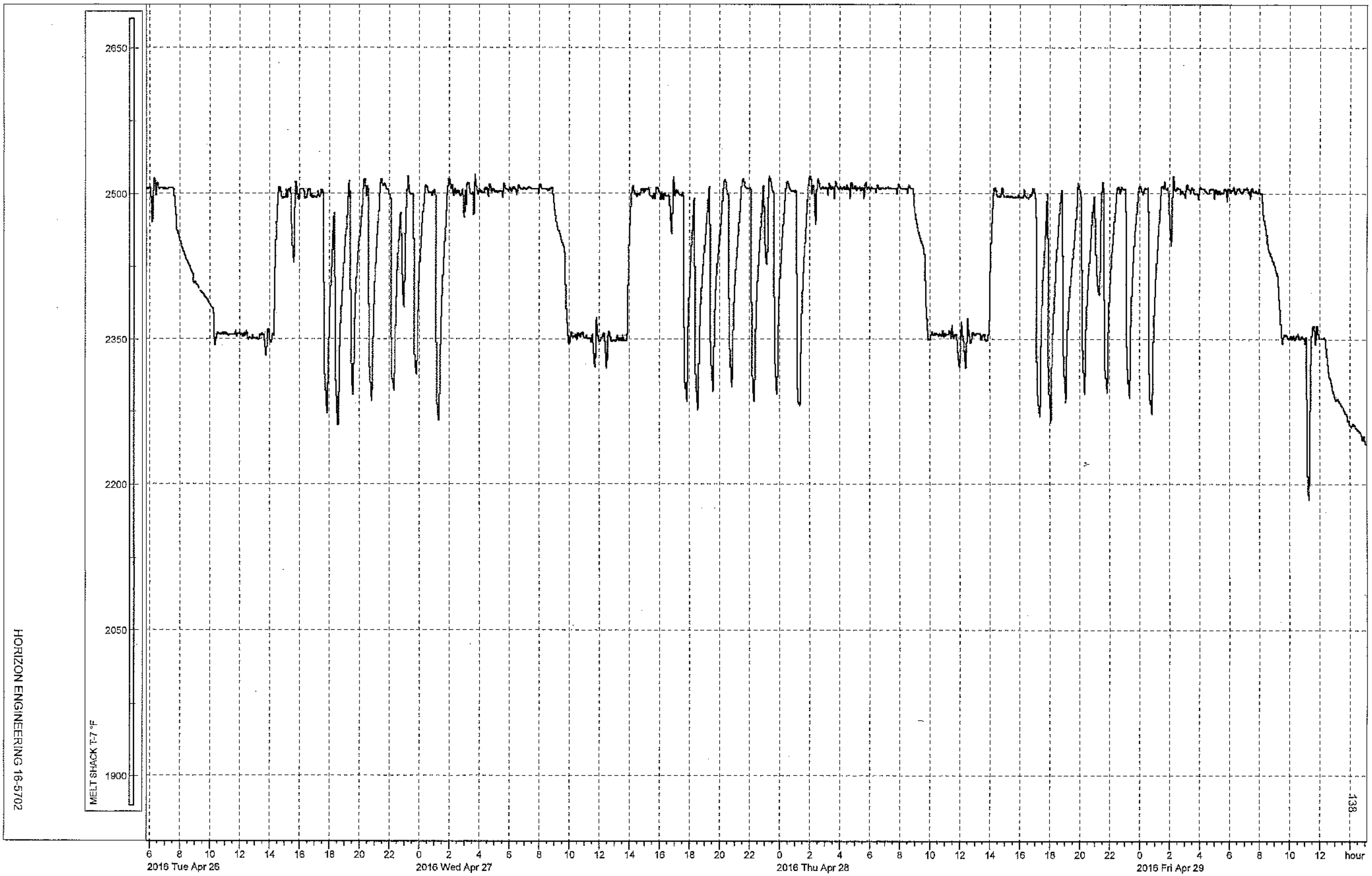
MELT SHACK T-7 °F
2650
2500
2350
2200
2050
1900
8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 0 1 2 3 4 5 6 7 8 9 10 11 12 13 hour
2016 Wed Apr 27
2016 Thu Apr 28
136



HORIZON ENGINEERING 16-5702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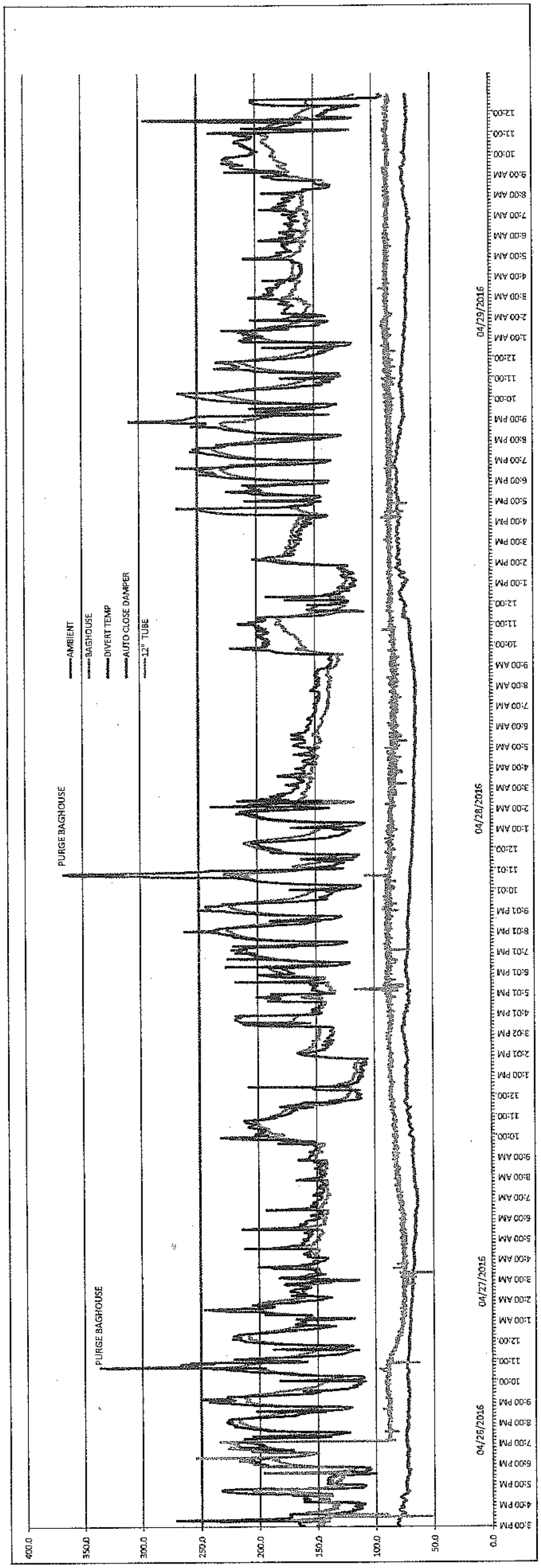
MELT SHACK T-7 °F
2650
2500
2350
2200
2050
1900
138
6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 14 16 18 20 22 0 2 4 6 8 10 12 hour
2016 Tue Apr 26
2016 Wed Apr 27
2016 Thu Apr 28
2016 Fri Apr 29



PURGE BAGHOUSE
PURGE BAGHOUSE
AMBIENT
BAGHOUSE
DIVERT TEMP
AUTO CLOSE DAMPER
12" TUBE
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
04/26/2016
04/27/2016
04/28/2016
04/29/2016

Conditions:	Date	Time	Oxy CFH	Gas CFH	Furn. Temp	Ambient Temp	Diverter valve Temp	12" inlet Temp	Bag H. temp	VFD Hertz	Damper set %	Stack damper door position	Air dump position - O/C	PM damper Position - O/C	Furnace door - O/C	Magnahelic
Setup	4/26															
At temp	4/26	5:25pm	478	258	2499	71	107	121	123	45	18	open	closed	closed	closed	5.5/4.9
Charge	4/26	5:30pm	292	154	2417	71	164	201	161	45	25/12.5	open	closed	open	open	5.5/5
Recover	4/26	5:50pm	977	516	2344	72	192	197	159	45	17	open	closed	closed	closed	5.5/5
At temp	4/26	6:10pm	973	516	2460	73	214	216	186	45	19	open	closed	closed	closed	5.5/4.9
Charge	4/26	6:15pm	238	154	2385	72	234	261	210	45	25/12.5	open	closed	open	open	5.4/4.9
Recover	4/26	6:30pm	989	518	2324	72	200	202	179	45	14	open	closed	closed	closed	5.5/4.9
At temp	4/26	7:10pm	983	515	2487	74	205	N/A	204	45	28	open	closed	closed	closed	5.4/4.9
Charge	4/26	7:15pm	294	155	2403	74	207	N/A	203	45	25/12.5	open	closed	open	open	5.4/5
Recover	4/26	7:25pm	982	514	2353	73	189	N/A	184	45	23	open	closed	closed	closed	5.5/5.1
At temp	4/26	8:25pm	715	372	2498	72	169	N/A	188	45	27	open	closed	closed	closed	5.4/5
Charge	4/26	8:30pm	297	156	2418	72	209	N/A	201	45	25/12.5	open	closed	open	open	5.5/5.1
Recover	4/26	8:50pm	981	517	2351	72	198	N/A	187	45	30	open	closed	closed	closed	5.6/5.2
		9:05p							216	47.5						
		9:17pm							210	50						
At temp	4/26	9:55pm	509	269	2500	72	112	N/A	144	50	16	open	closed	closed	closed	6.8/6.3
Charge	4/26	10:00pm	296	156	2411	72	182	N/A	177	50	25/12.5	open	closed	open	open	6.9/6.4
Recover	4/26	10:20pm	971	513	2358	73	156	N/A	167	50	30	open	closed	closed	closed	6.9/6.4
		11:40pm			2487					45						5.1/4.8
At temp	4/26	11:25 PM	531	284	2500	71	120	N/A	152	45	16.8	open	closed	closed	closed	5.5/4.9
Charge	4/26	11:30pm	296	155	2402	71	320	N/A	235	45	25/12.5	open	closed	open	open	5.5/4.9
Recover	4/26	11:50pm	980	515	2377	71	183	N/A	178	45	24	open	closed	closed	closed	5.5/5
Setup																
At temp	4/27	12:55am	535	284	2498	70	164	N/A	160	45	17	open	closed	closed	closed	5.5/5.1
Charge	4/27	1:00am	292	194	2339	69	170	N/A	170	48/45	25/12.5	open	closed	open	open	6.2/5.8
Recover	4/27	1:20am	980	514	2326	69	189	N/A	184	45	25.8	open	closed	closed	closed	5.7/5.2
	4/27	205am	750	395	(estimated flow rates)											
	4/27	245a	484	248	(estimated flow rates)											
	4/27	300am	508	267	(estimated flow rates)											
	4/27	400am	465	241	(estimated flow rates)											
	4/27	500am	566	301	(estimated flow rates)											
	4/27	600am	689	364	(estimated flow rates)											
	4/27	700am	463	235	(estimated flow rates)											
	4/27	800am	448	238	(estimated flow rates)											
	4/27	900am	290	152	(estimated flow rates)											

Notes:
The duration of each charge period is 5 minutes (0.083 hours)
The duration of each refining period is 8 hours.

HORIZON ENGINEERING 16-5702

Conditions:	Date	Time	Oxy CFH	Gas CFH	Furn. Temp	Ambient Temp	Diverter valve Temp	12" inlet Temp	Bag H. temp	VFD Hertz	Damper set %	Stack damper door position	Air dump position - O/C	PM damper Position - O/C	Furnace door - O/C	Magnahelic
Setup	4/27									45						
At temp	4/27	5:25pm	524	373	2501	71.5	155	n/a	140	45	8	open	closed	closed	closed	5.4/4.9
Charge	4/27	5:30pm	292	154	2405	71	224	n/a	183	45	25/12.5	open	closed	open	open	5.5/5.
Recover	4/27	5:50pm	982	514	2372	72	190	n/a	173	45	16.6	open	closed	closed	closed	5.5/5
		5:55pm					193		190							
At temp	4/27	6:10pm	978	517	2481	73	177	n/a	188	45		open	closed	closed	closed	
Charge	4/27	6:15pm	294	154	2341	72.3	227.4	n/a	209	45	25/12.5	open	closed	open	open	5.5/5
Recover	4/27	6:36pm	980	515	2356	73	171	n/a	176	45	25	open	closed	closed	closed	5.6/5.1
At temp	4/27	7:10pm	987	515	2497	71	211	n/a	209	45	24.5	open	closed	closed	closed	5.5/5.
Charge	4/27	7:15pm	297	157	2406	71	226	n/a	214	45	25/12.5	open	closed	open	open	5.5/5.1
Recover	4/27	7:35pm	984	517	2405	70.6	211.6	n/a	204.7	45	24.3	open	closed	closed	closed	5.5/5.2
At temp	4/27	8:25pm	590	313	2501	70.9	156	n/a	182	45	24.5	open	closed	closed	closed	5.5/5.2
Charge	4/27	8:30pm	299	158	2392	71.6	195	n/a	190	45	25/12.5	open	closed	open	open	5.6/5.2
Recover	4/27	8:50pm	987	517	2402	70.2	214.2	n/a	199.6	45	26.4	open	closed	closed	closed	5.5/5.1
	4/27	9:10p			2346		242		223	47.5						6/5.6
	4/27	9:22pm					221		215	50						6.5/6.1
		9:40pm					145		168	47.5						6.2/5.8
At temp	4/27	9:55pm	528	277	2501	68.9	134.5	n/a	155.4	47.5	16.4	open	closed	closed	closed	6.5/6.0
Charge	4/27	10:00pm	297	158	2382	68.9	179.2	n/a	169	47.5	25/12.5	open	closed	open	open	6.5/6
Recover	4/27	10:20pm	975	510	2355	69	163	n/a	165	47.5	27	open	closed	closed	closed	6.5/6
		11:00 AM			2422					45						5.1/4.8
At temp	4/27	11:25 PM	516	273	2500	68	125	n/a	146	45	25	open	closed	closed	closed	5.5/5
Charge	4/27	11:30pm	295	156	2318	68	160	n/a	163	45	25/12.5	open	closed	open	open	5.6/5.2
Recover	4/27	11:50pm	976	518	2370	67	168	n/a	171	45	22	open	closed	closed	closed	5.6/5.2
At temp	4/28	12:55am	505	262	2501	67	122	n/a	151	45	16	open	closed	closed	closed	5.7/5.2
Charge	4/28	1:00am	294	155	2375	67	165	n/a	171	45	25/12.5	open	closed	open	open	5.8/5.3
Recover	4/28	1:20am	982	513	2308	67	135	n/a	149	45	22	open	closed	closed	closed	5.8/5.3
	4/28	3am	508	267	(estimated flow rates)	65	165		155	40						4.9/4.3
	4/28	4am	465	241	(estimated flow rates)	65	160		152	40						5/4.5
	4/28	5am	566	301	(estimated flow rates)	64.6	154.3		150.4	40						4.9/4.5
	4/28	6am	689	364	(estimated flow rates)	64.5	164		149	40						4.9/4.5
	4/28	7am	463	235	(estimated flow rates)	64	149		138	40						5/4.6
	4/28	8am	448	238	(estimated flow rates)	63	150		139	40						5/4.6
	4/28	9am	290	152	(estimated flow rates)	65	146		138	40						5/4.6
	4/28	10am				66	202		162	45						6/5.6
	4/28	11am				67	195		175	45						6/5.8
	4/28	12pm				74	122		128	40						4.8/4.4
	4/28	1pm				74	120		128	40						5/4.5
	4/28	2pm				77	178		166	40						5/4.5
	4/28	3pm				77.7	164.4		170.6	40						5/4.3
	4/28	4pm				77.1	152.7		161.9	40						5/4.3

Notes:
The duration of each charge period is 5 minutes (0.083 hours)
The duration of each refining period is 8 hours.

Conditions:	Date	Time	Qxy CFH	Gas CFH	Furn. Temp	Ambient Temp	Diverter valve Temp	12" inlet Temp	Bag H. temp	VFD Hertz	Damper set %	Stack damper door position	Air dump position - O/C	PM damper Position - O/C	Furnace door - O/C	Magnahelic
Setup	4/28									45						
At temp	4/28	4:55pm	537	288	2500	78.8	154	n/a	154	45	12	open	closed	closed	closed	5.6/5.1
Charge	4/28	5:00pm	291	154	2377	77	210	n/a	183	45	25/12.5	open	closed	open	open	5.6/5.1
Recover	4/28	5:20pm	980	515	2352	78.4	194	n/a	177.1	45	19.9	open	closed	closed	closed	5.6/5.2
		5:00pm														
At temp	4/28	5:40pm	978	514	2492	79.9	205.2	n/a	205.8	45	18.1	open	closed	closed	closed	5.5/5.2
Charge	4/28	5:45pm	286	151	2342	79.3	215.7	n/a	209.5	45	25/12.5	open	closed	open	open	5.5/5.2
Recover	4/28	6:05pm	977	516	2345	79.5	197.9	n/a	193.6	45	25.5	open	closed	closed	closed	5.6/5.3
		6:40 AM								47.5						
At temp	4/28	6:40pm	977	510	2501	80.4	236.4	n/a	223.9	47.5	23.4	open	closed	closed	closed	6/5.7
Charge	4/28	6:45pm	293	154	2383	81.9	222.2	n/a	223.9	47.5	25/12.5	open	closed	open	open	6/5.7
Recover	4/28	7:05pm	298	515	2380	79.8	218	n/a	208	47.5	27.1	open	closed	closed	closed	6.2/5.9
		7:40pm								50						6.7/6.3
At temp	4/28	7:55pm	688	361	2509	77.6	177.4	n/a	205.6	50	17	open	closed	closed	closed	6.75/6.3
Charge	4/28	8:00pm	293	155	2384	76.5	197.5	n/a	202.7	50	25/12.5	open	closed	open	open	6.9/6.4
Recover	4/28	8:20pm	974	514	2380	75.3	195.9	n/a	194.9	50	28	open	closed	closed	closed	
	4/28	8:45pm	292	154					236	50						7.1/6.6
	4/28	9:00pm								45						5.5/5
At temp	4/28	9:25pm	607	322	2509	73.8	161.2	n/a	184.6	45	21.9	open	closed	closed	closed	5.5/5
Charge	4/28	9:30pm	292	154	2356	74.1	212.1	n/a	196.2	45	25/12.5	open	closed	open	open	5.6/5.2
Recover	4/28	9:50pm	981	519	2371	74	219.7	n/a	194.2	45	25	open	closed	closed	closed	6.1/5.2
		10:30pm					262		236	50						6.7/6.5
At temp	4/28	10:55pm	554	591	2500	74	135	n/a	157	50	19.9	open	closed	closed	closed	7/6.6
Charge	4/28	11:00pm	291	152	2442	74	184	n/a	171	50	25/12.5	open	closed	open	open	7/6.6
Recover	4/28	11:20pm	981	513	2391	75	174	n/a	162	50	19.5	open	closed	closed	closed	7.1/6.7
At temp	4/29	12:25am	538	282	2500	72	136	n/a	156	50	20.4	open	closed	closed	closed	7/6.7
Charge	4/29	12:30am	291	152	2366	73	201	n/a	174	50	25/12.5	open	closed	open	open	7.1/6.7
Recover	4/29	12:50am	980	515	2471	72.5	207	n/a	199.6	50	21	open	closed	closed	closed	6.9/6.6
		205am	750	395	2516	70.6	154		163	45	20	t54/b31.5	closed	closed	closed	5.8/5.3
		245a	484	248	2502	71	176		158	40	21	t54/b31.5	closed	closed	closed	4.8/4.4
		300am	508	267	2505	71	187.9		169	40	18.5	t54/b31.5	closed	closed	closed	4.9/4.5
		400am	465	241	2500	71	164		170	40		t54/b31.5	closed	closed	closed	4.9/4.6
		500am	566	301	2498	70	205		179	40	18	t54/b31.5	closed	closed	closed	4.9/4.5
		600am	689	364	2483	70	174		159	40	17	t54/b31.5	closed	closed	closed	4.9/4.6
		700am	463	235	2498	69	165		153	40	25	t54/b31.5	closed	closed	closed	4.9/4.6
		800am	448	238	2500	71.6	177		160	40	17	t54/b31.5	closed	closed	closed	5/4.7
		900am	290	152	2428	75	184		161	40	26	t54/b31.5	closed	closed	closed	5/4.7
		10am														

Notes:
The duration of each charge period is 5 minutes (0.083 hours)
The duration of each refining period is 8 hours.

Calibration Information

Meter Box
Calibration Critical Orifices
Standard Meter
Pitots
Shortridge Micromanometer
Magnehelic Gauge
Thermocouples and Indicators
Nozzle Diameters
Barometer

Biannual Meterbox Calibration

Method	EPA M-5 #7.2
Location	Horizon Shop
Meter Box ID	3
Meter ID	6077419
calibrated by	JM
Orifice Set	IZ

Date	3/24/2016
Pb=	30.35 (in Hg)
Ta=	58 (°F)
Tamb	517.67 (°R)

Leak checks

Negative	0 in/min @	25 inches Hg
Positive	0 in/min @	5 inches H20

0.97<Y<1.03	Old	New	Change	
	6/30/15	3/24/16	(+/-)	
Y=	1.02452	0.99150	-3.2%	PASS
dH@=	2.07640	1.88884	-9.0%	

	VAC (in Hg)	Critical Orifice ID	K	dH (inH_2O)	Meter (ft^3)	Net (ft^3)	Field T_{di} (°F)	Meter T_{do} (°F)	T_o (°R)	T_m (°R)	Time t (min)	Y	dH@	Y 0.020	dH@ 0.20	Allow. Tolerance
Initial	21.5	IZ48	0.34956	0.71	928.512	5.3930	61.0	62.0	522.7	522.4	12.00	1.01070	1.89402	0.019	0.01	
Final					933.905		64.0	64.0						pass	pass	
Initial	20	IZ55	0.45656	1.3	933.905	6.0160	64.0	64.0	523.2	523.4	10.00	0.98662	1.93347	0.005	0.04	
Final					939.921		64.0	63.0						pass	pass	
Initial	18.5	IZ63	0.58764	2.1	939.921	7.0460	64.0	63.0	524.7	525.2	9.00	0.97720	1.83902	0.014	0.05	
Final					946.967		68.0	67.0						pass	pass	
												0.99150	1.88884			
											STDEV	0.0141				
											STDEV/AVG	1.42%				

Meterbox		Ambient Standard, °F	Ambient Measured, °F	Ambient Difference %	Amb.	Heated Standard, °F	Heated Measured, °F	Heated Difference %	Heated
3	In	61.3	60.4	0.17%	pass	197.7	199.2	-0.23%	pass
3/24/16	Out	61.3	62.7	-0.27%	pass	197.9	199.2	-0.20%	pass
FLUKE	688								
Calibrated by	JM								

Thermocouple Indicator	Channel	Ambient Standard, °F	Ambient Measured, °F	Ambient Difference %		200 +/- Standard, °F	200 +/- Measured, °F	200 +/- Difference %		400 +/- Standard, °F	400 +/- Measured, °F	400 +/- Difference %	
3	Stack	59	61	-0.39%	pass	200	201	-0.15%	pass	400	401	-0.12%	pass
24-Mar-16	Probe	59	58	0.19%	pass	200	201	-0.15%	pass	400	399	0.12%	pass
	Oven	59	58	0.19%	pass	200	202	-0.30%	pass	400	400	0.00%	pass
	Impinger	59	61	-0.39%	pass	200	201	-0.15%	pass	400	401	-0.12%	pass
	Aux	59	61	-0.39%	pass	200	201	-0.15%	pass	400	401	-0.12%	pass
	Meter In	59	61	-0.39%	pass	200	201	-0.15%	pass	400	401	-0.12%	pass
	Meter Out	59	61	-0.39%	pass	200	201	-0.15%	pass	400	401	-0.12%	pass
Signal Tester	647												
Calibrated by	JM												

Biannual Meterbox Calibration

Method	EPA M-5 #7.2
Location	Horizon Shop
Meter Box ID	25
Meter ID	15131835
HE ID	
calibrated by	PLB
Orifice Set	ND

Date	3/24/2016
Pb=	30.35 (in Hg)
Ta=	58 (°F)
Tamb	517.67 (°R)

Leak checks

Negative	0 in/min @	25 inches Hg
Positive	0 in/min @	6 inches H_2O

0.97<Y<1.03	Old	New	Change	
	8/25/15	3/24/16	(+/-)	
Y=	1.01267	0.99916	-1.4%	PASS
dH@=	1.79831	1.79729	-0.1%	

	VAC (in Hg)	Critical Orifice ID	K	dH (inH_2O)	Meter (ft^3)	Net (ft^3)	Field T_{di} (°F)	Meter T_{do} (°F)	T_o (°R)	T_m (°R)	Time t (min)	Y	dH@	Y	dH@	
														0.020	0.20	Allow. Tolerance
Initial	19.5	ND48	0.3353	0.68	167.251	5.1660	64.0	63.0	522.7	523.4	12.00	1.01408	1.97691	0.015	0.18	
Final					172.417		65.0	63.0						pass	pass	
Initial	17.5	ND55	0.44909	1.1	172.417	5.2750	65.0	63.0	523.2	524.4	9.00	0.99851	1.72363	0.001	0.07	
Final					177.692		67.0	64.0						pass	pass	
Initial	15	ND63	0.58688	1.9	177.692	6.2180	67.0	64.0	523.7	525.9	8.00	0.98489	1.69133	0.014	0.11	
Final					183.91		70.0	64.0						pass	pass	
												0.99916	1.79729			

Meterbox		Ambient Standard, °F	Ambient Measured, °F	Ambient Difference %	Amb.	Heated Standard, °F	Heated Measured, °F	Heated Difference %	Heated
25	In	58.0	59.0			197.6	199.2		
3/24/16	Out	58.0	58.0	0.00%	pass	197.6	198.8	-0.18%	pass
Fluke	688								
Calibrated by	PLB								

Thermocouple Indicator	Channel	Ambient Standard, °F	Ambient Measured, °F	Ambient Difference %		200 +/- Standard, °F	200 +/- Measured, °F	200 +/- Difference %		400 +/- Standard, °F	400 +/- Measured, °F	400 +/- Difference %	
25	Stack	59	62	-0.58%	pass	200	200	0.00%	pass	400	399	0.12%	pass
24-Mar-16	Probe	59	61	-0.39%	pass	200	201	-0.15%	pass	400	398	0.23%	pass
	Oven	59	62	-0.58%	pass	200	198	0.30%	pass	400	398	0.23%	pass
	Impinger	59	62	-0.58%	pass	200	200	0.00%	pass	400	401	-0.12%	pass
	Aux	59	62	-0.58%	pass	200	199	0.15%	pass	400	400	0.00%	pass
	Meter	59	64	-0.96%	pass	200	202	-0.30%	pass	400	401	-0.12%	pass
		59	63	-0.77%	pass	200	202	-0.30%	pass	400	402	-0.23%	pass
Signal tester	647												
Calibrated by	PLB												

Post Test Meterbox Calibration

Method	EPA M-5 #7.2
Location	Horizon Shop
Meter Box ID	3
Meter ID	6077419
calibrated by	PB

Date	5/25/2016	
Pb=	30.23	(in Hg)
Ta=	66	(oF)
Tamb	525.7	(oR)

	Biannual 3/24/2016	Post-Test 5/25/16	Change (+/-)	
Y=	0.99150	0.98308	-0.9%	pass
dH@=	1.88864	1.86822	-1.1%	

	VAC (in Hg)	Critical Orifice ID IZ	K	dH (inH2O)	Meter (ft3)	Net (ft3)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Y 0.020	dH@ 0.20	Allow. Tolerance
Initial	20.5	55	0.44994	1.2	489.867	7.183	67	67	527.0	527.0	12.0	0.9766	1.8530	0.006	0.02	
Final					497.050		67	67						pass	pass	
Initial	20.5	55	0.44994	1.2	497.050	6.546	67	67	527.5	528.0	11.0	0.9842	1.8730	0.001	0.00	
Final					503.596		70	68						pass	pass	
Initial	20.5	55	0.44994	1.2	503.596	5.939	70	68	528.0	529.3	10.0	0.9885	1.8787	0.005	0.01	
Final					509.535		71	68						pass	pass	
												0.98308	1.8682			

Post Test Meterbox Calibration

Method EPA M-5 #7.2
Location Horizon Shop
Meter Box ID 25
Meter ID 15131835
calibrated by PT

Date 5/31/2016
Pb= 30.11 (in Hg)
Ta= 65 (oF)
Tamb 524.7 (oR)

	Biannual 3/24/2016	Post-Test 5/31/16	Change (+/-)	
Y=	0.99916	0.97912	-2.0%	pass
dH@=	1.79729	1.71253	-4.9%	

	VAC (in Hg)	Critical Orifice ID Shop #3	K	dH (inH2O)	Meter (ft3)	Net (ft3)	Field Tdi (oF)	Meter Tdo (oF)	To (oR)	Tm (oR)	Time t (min)	Y	dH@	Y	dH@	
Initial	21	55	0.44771	1.1	16.656	5.074	67	66	526.5	527.0	8.5	0.9756	1.7098	0.020	0.20	Allow. Tolerance
Final					21.730		68	67						0.004	0.00	
Initial	21	55	0.44771	1.1	21.730	6.270	68	67	527.0	528.3	10.5	0.9775	1.7070	pass	pass	
Final					28.000		71	67						0.002	0.01	
Initial	21	55	0.44771	1.1	28.000	6.242	71	67	527.5	529.5	10.5	0.9843	1.7208	pass	pass	
Final					34.242	-	72	68						0.005	0.01	
														pass	pass	
												0.97912	1.7125			

Critical Orifice Calibrations

Client	HORIZON				12/2/15 Date
Set ID	"YD" Shop #3				in house Job
DGM (Y) =	1.00310	Fluke ID 455			DP Calibrated
DGM ID #	2299046	Std Manometer 537			mew QA/QC

Dry Gas Meter			Orifice ID #	40	Orifice ID #	48	Orifice ID #	55	Orifice ID #	63	Orifice ID #	73
K' Critical Orifice Coefficient				**0.23426**		**0.34072**		**0.44994**		**0.59086**		**0.80743**
	Symbol	Units	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2
Initial volume	V_i	ft^3	498.995	504.431	509.896	515.660	521.449	531.500	537.697	545.494	553.284	563.225
Final Volume	V_f	ft^3	504.431	509.896	515.660	521.449	531.500	537.697	545.494	553.284	563.225	580.024
Difference	V_m	ft^3	5.436	5.465	5.764	5.789	10.051	6.197	7.797	7.790	9.941	16.799
Temperatures												
Ambient	T_a	°F	55.0	58.5	58.5	58.5	59.0	59.5	59.5	59.5	60.0	60.0
Absolute ambient	T_a	°R	514.67	518.17	518.17	518.17	518.67	519.17	519.17	519.17	519.67	519.67
Initial Inlet	T_i	°F	56.2	65.9	68.7	75.7	76.7	82.9	83.1	88.9	89.5	93.3
Outlet	T_f	°F	55.3	56.5	57.5	58.6	59.3	60.7	61.2	62.1	63.0	64.0
Final Inlet	T_i	°F	65.9	68.7	75.7	76.7	82.9	83.1	88.9	89.5	93.3	94.5
Outlet	T_f	°F	56.5	57.5	58.6	59.3	60.7	61.2	62.1	63.0	64.0	65.7
Avg. Temp	T_m	°R	518.145	521.82	524.795	527.245	529.57	531.645	533.495	535.545	537.12	539.045
Time		min	18	18	13	13	17	10	10	10	9	15
		sec	0	0	0	0	0	30	0	0	20	44
			18.00	18.00	13.00	13.00	17.00	10.50	10.00	10.00	9.33	15.73
SAMPLE RATE		ACFM	0.3020	0.3036	0.4434	0.4453	0.5912	0.5902	0.7797	0.7790	1.0651	1.0677
Orifice man. rdg	dH@	in H_2O	0.28	0.28	0.67	0.67	1.20	1.20	2.20	2.20	4.20	4.20
Barometric. Pressure	Pbar	inHg	30.08	30.11	30.11	30.08	30.11	30.08	30.05	30.05	30.08	30.08
Pump vacuum		inHg	21.0	21.0	19.6	19.6	18.0	18.0	16.0	16.0	12.8	12.8
K' factor			0.2341	0.2345	0.3408	0.3407	0.4511	0.4488	0.5923	0.5895	0.8079	0.8070
K' factor Average				0.2343		0.3407		0.4499		0.5909		0.8074
% Error (+/- 0.5)		%	PASS	0.082%	PASS	0.016%	PASS	0.260%	PASS	0.237%	PASS	0.056%

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Critical Orifice Calibrations

Client	HORIZON											12/2/15 Date
Set ID	"NR" Shop #2											in house Job
DGM (Y) =	1.00310		Fluke ID 455									YY Calibrated
DGM ID #	2299046		Std Manometer 537									mew QA/QC
Dry Gas Meter			Orifice ID #	40	Orifice ID #	48	Orifice ID #	55	Orifice ID #	63	Orifice ID #	73
K' Critical Orifice Coefficient				0.23609		0.34106		0.44771		0.57050		0.77954
	Symbol	Units	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2	Run 1	Run 2
Initial volume	V_i	ft²	580.170	587.015	595.181	600.520	605.860	612.315	618.785	625.170	631.564	637.752
Final Volume	V_f	ft²	587.015	595.181	600.520	605.860	612.315	618.785	625.170	631.564	637.752	643.920
Difference	V_m	ft²	6.845	8.166	5.339	5.340	6.455	6.470	6.385	6.394	6.188	6.168
Temperatures												
Ambient	T_a	°F	59.5	58.0	58.0	58.5	58.5	59.0	59.0	59.5	59.5	59.5
Absolute ambient	T_a	°R	519.17	517.67	517.67	518.17	518.17	518.67	518.67	519.17	519.17	519.17
Initial Inlet	T_i	°F	73.1	67.6	68.6	75.2	76.2	81.9	82.5	87.2	88.0	93.7
Outlet	T_f	°F	64.3	60.1	58.5	59.0	59.5	60.3	60.8	61.6	62.3	63.1
Final Inlet	T_i	°F	67.6	68.6	75.2	76.2	81.9	82.5	87.2	88.0	93.7	94.7
Outlet	T_f	°F	60.1	58.5	59.0	59.5	60.3	60.8	61.6	62.3	63.1	64.0
Avg. Temp	T_m	°R	525.945	523.37	524.995	527.145	529.145	531.045	532.695	534.445	536.445	538.545
Time		min	22	26	12	12	11	11	8	8	6	6
		sec	10	42	0	0	0	0	30	30	0	0
			22.17	26.70	12.00	12.00	11.00	11.00	8.50	8.50	6.00	6.00
SAMPLE RATE		ACFM	0.3088	0.3058	0.4449	0.4450	0.5868	0.5882	0.7512	0.7522	1.0313	1.0280
Orifice man. rdg	dH@	in H_2O	0.28	0.28	0.66	0.66	1.20	1.20	2.00	2.00	3.90	3.90
Barometric. Pressure	Pbar	inHg	30.08	30.08	30.05	30.02	30.02	29.99	30.02	30.02	29.99	29.99
Pump vacuum		inHg	21.2	21.2	19.6	19.6	18.0	18.0	16.2	16.2	13.0	13.0
K' factor			0.2368	0.2354	0.3416	0.3405	0.4479	0.4475	0.5709	0.5701	0.7823	0.7768
K' factor Average				0.2361		0.3411		0.4477		0.5705		0.7795
% Error (+/- 0.5)		%	PASS	0.308%	PASS	0.171%	PASS	0.039%	PASS	0.069%	PASS	0.357%

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Secondary Standard

M5 1.0031

DATE: 7/22/2015

Operator: Joe Ward

Meter No: 2299046				Meter Box ΔH@ 0.0000						Meter Box Yd 1.0031						Barometric Pressure: 29.71		
				Standard Meter Gas Volume (V_s)			Meter Box Gas Volume (V_{dg})			Std. Meter Temperature (t_s)			Meter Box Temperature (t_d)					
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd	Run #
1.21	-1.60	0.00	1.0000	0.0	5.005	5.005	192.235	197.290	5.055	72.0	72.0	72.0	76.0	76.0	76.0	4.08	1.0015	1
1.21	-1.60	0.00	1.0000	0.0	6.025	6.025	197.290	203.386	6.096	72.0	72.0	72.0	76.0	76.0	76.0	4.91	0.9997	1
1.21	-1.60	0.00	1.0000	0.0	5.005	5.005	203.386	208.775	5.059	72.0	72.0	72.0	76.0	76.0	76.0	4.09	1.0007	1
0.40	-0.60	0.00	1.0000	0.0	9.145	9.145	255.492	264.670	9.178	72.0	72.0	72.0	76.0	76.0	76.0	22.49	1.0054	2
0.40	-0.60	0.00	1.0000	0.0	5.000	5.000	264.670	269.691	5.021	72.0	72.0	72.0	76.0	76.0	76.0	12.29	1.0048	2
0.40	-0.60	0.00	1.0000	0.0	6.000	6.000	269.691	275.726	6.035	72.0	72.0	72.0	76.0	76.0	76.0	14.73	1.0032	2
0.62	-0.80	0.00	1.0000	0.0	5.000	5.000	279.510	284.532	5.022	72.0	72.0	72.0	77.0	77.0	77.0	8.00	1.0070	3
0.62	-0.80	0.00	1.0000	0.0	5.005	5.005	284.532	289.565	5.033	72.0	72.0	72.0	77.0	77.0	77.0	8.01	1.0058	3
0.62	-0.80	0.00	1.0000	0.0	5.015	5.015	289.565	294.610	5.045	72.0	72.0	72.0	77.0	77.0	77.0	8.01	1.0054	3
0.83	-1.40	0.00	1.0000	0.0	6.005	6.005	307.368	313.408	6.040	72.0	72.0	72.0	76.0	76.0	76.0	7.17	1.0052	4
0.83	-1.40	0.00	1.0000	0.0	9.025	9.025	313.408	322.502	9.094	72.0	72.0	72.0	76.0	76.0	76.0	10.75	1.0034	4
0.83	-1.40	0.00	1.0000	0.0	5.000	5.000	322.502	327.531	5.029	72.0	72.0	72.0	76.0	76.0	76.0	5.97	1.0052	4
1.00	-1.50	0.00	1.0000	0.0	9.300	9.300	331.290	340.710	9.420	72.0	72.0	72.0	76.0	76.0	76.0	9.15	0.9984	5
1.00	-1.50	0.00	1.0000	0.0	5.005	5.005	340.710	345.770	5.060	72.0	72.0	72.0	76.0	76.0	76.0	4.92	1.0003	5
1.00	-1.50	0.00	1.0000	0.0	5.005	5.005	345.770	350.831	5.061	72.0	72.0	72.0	76.0	76.0	76.0	4.95	1.0001	5
																AVERAGE	1.0031	

Operator Signature

Millennium Instruments Inc.
2402 Springridge Drive unit A
Spring Grove IL. 60081
PHONE#(815)675-3225
FAX#(815)675-6965
E-mail: millennium@millinst.com
www.millinst.com

Probe ID: 2-4
Date: 02/02/16
Operator: SH
Procedure: Method 2 Section 10.0

Std. Manometer ID 610/611/584
Std. P-Types Pitot 160-18

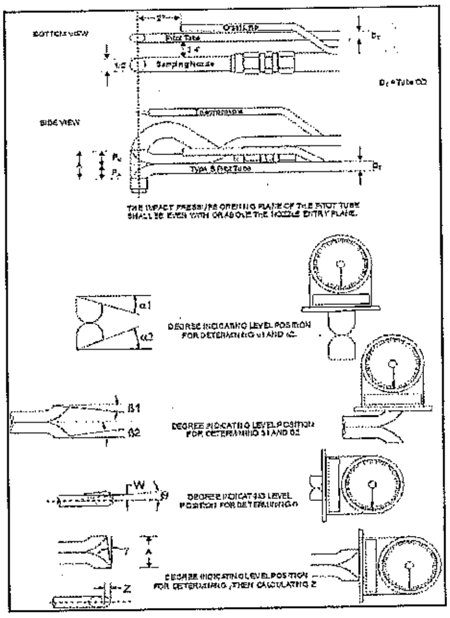
Run #	DpP (P-Type)	DpS (S-Type)	Cp	dS	Avg Cp	S <0.01		
1	0.180	0.250	0.8400	0.004	**0.8363**	0.002	Cp Limits	Pass
2	0.470	0.660	0.8354	0.001			MAX/MIN	Pass
3	0.880	1.240	0.8340	0.002			S Limits	Pass
4	1.440	2.020	0.8359	0.000				

Method 2 Passing Criteria 10.14.3/12.4

MONTROSE ENVIRONMENTAL

Client: Bulkeye
Project No: 5762

Type S Pitot Tube Inspection Form

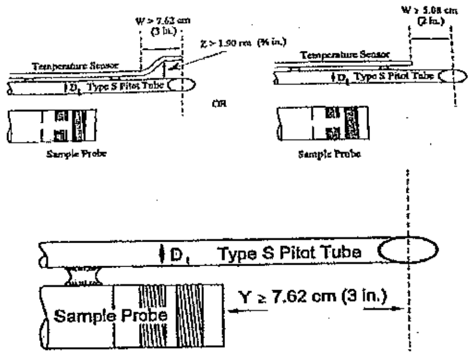


PITOT TUBE/PROBE # 2-4

Complete this section for all pitot tubes:

Parameter	Value	Allowable Range	Check
Assembly Level?	Y	Yes	✓
Ports Damaged?	N	No	✓
α1	1	-10° < α1 < +10°	✓
α2	1	-10° < α2 < +10°	✓
β1	0	-5° < β1 < +5°	✓
β2	0	-5° < β2 < +5°	✓
γ	0	NA	NA
Θ	0	NA	NA
Z_1 = A tan γ	0	Z_1 ≤ .125"	✓
W_1 = A tan Θ	0	W_1 ≤ .031"	✓
D_T	.375	.188" to .375"	✓
A/(2D_T)	.25	1.05 ≤ P_A/D_T ≤ 1.5	✓
A	.75	2.1D_T ≤ A ≤ 3D_T	✓

2.1 D_T = ________ 3D_T = ________



Complete this section for pitot tubes attached to Method 5 probes:

Parameter	Value	Allowable Range	Check
W_2	3.50	W_2 > 3"	✓
	—	W_2 > 2"	—
Z_2	—	Z_2 > 0.75"	—
Y	3.25	Y ≥ 3"	✓

Certification

I certify that pitot tube/probe number 2-4 meets or exceeds all specifications, criteria and/or applicable design features. See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: [signature] 8/23/20
Personnel (Signature/Date)

Shared files\Field\Data Sheets\Method 2\Method 2_pitot_alignment_M_v1

Probe ID: 3-5
Date: 02/02/16
Operator: SH
Procedure: Method 2 Section 10.0

Std. Manometer ID 610/611/584
Std. P-Types Pitot 160-18

Run #	DpP (P-Type)	DpS (S-Type)	Cp	dS	Avg Cp	S <0.01		
1	0.200	0.270	0.8521	0.005	**0.8472**	0.004	Cp Limits	Pass
2	0.470	0.650	0.8418	0.005			MAX/MIN	Pass
3	0.890	1.220	0.8456	0.002			S Limits	Pass
3	1.480	2.010	0.8495	0.002				

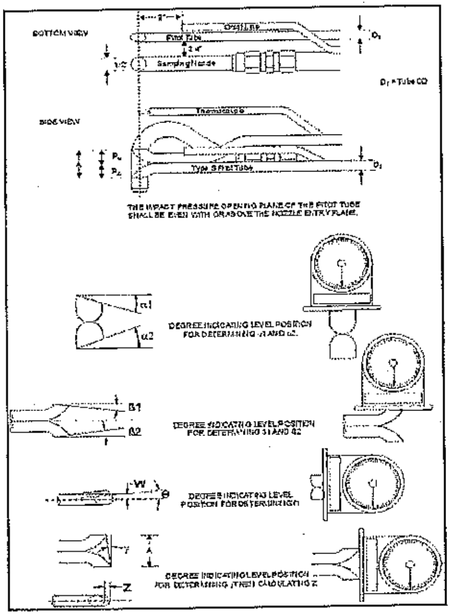
Method 2 Passing Criteria 10.14.3/12.4

MONTROSE ENVIRONMENTAL

Client: Bullsye
Project No: 5702

Type S Pitot Tube Inspection Form

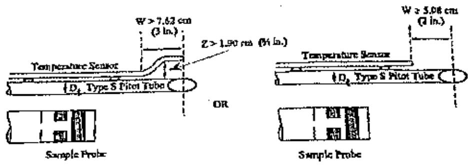
PITOT TUBE/PROBE # 3-5



Complete this section for all pitot tubes:

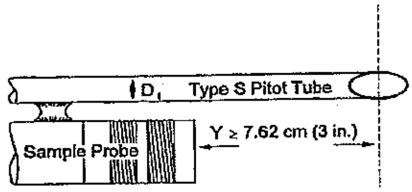
Parameter	Value	Allowable Range	Check
Assembly Level?	YES	Yes	✓
Ports Damaged?	NO	No	✓
α1	1	-10° < α1 < +10°	✓
α2	0	-10° < α2 < +10°	✓
β1	0	-5° < β1 < +5°	✓
β2	-1	-5° < β2 < +5°	✓
γ	0	NA	NA
Θ	0	NA	NA
Z_1 = A tan γ	0	Z_1 ≤ .125"	✓
W_1 = A tan Θ	0	W_1 ≤ .031"	✓
D_T	.248	.188" to .375"	✓
A/(2D_T)	1.285	1.05 ≤ P_A/D_T ≤ 1.5	✓
A	.6375	2.1D_T ≤ A ≤ 3D_T	✓

2.1 D_T = ________ 3D_T = ________



Complete this section for pitot tubes attached to Method 5 probes:

Parameter	Value	Allowable Range	Check
W_2		W_2 > 3"	NO
	2.08	W_2 > 2"	✓
Z_2		Z_2 > 0.75"	NO
Y	3.585	Y ≥ 3"	✓



Certification

I certify that pitot tube/probe number 3-5 meets or exceeds all specifications, criteria and/or applicable design features. See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: [signature] 5/3/16
Personnel (Signature/Date)

Shared files\Field\Data Sheets\Method 2\Method 2_pitot_alignment_M_v1

Probe ID: 3-6
Date: 02/03/16
Operator: SH
Procedure: Method 2 Section 10.0

Std. Manometer ID 610/611/584
Std. P-Types Pitot 160-18

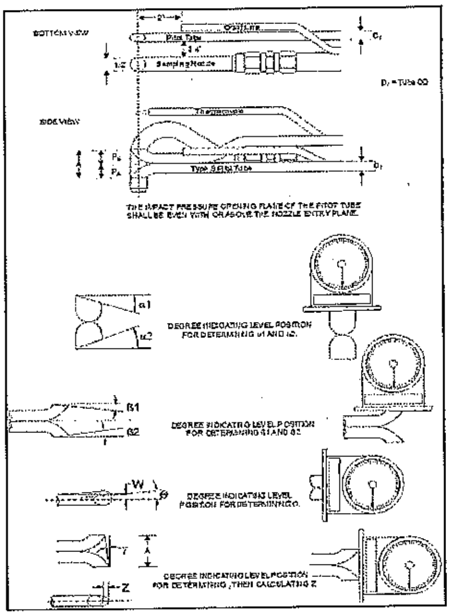
Run #	DpP (P-Type)	DpS (S-Type)	Cp	dS	Avg Cp	S <0.01		
1	0.200	0.280	0.8367	0.001	**0.8378**	0.002	Cp Limits	Pass
2	0.490	0.690	0.8343	0.004			MAX/MIN	Pass
3	0.870	1.210	0.8395	0.002			S Limits	Pass
4	1.500	2.080	0.8407	0.003				

Method 2 Passing Criteria 10.14.3/12.4

MONTROSE ENVIRONMENTAL

Client: Bullseye
Project No: 5762

Type S Pitot Tube Inspection Form

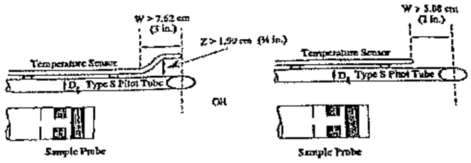


PITOT TUBE/PROBE # 3-6

Complete this section for all pitot tubes:

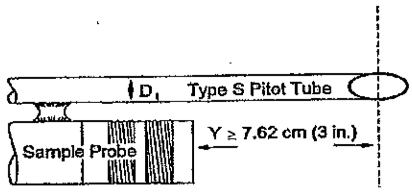
Parameter	Value	Allowable Range	Check ✓
Assembly Level?	YES	Yes	✓
Ports Damaged?	NO	No	✓
α1	1	-10° < α1 < +10°	✓
α2	1	-10° < α2 < +10°	✓
β1	1	-5° < β1 < +5°	✓
β2	0	-5° < β2 < +5°	✓
γ	1	NA	NA
Θ	0	NA	NA
$Z_1 = A \tan \gamma$	.013	$Z_1 \le .125"$	✓
$W_1 = A \tan \Theta$	0	$W_1 \le .031"$	✓
D_T	.252	.188" to .375"	✓
$A/(2D_T)$	1.99	$1.05 \le P_A/D_T \le 1.5$	✓
A	.754	$2.1D_T \le A \le 3D_T$	✓

$2.1\ D_T$ = ________ $3D_T$ = ________



Complete this section for pitot tubes attached to Method 5 probes:

W_2	5.5	$W_2 > 3"$	✓
	—	$W_2 > 2"$	—
Z_2	1.25	$Z_2 > 0.75"$	✓
Y	4.5	$Y \ge 3"$	✓



Certification

I certify that pitot tube/probe number 3-6 meets or exceeds all specifications, criteria and/or applicable design features.
See 40 CFR Pt. 60, App. A, EPA Method 2.

Certified by: [signature] 5/3/16
Personnel (Signature/Date)

MONTROSE
ENVIRONMENTAL

Client: Bullseye
Project No: 5702
Date: 5/3/16

Differential Pressure Gauge Calibration Form

MAGNEHELIC/SHORTRIDGE ID:
(circle one)

Parameter	Value	Allowable Range	Check
$P_{gauge,1}$ (in.w.c.)	2.424	NA	NA
$P_{std,1}$ (in.w.c.)	2.4	NA	NA
$Difference_1$ (in.w.c.)	.024	NA	NA
$Difference_1$ (%)		5%	

Difference = $|P_{std} - P_{gauge}|$

% Difference = $|P_{std} - P_{gauge}| \div P_{std}$

Parameter	Value	Allowable Range	Check
$P_{gauge,2}$ (in.w.c.)	~~1~~1.014	NA	NA
$P_{std,2}$ (in.w.c.)	1.0	NA	NA
$Difference_2$ (in.w.c.)	.014	NA	NA
$Difference_2$ (%)		5%	

std MAW 537
64°
29.99"
System Leak
0.00@6.7

Parameter	Value	Allowable Range	Check
$P_{gauge,3}$ (in.w.c.)	.3020	NA	NA
$P_{std,3}$ (in.w.c.)	.30	NA	NA
$Difference_3$ (in.w.c.)	.0020	NA	NA
$Difference_3$ (%)		5%	

Parameter	Value	Allowable Range	Check
Max Difference (%)		5%	

Certification

I certify that magnehelic/Shortridge number 1 meets or exceeds all specifications, criteria and/or applicable design features. See 40 CFR Pt. 60, App. A, EPA Method 2 Section 6.2.

Certified by: [signature]
Personnel (Signature/Date)

MONTROSE ENVIRONMENTAL

Client: Bullseye
Project No: 5702
Date: 5-2-16

Differential Pressure Gauge Calibration Form

MAGNEHELIC/SHORTRIDGE ID: SR#5
(circle one)

Parameter	Value	Allowable Range	Check
$P_{gauge,1}$ (in.w.c.)	2.413	NA	NA
$P_{std,1}$ (in.w.c.)	2.400	NA	NA
$Difference_1$ (in.w.c.)	.013	NA	NA
$Difference_1$ (%)		5%	

Difference = $|P_{std} - P_{gauge}|$

% Difference = $|P_{std} - P_{gauge}| \div P_{std}$

Parameter	Value	Allowable Range	Check
$P_{gauge,2}$ (in.w.c.)	.9013	NA	NA
$P_{std,2}$ (in.w.c.)	.90	NA	NA
$Difference_2$ (in.w.c.)	.0013	NA	NA
$Difference_2$ (%)		5%	

Std man: 537
64°
29.99"
System Leak ✓
0.000 @ 6.7"

Parameter	Value	Allowable Range	Check
$P_{gauge,3}$ (in.w.c.)	.4208	NA	NA
$P_{std,3}$ (in.w.c.)	.42	NA	NA
$Difference_3$ (in.w.c.)	.0008	NA	NA
$Difference_3$ (%)		5%	

Parameter	Value	Allowable Range	Check
Max Difference (%)		5%	

Certification

I certify that magnehelic/Shortridge number 5 meets or exceeds all specifications, criteria and/or applicable design features. See 40 CFR Pt. 60, App. A, EPA Method 2 Section 6.2.

Certified by: [signature]
Personnel (Signature/Date)

MONTROSE
ENVIRONMENTAL

Client: Bullseye
Project No: 5702
Date: 5/3/16

Differential Pressure Gauge Calibration Form

MAGNEHELIC/SHORTRIDGE ID: 97
(circle one)

Parameter	Value	Allowable Range	Check
$P_{gauge,1}$ (in.w.c.)	.25	NA	NA
$P_{std,1}$ (in.w.c.)	.25	NA	NA
$Difference_1$ (in.w.c.)	0	NA	NA
$Difference_1$ (%)		5%	

Difference = $|P_{std} - P_{gauge}|$
% Difference = $|P_{std} - P_{gauge}| \div P_{std}$

Parameter	Value	Allowable Range	Check
$P_{gauge,2}$ (in.w.c.)	.19	NA	NA
$P_{std,2}$ (in.w.c.)	.19	NA	NA
$Difference_2$ (in.w.c.)	0	NA	NA
$Difference_2$ (%)		5%	

std man 537
64°
29.99"
system Leak ✓
0.00@ 6.7

Parameter	Value	Allowable Range	Check
$P_{gauge,3}$ (in.w.c.)	.05	NA	NA
$P_{std,3}$ (in.w.c.)	.05	NA	NA
$Difference_3$ (in.w.c.)	0	NA	NA
$Difference_3$ (%)		5%	

Parameter	Value	Allowable Range	Check
Max Difference (%)		5%	

Certification

I certify that magnehelic/Shortridge number 97 meets or exceeds all specifications, criteria and/or applicable design features. See 40 CFR Pt. 60, App. A, EPA Method 2 Section 6.2.

Certified by: [signature]
Personnel (Signature/Date)

Sample Box Thermocouple Calibrations

Month:	4/4/2016	Tester/Standard: PB,BW				Location: Horizon Shop/Auburn shop/Bellingham			Fluke 526
		Ambient				Ice			
	Date	Standard, °F	Measured, °F	Difference %		Standard, °F	Measured, °F	Difference %	
Sample Box - impinger out									
I-01	4/7/2016	64.3	68.3	-0.76%	pass	34.7	34.3	0.08%	pass
I-02									
I-03	4/7/2016	66.3	66.0	0.06%	pass	33.1	32.7	0.08%	pass
I-04	1/27/2016	69.0	68.9	0.02%	pass	31.7	31.9	-0.04%	pass
I-05	10/7/2015	68.7	67.3	0.26%	pass	36.9	35.2	0.34%	pass
I-06	1/27/2016	57.7	55.7	0.39%	pass	31.7	32.6	-0.18%	pass
I-07	10/7/2015	68.7	67.3	0.26%	pass	37.1	37.6	-0.10%	pass
I-08	4/7/2016	63.8	65.1	-0.25%	pass	35.0	34.2	0.16%	pass
I-09	10/7/2015	68.6	66.6	0.38%	pass	37.2	36.8	0.08%	pass
I-10	1/27/2016	69.1	67.4	0.32%	pass	31.7	32.0	-0.06%	pass
I-11	1/27/2016	57.7	55.7	0.39%	pass	31.7	33.3	-0.33%	pass
I-12	4/7/2016	66.3	67.9	-0.30%	pass	33.2	33.7	-0.10%	pass
I-13	4/7/2016	64.4	63.5	0.17%	pass	33.0	32.9	0.02%	pass
I-14	4/7/2016	64.0	64.3	-0.06%	pass	33.5	32.7	0.16%	pass
I-15									
I-16	2/26/2016	64.0	65.0	-0.19%	pass	32.0	33.0	-0.20%	pass
I-17	10/7/2015	68.5	67.3	0.23%	pass	37.1	37.1	0.00%	pass
I-18									
I-19									
I-20	4/6/2016	66.8	66.5	0.06%	pass	33.1	33.1	0.00%	pass
I-21									
I-22	3/14/2016	88.8	89.0	-0.04%	pass	31.9	32.0	-0.02%	pass
I-23	4/7/2016	66.1	64.8	0.25%	pass	33.1	33.8	-0.14%	pass
I-24	10/7/2015	68.6	67.1	0.28%	pass	36.5	36.4	0.02%	pass
I-25	2/26/2016	64.0	64.0	0.00%	pass	32.0	34.0	-0.41%	pass
I-26	4/7/2016	65.6	66.5	-0.17%	pass	34.7	34.4	0.06%	pass
I-27	4/7/2016	66.1	66.4	-0.06%	pass	34.3	33.3	0.20%	pass
I-28	4/7/2016	64.3	63.1	0.23%	pass	33.5	33.9	-0.08%	pass
I-29	1/27/2016	67.5	65.5	0.38%	pass	31.7	32.1	-0.08%	pass
I-30	4/6/2016	66.8	65.6	0.23%	pass	33.2	33.7	-0.10%	pass
I-31	4/7/2016	68.0	69.1	-0.21%	pass	35.1	33.3	0.36%	pass
I-32									
I-33									
I-34									
I-35	4/7/2016	64.0	63.6	0.08%	pass	33.1	32.1	0.20%	pass
I-36	10/7/2015	69.8	68.1	0.32%	pass				
I-37	4/7/2016	66.1	66.9	-0.15%	pass	33.8	33.4	0.08%	pass
I-38	4/7/2016	64.2	63.9	0.06%	pass	33.1	33.1	0.00%	pass
I-39	4/7/2016	66.0	66.2	-0.04%	pass	34.7	34.0	0.14%	pass
I-40	4/7/2016	64.3	62.7	0.31%	pass	33.1	32.0	0.22%	pass
I-41	4/7/2016	64.0	62.2	0.34%	pass	33.0	33.3	-0.06%	pass
GS-02	4/6/2016	66.5	65.1	0.27%	pass	36.6	35.6	0.20%	pass
GS-03	4/6/2016	66.4	64.7	0.32%	pass	35.7	33.4	0.46%	pass
GS-202-01	4/7/2016	64.0	62.8	0.23%	pass	33.1	32.5	0.12%	pass
GS-202-02	4/7/2016	65.6	66.9	-0.25%	pass	32.7	33.5	-0.16%	pass
GA-05	11/3/2015	50.5	48.5	0.39%	pass	33.0	33.5	-0.10%	pass

GN-2	1/27/2016	57.7	57.2	0.10%	pass	31.8	31.9	-0.02%	pass
GN-7	4/6/2016	66.5	65.0	0.29%	pass	33.8	33.1	0.14%	pass
4721	11/3/2015	54.2	53.0	0.23%	pass	35.1	34.8	0.06%	pass
SEA-GN-1	4/7/2016	64.0	62.1	0.36%	pass	33.0	33.5	-0.10%	pass
		50.5	48.5	0.39%	pass	33.0	33.5	-0.10%	pass
		50.5	48.5	0.39%	pass	33.0	33.5	-0.10%	pass
		50.5	48.5	0.39%	pass	33.0	33.5	-0.10%	pass
		50.5	48.5	0.39%	pass	33.0	33.5	-0.10%	pass

Sample Box Thermocouple Calibrations

Month:	4/4/2016	Tester/Standard: PB,BW				Location: Horizon Shop/Auburn shop/Bellingham			Fluke 526
		Ambient				Heated			
	Date	Standard, °F	Measured, °F	Difference %		Standard, °F	Measured, °F	Difference %	
Sample Box - oven									
017	4/5/2016	65.1	65.3	-0.04%	pass	254.0	259.0	-0.70%	pass
018	4/4/2016	63.4	62.7	0.13%	pass	257.0	258.0	-0.14%	pass
019	4/6/2016	59.6	57.1	0.48%	pass	227.0	228.0	-0.15%	pass
020	4/6/2016	60.1	58.3	0.35%	pass	235.0	237.0	-0.29%	pass
156	DECONST								
172	10/7/2015	72.2	70.1	0.39%	pass	212.0	217.0	-0.74%	pass
173	12/22/2015	64.0	64.0	0.00%	pass	248.0	249.0	-0.14%	pass
184	DECONST								
185	10/7/2015	71.8	69.9	0.36%	pass	224.0	225.0	-0.15%	pass
186	4/5/2016	64.7	65.4	-0.13%	pass	263.0	261.0	0.28%	pass
187	DECONST								
188	10/7/2015	70.0	69.1	0.17%	pass	226.0	224.6	0.20%	pass
189	10/7/2015	70.6	68.6	0.38%	pass	222.0	226.1	-0.60%	pass
190	DECONST								
229	2/26/2016	65.0	64.0	0.19%	pass	228.0	225.0	0.44%	pass
230									
323	4/7/2016	68.5	68.0	0.09%	pass	262.0	259.0	0.42%	pass
327	4/5/2016	64.9	65.4	-0.10%	pass	258.0	258.0	0.00%	pass
328									
329	4/6/2016	59.8	58.0	0.35%	pass	210.0	209.0	0.15%	pass
331	DECONST								
412									
413	2/1/2016	54.3	54.3	0.00%	pass	232.0	230.0	0.29%	pass
450	4/7/2016	66.6	67.0	-0.08%	pass	273.0	272.0	0.14%	pass
451	4/7/2016	65.7	65.0	0.13%	pass	280.0	281.2	-0.16%	pass
452	4/6/2016	65.6	67.0	-0.27%	pass	265.0	265.0	0.00%	pass
531	5/17/2016	61.4	64.3	-0.56%	pass	200.1	199.8	0.05%	pass
453	1/27/2016	56.9	55.3	0.31%	pass	224.0	229.0	-0.73%	pass
473	4/7/2016	65.3	67.0	-0.32%	pass	261.0	263.2	-0.31%	pass
479	4/7/2016	62.0	60.1	0.36%	pass	254.0	252.0	0.28%	pass
524	4/7/2016	60.1	64.0	-0.75%	pass	218.0	218.0	0.00%	pass
525	4/7/2016	58.4	60.0	-0.31%	pass	257.0	261.0	-0.56%	pass
609	4/5/2016	64.6	64.2	0.08%	pass	259.0	256.0	0.42%	pass
649	4/7/2016	58.0	59.0	-0.19%	pass	261.0	260.0	0.14%	pass
OP-01	11/3/2015	71.0	71.0	0.00%	pass	260.0	262.0	-0.28%	pass
OS-02	10/23/2015	62.2	60.3	0.36%	pass	183.4	191.0	-1.18%	pass
OS-16	4/4/2016	64.8	64.3	0.10%	pass	254.0	253.0	0.14%	pass
OS-30	4/5/2016	61.6	60.3	0.25%	pass	260.0	258.0	0.28%	pass
OS-31	1/27/2016	57.2	55.8	0.27%	pass	227.0	231.0	-0.58%	pass
OS-51	4/4/2016	65.9	65.5	0.08%	pass	260.0	261.0	-0.14%	pass
OS-52	4/5/2016	63.6	63.1	0.10%	pass	263.0	261.0	0.28%	pass
PDX OS-01	4/7/2016	64.8	66.0	-0.23%	pass	269.0	267.0	0.27%	pass
SEA OS-01	4/5/2016	63.5	63.7	-0.04%	pass	252.0	250.0	0.28%	pass
SEA OS-02	11/2/2015	62.6	65.1	-0.48%	pass	185.1	185.3	-0.03%	pass
SEA OS-03	4/7/2016	64.1	65.0	-0.17%	pass	260.0	258.2	0.25%	pass

Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6313610

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

JF

Model: 9327K16 S/N: 140754307 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-309	B3A444		
Digital Thermometer	140073820	1/28/15	4000-5680560

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 10/31/14 Due Date: 10/31/16
Test Conditions: 23.0°C 43.0 %RH 1021 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.3	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.7	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-2006-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

ilac-MRA A2LA ACCREDITED Calibration Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-5554528

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Cust ID:Horizon Engineering, 13585 NE Whitaker Way, Attn. Joe Heffernan III, Portland, OR 97230 U.S.A. (RMA:982686)

Instrument Identification:

JH

ID: CS Model: 90205-22 S/N: 111896552 Manufacturer:Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/13/14	1000332071
Temperature Probe	128	2/20/14	6-B48Z9-30-1
Temperature Calibration Bath TC-218	A73332		
Thermistor Module	A27129	10/25/14	1000346002
Temperature Probe	5202	11/30/14	15-B15PW-1-1

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 12/03/13 **Cal Due: 12/03/15**

Test Conditions: 24.5°C 44.0 %RH 1007 mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.5	Y	-1.0	1.0	0.100	>4:1
°C		N.A.		100.000	99.7	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Calibration Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-7216692

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Cust ID:Horizon Engineering, 13585 NE Whitaker Way, , Portland, OR 97230 U.S.A. (RMA:1000681)

JL

Instrument Identification:

Model: 90205-22 S/N: 240289961 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	3/03/16	1000371058
Temperature Probe	3039	4/02/16	15--A0P2S-20-1
Temperature Calibration Bath TC-231	A79341		
Digital Thermometer	130070752	2/20/16	4000-6561724

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 11/16/15 Due Date: 11/16/16

Test Conditions: 24.9°C 50.0 %RH 1011 mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	0.000	-0.2	Y	0.000	-0.2	Y	-1.0	1.0	0.10	>4:1
°C	100.000	100.0	Y	100.000	100.0	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez

Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

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Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6313618

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

Model: 9327K16   S/N: 140754311   Manufacturer: Control Company   CH

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-309	B3A444		
Digital Thermometer	140073820	1/28/15	4000-5680560

Certificate Information:

Technician: 68   Procedure: CAL-03   Cal Date: 10/31/14   Due Date: 10/31/16
Test Conditions: 23.0°C   43.0 %RH   1021 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.5	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.7	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

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Recalibration:

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CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

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Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-2006-AO-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

ilac-MRA ACCREDITED
Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6313622

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

BC

Model: 9327K16 S/N: 140754314 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-309	B3A444		
Digital Thermometer	140073820	1/28/15	4000-5680560

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 10/31/14 Due Date: 10/31/16
Test Conditions: 23.0°C 43.0 %RH 1021 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.5	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.7	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ±U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy=±(Max-Min)/2; Min = As Left Nominal(Rounded) - Tolerance; Max = As Left Nominal(Rounded) + Tolerance; Date=MM/DD/YY

Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Control Company is an ISO 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by (DNV) Det Norske Veritas, Certificate No. CERT-01805-2006-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

ilac-MRA ACCREDITED
Calibration
Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6313605

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

BS

Model: 9327K16 S/N: 140754303 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-309	B3A444		
Digital Thermometer	140073820	1/28/15	4000-5680560

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 10/31/14 Due Date: 10/31/16
Test Conditions: 23.0°C 43.0 %RH 1021 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.2	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.5	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

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Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

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International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

ilac-MRA A2LA ACCREDITED Calibration Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6313611

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

MV

Model: 9327K16 S/N: 140754308 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	128	3/12/15	15-CJ73J-4-1
Temperature Calibration Bath TC-309	B3A444		
Digital Thermometer	140073820	1/28/15	4000-5680560

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 10/31/14 Due Date: 10/31/16

Test Conditions: 23.0°C 43.0 %RH 1021 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.3	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.8	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

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Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Calibration Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-7216695

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Cust ID:Horizon Engineering, 13585 NE Whitaker Way, , Portland, OR 97230 U.S.A. (RMA:1000681)

Instrument Identification:

PB

Model: 90205-22 S/N: 130301083 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	3/03/16	1000371058
Temperature Probe	3039	4/02/16	15--A0P2S-20-1
Temperature Calibration Bath TC-231	A79341		
Digital Thermometer	130070752	2/20/16	4000-6561724

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 11/16/15 Due Date: 11/16/16

Test Conditions: 24.9°C 50.0 %RH 1011 mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	0.000	-0.3	Y	0.000	-0.3	Y	-1.0	1.0	0.10	>4:1
°C	100.000	99.8	Y	100.000	99.8	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expended uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

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Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

In our opinion once calibrated your Water-Proof Thermometer °F/°C should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Water-Proof Thermometer °F/°Cs change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

ilac-MRA ACCREDITED

Calibration Certificate No. 1750.01

Cert. No.: 4039-7216696

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Cust ID:Horizon Engineering, 13585 NE Whitaker Way, , Portland, OR 97230 U.S.A. (RMA:1000681)

SH

Instrument Identification:

Model: 90205-22 S/N: 130306869 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	3/03/16	1000371058
Temperature Probe	3039	4/02/16	15--A0P2S-20-1
Temperature Calibration Bath TC-231	A79341		
Digital Thermometer	130070752	2/20/16	4000-6561724

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 11/16/15 Due Date: 11/16/16

Test Conditions: 24.9°C 50.0 %RH 1011 mBar

Calibration Data:

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C	0.000	-0.2	Y	0.000	-0.2	Y	-1.0	1.0	0.10	>4:1
°C	100.000	99.8	Y	100.000	99.8	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

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Nicol Rodriguez
Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

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Recalibration:

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International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

ilac-MRA ACCREDITED Calibration Certificate No. 1750.01

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

Cert. No.: 4039-6506386

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

PAT

Model: 9327K16 S/N: 150067645 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-231	A79341		
Thermistor Module	A27129	11/04/15	1000365407
Temperature Probe	5202	11/19/16	6-CV9Y2-1-1
Thermistor Module	A17118	2/24/15	1000351744
Temperature Probe	3039	3/12/15	15-CJ73J-1-1
Temperature Calibration Bath TC-179	A45240		

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 1/28/15 Due Date: 1/28/17
Test Conditions: 25.0°C 32.0 %RH 1022 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.4	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	99.4	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

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Nicol Rodriguez, Quality Manager

Aaron Judice, Technical Manager

Maintaining Accuracy:

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Recalibration:

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CONTROL COMPANY 4455 Rex Road Friendswood, TX 77546 USA
Phone 281 482-1714 Fax 281 482-9448 service@control3.com www.control3.com

Calibration complies with ISO/IEC 17025, ANSI/NCSL Z540-1, and 9001

ilac-MRA ACCREDITED Calibration Certificate No. 1750.01

Cert. No.: 4039-7175480

Traceable® Certificate of Calibration for Water-Proof Thermometer °F/°C

Manufactured for and distributed by: Thomas Scientific, Box 99, 99 High Hill Road, Swedeboro, NJ 08085-0099 U.S.A.

Instrument Identification:

JM

Model: 9327K16 S/N: 151830463 Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Temperature Calibration Bath TC-179	A45240		
Thermistor Module	A17118	3/03/16	1000371058
Temperature Probe	3039	4/02/16	15--A0P2S-20-1
Temperature Calibration Bath TC-231	A79341		
Thermistor Module	A27129	11/04/15	1000365407
Temperature Probe	5202	11/19/16	6-CV9Y2-1-1

Certificate Information:

Technician: 68 Procedure: CAL-03 Cal Date: 10/30/15 Due Date: 10/30/17
Test Conditions: 24.4°C 50.0 %RH 1012 mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
°C		N.A.		0.000	-0.3	Y	-1.0	1.0	0.10	>4:1
°C		N.A.		100.000	100.2	Y	99.0	101.0	0.059	>4:1

This Instrument was calibrated using Instruments Traceable to National Institute of Standards and Technology.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO "Guide to the Expression of Uncertainty in Measurement" (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

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Nicol Rodriguez
Nicol Rodriguez, Quality Manager

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Maintaining Accuracy:

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International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).

Biannual Nozzle Calibrations

Stainless Steel Nozzle Size List
Horizon Engineering

Personnel: PB JM RM   Date: 03/10/16

Diamete	I.D. #	Measurements (in.)				Average		
1"	S-B01	03/10/16	0.9880	0.9850	0.9870	0.9867	PASS	0.0030
1.00	S-B02	03/10/16	0.9890	0.9900	0.9930	0.9907	PASS	0.0040
	S-B03	03/10/16	0.9990	0.9980	0.9980	0.9983	PASS	0.0010
3/4"	S-C01	03/10/16	0.7510	0.7520	0.7540	0.7523	PASS	0.0030
0.75	S-C02	03/10/16	0.7510	0.7510	0.7500	0.7507	PASS	0.0010
	S-C03	03/10/16	0.7510	0.7510	0.7520	0.7513	PASS	0.0010
	S-C04	03/10/16	0.7580	0.7570	0.7540	0.7563		0.0040
5/8"	S-A02	03/10/16	0.6170	0.6170	0.6180	0.6173	PASS	0.0010
0.625	S-A03	03/10/16	0.6190	0.6150	0.6170	0.6170	PASS	0.0040
	S-A04	RESERVED						
	S-A05	03/10/16	0.6780	0.6760	0.6780	0.6773	PASS	0.0020
	S-A07	03/10/16	0.6200	0.6170	0.6190	0.6187	PASS	0.0030
	S-A08	03/10/16	0.6500	0.6510	0.6510	0.6507	PASS	0.0010
	S-A09	03/10/16	0.6580	0.6560	0.6570	0.6570	PASS	0.0020
	S-A10	03/10/16	0.6600	0.6600	0.6580	0.6593	PASS	0.0020
	S-A11	03/10/16	0.6160	0.6150	0.6140	0.6150	PASS	0.0020
	S-A12	03/14/16	0.6210	0.6230	0.6230	0.6223	PASS	0.0020
	S-A13					#DIV/0!	PASS	0.0000
1/2"	S-801	RESERVED						
0.50	S-802	03/10/16	0.5060	0.5050	0.5070	0.5060	PASS	0.0020
	S-803	03/10/16	0.4970	0.4980	0.4990	0.4980	PASS	0.0020
	S-804	03/10/16	0.4980	0.4970	0.4950	0.4967	PASS	0.0030
	S-805							
	S-806	03/10/16	0.4980	0.4950	0.4970	0.4967	PASS	0.0030
	S-807							
	S-808	03/10/16	0.5000	0.4990	0.5000	0.4997	PASS	0.0010
	S-809							
	S-810	03/10/16	0.4920	0.4920	0.4930	0.4923	PASS	0.0010
	S-811	03/16/16	0.4865	0.4895	0.4885	0.4882	PASS	0.0030
	S-812	03/10/16	0.4960	0.4980	0.5000	0.4980	PASS	0.0040
	S-813	03/10/16	0.4970	0.5010	0.4990	0.4990	PASS	0.0040
	S-814	03/10/16	0.4980	0.4980	0.4980	0.4980	PASS	0.0000
	S-815	RESERVED						
	S-816					#DIV/0!	PASS	0.0000
	S-817	03/10/16	0.4860	0.4820	0.4830	0.4837	PASS	0.0040
	S-818	03/16/16	0.5080	0.5100	0.5090	0.5090	PASS	0.0020
	S-819					#DIV/0!	PASS	0.0000
	S-820	03/10/16	0.4880	0.4920	0.4890	0.4897	PASS	0.0040
	T-1	03/16/16	0.5085	0.5090	0.5075	0.5083	PASS	0.0015
	T-2	03/16/16	0.5015	0.4985	0.5000	0.5000	PASS	0.0030
	T-3	03/10/16	0.4950	0.4970	0.4990	0.4970	PASS	0.0040
	T-4	RESERVED						
	T-5					#DIV/0!	PASS	0.0000
7/16"	S-701	03/16/16	0.4440	0.4400	0.4410	0.4417	PASS	0.0040
	S-702	03/10/16	0.4240	0.4270	0.4250	0.4253	PASS	0.0030
0.4375	S-703	03/16/16	0.4445	0.4475	0.4460	0.4460	PASS	0.0030
	S-704	03/10/16	0.4280	0.4240	0.4280	0.4267	PASS	0.0040
	S-705	03/10/16	0.4390	0.4400	0.4430	0.4407	PASS	0.0040
	S-706					#DIV/0!	PASS	0.0000
	S-707	03/16/16	0.4395	0.4435	0.4401	0.4410	PASS	0.0040
	S-708					#DIV/0!	PASS	0.0000
	S-709	03/10/16	0.4370	0.4350	0.4380	0.4367	PASS	0.0030
	S-711	03/10/16	0.4290	0.4290	0.4280	0.4287	PASS	0.0010
	S-712	03/10/16	0.4290	0.4280	0.4290	0.4287	PASS	0.0010
	S-713	03/10/16	0.4260	0.4300	0.4300	0.4287	PASS	0.0040
	S-714	03/10/16	0.4380	0.4400	0.4420	0.4400	PASS	0.0040
	S-715	03/14/16	0.4450	0.4420	0.4430	0.4433	PASS	0.0030
	S-716	03/10/16	0.4040	0.4030	0.4030	0.4033	PASS	0.0010
	T-10	03/10/16	0.4340	0.4340	0.4350	0.4343	PASS	0.0010
	T-11	NOT PRESENT						
	T-12							
	T-13	03/16/16	0.4020	0.4040	0.4035	0.4032	PASS	0.0020
5/16"	T-14	03/10/16	0.4270	0.4300	0.4300	0.4290	PASS	0.0030
0.3125	S-502	03/16/16	0.3100	0.3125	0.3130	0.3118	PASS	0.0030
	S-503	03/10/16	0.3100	0.3090	0.3060	0.3083	PASS	0.0040
	S-505	NOT PRESENT						
	S-510	03/10/16	0.3100	0.3100	0.3090	0.3097	PASS	0.0010
	S-511	RESERVED						
	S-512	03/10/16	0.3100	0.3080	0.3090	0.3090	PASS	0.0020
	S-513	03/10/16	0.3010	0.2980	0.3000	0.2997	PASS	0.0030
	S-514	03/10/16	0.3010	0.3030	0.3040	0.3027	PASS	0.0030
	S-515	03/14/16	0.3150	0.3180	0.3190	0.3173	PASS	0.0040
	S-516	03/10/16	0.3010	0.2990	0.3000	0.3000	PASS	0.0020
	S-517	03/10/16	0.3030	0.3020	0.3020	0.3023	PASS	0.0010
	S-519	03/10/16	0.3100	0.3080	0.3120	0.3100	PASS	0.0040
	S-520	03/10/16	0.3020	0.3030	0.3030	0.3027	PASS	0.0010
	S-521					#DIV/0!	PASS	0.0000
	S-522	03/10/16	0.3080	0.3100	0.3080	0.3087	PASS	0.0020
	S-523	03/10/16	0.3040	0.3000	0.3010	0.3017	PASS	0.0040
	S-524	03/10/16	0.3280	0.3300	0.3280	0.3287	PASS	0.0020
	S-525	03/10/16	0.2960	0.2930	0.2970	0.2953	PASS	0.0040
	T-40	03/16/16	0.3140	0.3150	0.3120	0.3137	PASS	0.0030
	T-41	03/16/16	0.3110	0.3085	0.3080	0.3092	PASS	0.0030
	T-58	03/10/16	0.3010	0.2970	0.3010	0.2997	PASS	0.0040

Diametc	I.D. #	Measurements (in.)				Average		
3/8"	S-601	03/10/16	0.3640	0.3670	0.3680	0.3663	PASS	0.0040
0.375	S-602					#DIV/0!	PASS	0.0000
	S-603					#DIV/0!	PASS	0.0000
	S-604	03/10/16	0.3700	0.3690	0.3690	0.3693	PASS	0.0010
	S-605	03/10/16	0.3730	0.3720	0.3730	0.3727	PASS	0.0010
	S-607	03/10/16	0.3690	0.3660	0.3680	0.3677	PASS	0.0030
	S-608	03/10/16	0.3710	0.3730	0.3730	0.3723	PASS	0.0020
	S-609					#DIV/0!	PASS	0.0000
	S-610	03/16/16	0.3770	0.3780	0.3775	0.3775	PASS	0.0010
	S-611	03/10/16	0.3760	0.3760	0.3780	0.3767	PASS	0.0020
	S-612	03/10/16	0.3630	0.3640	0.3620	0.3630	PASS	0.0020
	S-613	03/10/16	0.3710	0.3690	0.3700	0.3700	PASS	0.0020
	S-614	03/10/16	0.3660	0.3640	0.3640	0.3647	PASS	0.0020
	S-615	03/10/16	0.3710	0.3690	0.3710	0.3703	PASS	0.0020
	S-616	03/10/16	0.3740	0.3710	0.3720	0.3723	PASS	0.0030
	S-617	03/16/16	0.3640	0.3600	0.3605	0.3615	PASS	0.0040
	S-618	03/10/16	0.3690	0.3710	0.3710	0.3703	PASS	0.0020
	S-620	03/10/16	0.3980	0.3960	0.3950	0.3963	PASS	0.0030
	S-621	NOT PRESENT						
	S-622	RESERVED						
	S-623					#DIV/0!	PASS	0.0000
	S-624	RESERVED						
	S-627	03/10/16	0.3640	0.3640	0.3660	0.3647	PASS	0.0020
	S-628	03/10/16	0.3720	0.3730	0.3720	0.3723	PASS	0.0010
	S-629	03/10/16	0.3720	0.3710	0.3700	0.3710	PASS	0.0020
	S-630	03/10/16	0.3710	0.3740	0.3720	0.3723	PASS	0.0030
	S-631	03/10/16	0.3730	0.3760	0.3750	0.3747	PASS	0.0030
	S-632	03/16/16	0.3720	0.3705	0.3695	0.3707	PASS	0.0025
	S-633	NOT PRESENT						
	S-634	03/14/16	0.3770	0.3800	0.3800	0.3790	PASS	0.0030
	S-635	03/16/16	0.3760	0.3720	0.3725	0.3735	PASS	0.0040
	S-669	03/10/16	0.3790	0.3770	0.3790	0.3783	PASS	0.0020
	T-20	03/10/16	0.3750	0.3750	0.3760	0.3753	PASS	0.0010
	T-22	03/10/16	0.3700	0.3690	0.3680	0.3690	PASS	0.0020
	T-23	03/10/16	0.3740	0.3750	0.3730	0.3740	PASS	0.0020
	T-24	03/10/16	0.3710	0.3740	0.3730	0.3727	PASS	0.0030
	T-26	03/16/16	0.3755	0.3725	0.3740	0.3740	PASS	0.0030
	T-27					#DIV/0!	PASS	0.0000
	T-28	RESERVED						
1/4"	S-401	03/10/16	0.2460	0.2470	0.2450	0.2460	PASS	0.0020
0.25	S-403	03/10/16	0.2480	0.2480	0.2460	0.2473	PASS	0.0020
	S-404	03/10/16	0.2560	0.2540	0.2520	0.2540	PASS	0.0040
	S-405	03/16/16	0.2565	0.2600	0.2575	0.2580	PASS	0.0035
	S-406	03/10/16	0.2540	0.2540	0.2560	0.2547	PASS	0.0020
	S-408	03/16/16	0.2575	0.2575	0.2590	0.2580	PASS	0.0015
	S-409	03/16/16	0.2590	0.2600	0.2615	0.2602	PASS	0.0025
	S-410	03/10/16	0.2480	0.2470	0.2450	0.2467	PASS	0.0030
	S-411	03/10/16	0.2530	0.2520	0.2520	0.2523	PASS	0.0010
	S-412	03/10/16	0.2640	0.2630	0.2650	0.2640	PASS	0.0020
	S-413							
	S-414	03/10/16	0.2510	0.2520	0.2550	0.2527	PASS	0.0040
	S-415	03/10/16	0.2380	0.2360	0.2350	0.2363	PASS	0.0030
	S-416	03/10/16	0.2460	0.2470	0.2450	0.2460	PASS	0.0020
	S-418	03/10/16	0.2400	0.2400	0.2420	0.2407	PASS	0.0020
	S-419	NOT PRESENT						
	S-420	03/16/16	0.2650	0.2610	0.2610	0.2623	PASS	0.0040
	S-421	03/10/16	0.2860	0.2820	0.2840	0.2840	PASS	0.0040
	S-422	03/10/16	0.2340	0.2310	0.2330	0.2327	PASS	0.0030
	S-423	03/10/16	0.2840	0.2820	0.2810	0.2823	PASS	0.0030
	S-424					#DIV/0!	PASS	0.0000
	S-425	03/10/16	0.2120	0.2130	0.2130	0.2127	PASS	0.0010
	S-426	03/10/16	0.2520	0.2520	0.2510	0.2517	PASS	0.0010
	S-428	RESERVED						
	S-429	RESERVED						
	S-430	03/10/16	0.2440	0.2450	0.2430	0.2440	PASS	0.0020
	S-431	03/10/16	0.2450	0.2460	0.2450	0.2453	PASS	0.0010
	S-432	03/14/16	0.2630	0.2660	0.2640	0.2643	PASS	0.0030
	S-433	03/10/16	0.2360	0.2350	0.2380	0.2363	PASS	0.0030
	S-434	03/10/16	0.2380	0.2380	0.2370	0.2377	PASS	0.0010
	S-435	03/14/16	0.2350	0.2350	0.2340	0.2347	PASS	0.0010
	S-436	03/10/16	0.2380	0.2380	0.2410	0.2390	PASS	0.0030
	S-437	03/14/16	0.2540	0.2520	0.2520	0.2527	PASS	0.0020
	S-438	03/10/16	0.3960	0.4000	0.3980	0.3980	PASS	0.0040
	S-439					#DIV/0!	PASS	0.0000
	UG	NOT PRESENT						
	T-52	03/10/16	0.2440	0.2430	0.2430	0.2433	PASS	0.0010
	T-56	03/10/16	0.2400	0.2430	0.2430	0.2420	PASS	0.0030
	T-63	03/10/16	0.2400	0.2410	0.2400	0.2403	PASS	0.0010

Diameter	I.D. #	Measurements (in.)				Average		
7/32"	S-901	03/10/16	0.2080	0.2070	0.2070	0.2073	PASS	0.0010
0.219	S-902	03/10/16	0.2070	0.2040	0.2040	0.2050	PASS	0.0030
	S-903	03/14/16	0.2110	0.2130	0.2140	0.2127	PASS	0.0030
	S-904	03/10/16	0.1990	0.1950	0.1990	0.1977	PASS	0.0040
	S-905	03/10/16	0.2030	0.2010	0.2000	0.2013	PASS	0.0030
	S-906	03/10/16	0.2130	0.2140	0.2140	0.2137	PASS	0.0010
	S-907	NOT PRESENT						
	S-908	03/16/16	0.2115	0.2085	0.2110	0.2103	PASS	0.0030
	S-909	03/10/16	0.2110	0.2120	0.2150	0.2127	PASS	0.0040
	S-910							
	S-911	03/10/16	0.2090	0.2060	0.2090	0.2080	PASS	0.0030
	S-912	03/10/16	0.2030	0.2020	0.2040	0.2030	PASS	0.0020
	S-913	03/10/16	0.2090	0.2090	0.2100	0.2093	PASS	0.0010
	S-914	03/10/16	0.2130	0.2120	0.2120	0.2123	PASS	0.0010
	S-923	03/10/16	0.2080	0.2050	0.2040	0.2057	PASS	0.0040
	S-924	03/10/16	0.2080	0.2090	0.2110	0.2093	PASS	0.0030
	S-925					#DIV/0!	PASS	0.0000
	S-926	03/10/16	0.1890	0.1890	0.1890	0.1890	PASS	0.0000
	S-927	03/10/16	0.1850	0.1870	0.1850	0.1857	PASS	0.0020
	S-928	03/10/16	0.2150	0.2160	0.2160	0.2157	PASS	0.0010
3/16"	S-301	03/10/16	0.1850	0.1870	0.1850	0.1857	PASS	0.0020
0.1875	S-302	03/10/16	0.1800	0.1790	0.1810	0.1800	PASS	0.0020
	S-303					#DIV/0!	PASS	0.0000
	S-304	03/10/16	0.1700	0.1710	0.1700	0.1703	PASS	0.0010
	S-305	03/10/16	0.1780	0.1760	0.1770	0.1770	PASS	0.0020
	S-306	03/10/16	0.1670	0.1640	0.1660	0.1657	PASS	0.0030
	S-307	03/10/16	0.1791	0.1789	0.1789	0.1790	PASS	0.0002
	S-308	03/10/16	0.1850	0.1850	0.1840	0.1847	PASS	0.0010
	S-309	03/10/16	0.1550	0.1540	0.1550	0.1547	PASS	0.0010
	S-310	03/10/16	0.1790	0.1780	0.1750	0.1773	PASS	0.0040
	S-311	03/10/16	0.1740	0.1740	0.1710	0.1730	PASS	0.0030
	S-312	03/10/16	0.1690	0.1710	0.1680	0.1693	PASS	0.0030
	S-313	03/10/16	0.1722	0.1721	0.1720	0.1721	PASS	0.0002
	S-314	RESERVED						
	S-315	03/10/16	0.1690	0.1690	0.1680	0.1687	PASS	0.0010
	S-316	03/10/16	0.1750	0.1750	0.1740	0.1747	PASS	0.0010
	S-317	03/10/16	0.1770	0.1760	0.1780	0.1770	PASS	0.0020
	S-318	03/10/16	0.1520	0.1510	0.1490	0.1507	PASS	0.0030
	S-319	03/14/16	0.1880	0.1880	0.1870	0.1877	PASS	0.0010
	T-54	03/16/16	0.1865	0.1850	0.1860	0.1858	PASS	0.0015
	T-59	03/10/16	0.1780	0.1820	0.1800	0.1800	PASS	0.0040
	T-65	03/10/16	0.1750	0.1740	0.1730	0.1740	PASS	0.0020
	T-66	RESERVED						
	T-67	03/10/16	0.1760	0.1750	0.1770	0.1760	PASS	0.0020
1/8"	S-201	03/10/16	0.1220	0.1220	0.1210	0.1217	PASS	0.0010
0.125	S-202	03/10/16	0.1230	0.1230	0.1210	0.1223	PASS	0.0020
	S-203	03/10/16	0.1170	0.1170	0.1160	0.1167	PASS	0.0010
	S-204	03/10/16	0.1210	0.1220	0.1210	0.1213	PASS	0.0010
	S-205	03/10/16	0.1240	0.1250	0.1240	0.1243	PASS	0.0010
	S-206	03/10/16	0.1140	0.1150	0.1160	0.1150	PASS	0.0020
	S-207							
	S-208							
	S-209					#DIV/0!	PASS	0.0000
	T-55					#DIV/0!	PASS	0.0000
	T-56	NOT PRESENT						
	T-57	03/10/16	0.1220	0.1230	0.1240	0.1230	PASS	0.0020
	T-64	RESERVED						

Horizon Shop
2016 Calibrations
JH

BAROMETER CALIBRATIONS ELEVATION OF STANDARD 30 FT		inHg	inHg NWS	Diff %	mew inHg
TV 1			#N/A	#N/A	#N/A
TV 2			#N/A	#N/A	#N/A
TV 3	1/8/2016	30.10	30.02	0.3%	0.08
TV 4	1/15/2016	30.20	30.06	0.5%	0.14
TV 5	1/8/2016	30.20	30.02	0.6%	0.18
Portland Shop Barometer			#N/A	#N/A	#N/A
Shortridge #1 (HE 276)	1/8/2016	30.30	30.02	0.9%	0.28
Shortridge #2 (HE 028)	1/8/2016	30.00	30.02	-0.1%	-0.02
Shortridge #3 (HE 226)	1/8/2016	30.00	30.02	-0.1%	-0.02
Shortridge #4 (HE 325)	1/13/2016	29.93	29.90	0.1%	0.03
Shortridge #5 (HE 414)	1/15/2016	29.99	30.06	-0.2%	-0.07
Shortridge #6	1/13/2016	29.93	29.80	0.4%	0.13
Shortridge #7 (HE 324)	1/8/2016	30.10	30.02	0.3%	0.08
Shortridge #8			#N/A	#N/A	
CARL SLIMP			#N/A	#N/A	

QA/QC Documentation
Procedures

Quality Assurance/Quality Control

Introduction The QA procedures outlined in the U. S. Environmental Protection Agency (EPA) test methods are followed, including procedures, equipment specifications, calibrations, sample extraction and handling, calculations, and performance tolerances. Many of the checks performed have been cited in the Sampling section of the report text. The results of those checks are on the applicable field data sheets in the Appendix.

Continuous Analyzer Methods Field crews operate the continuous analyzers according to the test method requirements, and Horizon's additional specifications. On site quality control procedures include:

- Analyzer calibration error before initial run and after a failed system bias or drift test (within ± 2.0% of the calibration span of the analyzer for the low, mid, and high-level gases or 0.5 ppmv absolute difference)
- System bias at low-scale (zero) and upscale calibration gases (within ± 5.0% of the calibration span or 0.5 ppmv absolute difference)
- Drift check (within ±3.0% of calibration span for low, and mid or high-level gases, or 0.5 ppmv absolute difference)
- System response time (during initial sampling system bias test)
- Checks performed with EPA Protocol 1 or NIST traceable gases
- Leak free sampling system
- Data acquisition systems record 10-second data points or one-minute averages of one second readings
- NO_2 to NO conversion efficiency (before each test)
- Purge time (≥ 2 times system response time and will be done before starting run 1, whenever the gas probe is removed and re-inserted into the stack, and after bias checks)
- Sample time (at least two times the system response time at each sample point)
- Sample flow rate (within approximately 10% of the flow rate established during system response time check)
- Interference checks for analyzers used will be included in the final test report
- Average concentration (run average ≤ calibration span for each run)
- Stratification test (to be done during run 1 at three(3) or twelve(12) points according to EPA Method 7E; Method 3A, if done for molecular weight only, will be sampled near the centroid of the exhaust; stratification is check not normally applicable for RATAs)

Manual Equipment QC Procedures On site quality control procedures include pre- and post-test leak checks on trains and pitot systems. If pre-test checks indicate problems, the system is fixed and rechecked before starting testing. If post-test leak checks are not acceptable, the test run is voided and the run is repeated. Thermocouples and readouts are verified in the field to read ambient prior to the start of any heating or cooling devices.

Sample Handling Samples taken during testing are handled to prevent contamination from other runs and ambient conditions. Sample containers are glass, Teflon™, or polystyrene (filter petri dishes) and are pre-cleaned by the laboratory and in the Horizon Engineering shop. Sample levels are marked on containers and are verified by the laboratory. All particulate sample containers are kept upright and are delivered to the laboratory by Horizon personnel.

Data Processing Personnel performing data processing double-check that data entry and calculations are correct. Results include corrections for field blanks and analyzer drift. Any abnormal values are verified with testing personnel and the laboratory, if necessary.

After results are obtained, the data processing supervisor validates the data with the following actions:

- verify data entry
- check for variability within replicate runs
- account for variability that is not within performance goals (check the method, testing, and operation of the plant)
- verify field quality checks

Equipment Calibrations Periodic calibrations are performed on each piece of measurement equipment according to manufacturers' specifications and applicable test method requirements. The Oregon Department of Environmental Quality (ODEQ) Source Testing Calibration Requirements sheet is used as a guideline. Calibrations are performed using primary standard references and calibration curves where applicable.

Dry Gas Meters Dry gas meters used in the manual sampling trains are calibrated at three rates using a standard dry gas meter that is never taken into the field. The standard meter is calibration verified by the Northwest Natural Gas meter shop once every year. Dry gas meters are post-test calibrated with documentation provided in test reports.

Thermocouples Sample box oven and impinger outlet thermocouples are calibration checked against an NIST traceable thermocouple and indicator system every six months at three points. Thermocouple indicators and temperature controllers are checked using a NIST traceable signal generator. Readouts are checked over their usable range and are adjusted if necessary (which is very unusual). Probe thermocouples are calibrated in the field using the ALT-011 alternate Method 2 calibration procedure, which is documented on the field data sheet for the first run the probe thermocouple was used.

Pitots Every six months, S-type pitots are calibrated in a wind tunnel at three points against a standard pitot using inclined manometers. They are examined for dents and distortion to the alignment, angles, lengths, and proximity to thermocouples before each test. Pitots are protected with covers during storage and handling until they are ready to be inserted in the sample ports.

Nozzles Stainless steel nozzles are calibrated twice each year by checking for nicks or dents and making diameter measurements in triplicate. Quartz and borosilicate glass nozzles (and often stainless steel nozzles) are commonly calibrated in the field by taking the average of three consecutive diameter measurements. These field calibrations are recorded on the field data sheet for the first run the nozzle was used.

Correspondence

Source Test Plan and Correspondence

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March 24, 2016

Project No. 5702

Mr. George Davis
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Northwestern Region – Portland Office
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Mr. Michael Eisele, P.E.
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Re: Source Testing: Bullseye Glass Co.
3722 SE 21st Ave
Portland, OR 97202

This correspondence is notice that Horizon Engineering is to do source testing for the above-referenced facility, tentatively scheduled for April 2016. This will serve as the Source Test Plan unless changes are requested prior to the start of testing.

1. **Source to be Tested:** Glass Furnace T7

2. **Test Locations:** Baghouse BH-1 Inlet and Outlet

3. **Purpose of the Testing:** Performance testing for new baghouse

4. **Source Description:** Source description will be included in the final report.

5. **Pollutants to be Tested:** particulate matter (PM), Total Cr, and Cr^{+6}.

6. **Test Methods to be Used:** Testing will be conducted in accordance with EPA methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, from the Electronic Code of Federal Regulations (www.ecfr.gov), January, 2014; Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, April, 2015.

Flow Rate:	EPA Methods 1 and 2 (S-type pitot w/ isokinetic traverses)
CO_2 and O_2:	EPA Method 3A (NDIR and paramagnetic analyzers)[1]
Moisture:	EPA Method 4 (incorporated w/ ODEQ Method 5)
PM:	ODEQ Method 5 (filterable and condensable PM; isokinetic impinger train technique)
Total Cr & Cr^{+6}:	SW-846 Method 0061 (isokinetic recirculatory impinger train technique with Cr^{+6} analysis by IC with Post-Column Derivatization-Visible Absorption and Total Cr analysis by ICP-MS)

7. **Continuous Analyzer Data Recording:** Data acquisition system (DAS) will be used. Strip chart records may be used as backup. One-minute averages of one-second readings are logged. Run averages, tabulated data and the graphic outputs from the DAS are included in the test reports.

8. **Continuous Analyzer Gas Sampling:** EPA Method 3A will be sampled at one point near the exhaust centroid because it is not done for a correction. Particulate and gas sampling will be simultaneous.

9. **Criteria Location:** It is assumed today, but it will be confirmed on or before the test day, that each test port location meets criteria in EPA Methods 1 and 2.

10. **Quality Assurance/Quality Control (QA/QC):** Method-specific quality assurance/quality control procedures must be performed to ensure that the data is valid for determining source compliance. Documentation of the procedures and results will be presented in the source test report for review. Omission of this critical information may result in rejection of the data, requiring a retest. This documentation will include at least the following:

    Continuous analyzer procedures: Field crews will operate the analyzers according to the test method requirements with additional data backup. On-site procedures include:

    EPA Method 3A:
    - Analyzer calibration error before initial run and after a failed system bias or drift test (within ± 2.0% of the calibration span of the analyzer for the low, mid, and high-level gases or 0.5 ppmv absolute difference)
    - System bias at low-scale (zero) and upscale calibration gases (within ± 5.0% of the calibration span or 0.5 ppmv absolute difference)
    - Drift check (within ±3.0% of calibration span for low, and mid or high-level gases, or 0.5 ppmv absolute difference)
    - System response time (during initial sampling system bias test)
    - Checks performed with EPA Protocol 1 or NIST traceable gases except zero gas
    - Zero gas meets the definition for zero air material as defined by 40 CFR 72.2
    - Leak free sampling system
    - Data acquisition systems record 10-second data points or one-minute averages of one second readings

[1] EPA Method 3A will only be measured at the baghouse outlet.

- Purge time (≥ 2 times system response time and will be done before starting run 1, whenever the gas probe is removed and re-inserted into the stack, and after bias checks)
- Sample time (at least two times the system response time at each sample point)
- Sample flow rate (within approximately 10% of the flow rate established during system response time check)
- Interference checks for analyzers used will be included in the final test report
- Average concentration (run average ≤ calibration span for each run)
- Stratification test (to be done during run 1 at three(3) or twelve(12) points according to EPA Method 7E; EPA Method 3A if done for molecular weight only will be sampled near the centroid of the exhaust; and stratification check not normally applicable for RATAs)

Manual equipment procedures: Field crews will operate the manual testing equipment according to the test method requirements. On-site procedures include:

- Operators will perform pre- and post-test leak checks on the sampling system and pitot lines.
- Thermocouples attached to the pitots and probes are calibrated in the field using EPA Alternate Method 11. A single-point calibration on each thermocouple system using a reference thermometer is performed. Thermocouples must agree within ±2°F with the reference thermometer. Also, prior to use, thermocouple systems are checked for ambient temperature before heaters are started.
- Nozzles are inspected for nicks or dents and pitots are examined before and after each use to confirm that they are still aligned.
- Pre- and post-test calibrations on the meter boxes will be included with the report, along with semi-annual calibrations of critical orifices, pitots, nozzles and thermocouples (sample box impinger outlet and oven, meter box inlet and outlet, and thermocouple indicators).
- Blank reagents are submitted to the laboratory with the samples. Liquid levels are marked on sample jars in the field and are verified by the laboratory.
- The Oregon Method 5, 7, and 17 minimum sample volume shall be the greater of 31.8 dscf or sufficient to ensure a minimum ISDL of one-half (1/2) the emission standard.

SW-846 Method 0061: Field crews will operate the manual testing equipment according to the test method requirements. On-site procedures include:

- 0.5 M KOH will be used to ensure that the pH of the solution is above 8.5 after sampling.
- pH of the impinger solution will be checked during sample recovery.
- The sample train will be purged with N_2 at a rate of 10 L/min for 30 minutes.
- If the stack temperature is above 200 ^{0}F, the Teflon sample and recirculating lines may be placed in an ice bath to keep the recirculated reagent cool enough so it does not turn to steam.

Audit Sample Requirement: The EPA Stationary Source Audit Sample Program was restructured and promulgated on September 30, 2010 and was made effective 30 days after that date. The Standard requires that the Facility or their representative must order audit samples if they are available, with the exception of the methods listed in 40 CFR 60, 60.8(g)(1). The TNI website is referred to for a list of available accredited audit Providers and audits (www.nelac-institute.org/ssas/). If samples are not available from at least two accredited Providers they are not required. Currently, accredited Providers offer audit samples for EPA Methods 6, 7, 8, 12, 13A, 13B, 26, 26A, 29 and 101A. Based on the above, Bullseye Glass is not required to obtain audit samples for this test program.

11. **Number of Sampling Replicates and their Duration:** One (1) test run of approximately sixteen hours at each location. Inlet and outlet testing will be simultaneous. In no case will sampling replicates be separated by twenty-four (24) or more hours, unless prior authorization is granted by the Department.

12. **Reporting Units for Results:** Results will be expressed as concentrations (ppmv, μg/dscm. or gr/dscf), as rates (lb/hr), and on a production basis if that information is provided.

13. **Horizon Engrg. Contact:**		Thomas Rhodes or
		(503) 255-5050
	Fax	(503) 255-0505
	E-mail	trhodes@montrose-env.com
14. **Consultant:**		John Browning
		(503) 212-2515
	Cell	(503) 412-9842
	E-mail	jbrowning@bridgeh2o.com
15. **Source Site Personnel:**		Dan Schwoerer
		(503) 232-8887
	Fax	(503) 238-9963
	E-mail	danschwoerer@bullseyeglass.com
16. **Regulatory Contacts:**		George Davis
		(503) 229-5534
	Fax	(503) 229-6945
	Email	davis.george@deq.state.or.us
		Michael Eisele
		(503) 378-5070
	Fax	(503) 378-4196
	E-mail	EISELE.Michael@deq.state.or.us

17. **Applicable Process/Production/Control Information:** Operating data that characterize the source are considered to be:

- Type and quantity of material being processed – 1,200 to 1,350 pounds of batch materials to make dark green cathedral glass with a chromium content greater than 1.00%

- Furnace temperature – Furnace to be regulated between the temperature of 2,100^{0}F and 2,575^{0}F as per usual production parameters.
- Redox settings – Combustion gasses to be mixed at a ratio of 1.02 to 1.20 parts natural gas for 2.0 parts oxygen as per usual production parameters
- Baghouse pressure drop – Pressure readings will be tracked during the testing cycle
- All normally recorded process information

Process/Production/Control information is to be gathered for each test run by the Source Site Personnel and provided to Horizon for inclusion in the report.

The source must operate at the rate specified in the Permit during testing. Rates not in agreement with those stipulated in the Permit can result in test rejection for application to determine compliance or emission factor verification. Imposed process limitations could also result from atypical rates.

If the Permit does not specify a process rate for testing, we recommend a normal maximum rate.

18. **Source Test Audit Report:** Source Test Audit Report forms will be submitted along with the source test report for this testing.

19. **Plant Entry & Safety Requirements:** The test team will follow internal safety policies and abide by any site specific safety and entry requirements.

20. **Responsibilities of Test Personnel:** The test team will consist of one Project Manager and eight Technicians.

21. **Tentative Test Schedule:**

Day 1: Mobilize
Day 2: Test
Day 3: Demobilize

22. **Other Considerations:** The testing locations for the baghouse inlet are on a horizontal section of ducting. Depending on the port orientation, to prevent the recirculating impinger solution from draining out of the nozzle, the SW-846 Method 0061sample train may only be sampled from the horizontal port.

23. **Administrative Notes:** Unless notified prior to the start of testing, this test plan is considered to be approved for compliance testing of this source. A letter acknowledging receipt of this plan and agreement on the content (or changes as necessary) would be appreciated.

The Department will be notified of any changes in source test plans prior to testing. It is recognized that significant changes not acknowledged, which could affect accuracy and reliability of the results, could result in test report rejection.

Source test reports will be prepared by Horizon Engineering and will include all results and example calculations, field sampling and data reduction procedures, laboratory analysis reports, and QA/QC documentation. Source test reports will be submitted to you within 45days of the completion of the field work, unless another deadline is agreed upon. Bullseye Glass should send one (1) hardcopy of the completed source test report to you at the address above.

Any questions or comments relating to this test plan should be directed to me.

Sincerely,

Thomas Rhodes, QSTI
District Manager
Horizon Engineering, an affiliate of Montrose Environmental Group, Inc.

For information on Horizon Engineering and Montrose Environmental, go to www.montrose-env.com

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HORIZON ENGINEERING LLC

13585 NE Whitaker Way • Portland, OR 97230
Phone (503) 255-5050 • Fax (503) 255-0505
www.horizonengineering.com

April 8, 2016

Project No. 5702

Mr. George Davis
Oregon Department of Environmental Quality
Northwestern Region – Portland Office
700 NE Multnomah St., Suite 600
Portland, OR 97232

Mr. Michael Eisele, P.E.
Oregon Department of Environmental Quality
Western Region – Salem Office
4026 Fairview Industrial Drive
Salem, OR 97302

Re: Source Testing: Bullseye Glass Co.
3722 SE 21st Ave
Portland, OR 97202

This correspondence is notice that Horizon Engineering is to do source testing for the above-referenced facility, tentatively scheduled for April 2016. This will serve as the Source Test Plan unless changes are requested prior to the start of testing.

1. **Source to be Tested:** Glass Furnace T7
2. **Test Locations:** Baghouse BH-1 Inlet and Outlet
3. **Purpose of the Testing:** Performance testing for new baghouse. Cr^{+6} emissions will be estimated using the Cr^{+6} inlet results and the PM removal efficiency.
4. **Source Description:** Source description will be included in the final report.
5. **Pollutants to be Tested:** particulate matter (PM), Total Cr, and Cr^{+6}.
6. **Test Methods to be Used:** Testing will be conducted in accordance with EPA methods in Title 40 Code of Federal Regulations Part 60 (40 CFR 60), Appendix A, from the Electronic Code of Federal Regulations (www.ecfr.gov), January, 2014; Oregon Department of Environmental Quality (ODEQ) methods in Source Sampling Manual Volume 1, April, 2015.

Baghouse Inlet	
Flow Rate:	EPA Methods 1 and 2 (S-type pitot w/ isokinetic traverses)
CO_2 and O_2:	Assume same molecular weight as the outlet
Moisture:	EPA Method 4 (incorporated w/ ODEQ Method 5)
PM:	ODEQ Method 5 (filterable and condensable PM; isokinetic impinger train technique)
Total Cr & Cr^{+6}:	SW-846 Method 0061 (isokinetic recirculatory impinger train technique with Cr^{+6} analysis by IC with Post-Column Derivatization-Visible Absorption and Total Cr analysis by ICP-MS)

Baghouse Outlet	
Flow Rate:	EPA Methods 1 and 2 (S-type pitot w/ isokinetic traverses)
Fixed Gases:	EPA Method 3C (Tedlar bags with analysis by GC/TCD for CH_4, N_2, O_2, & CO_2)[1]
Moisture:	EPA Method 4 (incorporated w/ ODEQ Method 5)
PM:	ODEQ Method 5 (filterable and condensable PM; isokinetic impinger train technique)

7. **Continuous Analyzer Data Recording:** Data acquisition system (DAS) will be used. Strip chart records may be used as backup. One-minute averages of one-second readings are logged. Run averages, tabulated data and the graphic outputs from the DAS are included in the test reports.

8. **Continuous Analyzer Gas Sampling:** EPA Method 3A will be sampled at one point near the exhaust centroid because it is not done for a correction. Particulate and gas sampling will be simultaneous.

9. **Criteria Location:** It is assumed today, but it will be confirmed on or before the test day, that each test port location meets criteria in EPA Methods 1 and 2.

10. **Quality Assurance/Quality Control (QA/QC):** Method-specific quality assurance/quality control procedures must be performed to ensure that the data is valid for determining source compliance. Documentation of the procedures and results will be presented in the source test report for review. Omission of this critical information may result in rejection of the data, requiring a retest. This documentation will include at least the following:

    Manual equipment procedures: Field crews will operate the manual testing equipment according to the test method requirements. On-site procedures include:

    - Operators will perform pre- and post-test leak checks on the sampling system and pitot lines.
    - Thermocouples attached to the pitots and probes are calibrated in the field using EPA Alternate Method 11. A single-point calibration on each thermocouple system using a reference thermometer is performed. Thermocouples must agree within ±2°F with the reference thermometer.

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[1] It is anticipated that several Tedlar bag samples will be taken during the run to encompass the entire length of the test run.

Also, prior to use, thermocouple systems are checked for ambient temperature before heaters are started.

- Nozzles are inspected for nicks or dents and pitots are examined before and after each use to confirm that they are still aligned.
- Pre- and post-test calibrations on the meter boxes will be included with the report, along with semi-annual calibrations of critical orifices, pitots, nozzles and thermocouples (sample box impinger outlet and oven, meter box inlet and outlet, and thermocouple indicators).
- Blank reagents are submitted to the laboratory with the samples. Liquid levels are marked on sample jars in the field and are verified by the laboratory.
- The Oregon Method 5, 7, and 17 minimum sample volume shall be the greater of 31.8 dscf or sufficient to ensure a minimum ISDL of one-half (1/2) the emission standard.

<u>SW-846 Method 0061:</u> Field crews will operate the manual testing equipment according to the test method requirements. On-site procedures include:

- 0.5 M KOH will be used to ensure that the pH of the solution is above 8.5 after sampling.
- pH of the impinger solution will be checked during sample recovery.
- pH of the impinger solution may be checked periodically during the test run. The sample train will be leak check before and after any disassembly that may be required. If additional KOH is added, the volume will be recorded.
- The sample train will be purged with N_2 at a rate of 10 L/min for 30 minutes.
- If the stack temperature is above 200 ^{0}F, the Teflon sample and recirculating lines may be placed in an ice bath to keep the recirculated reagent cool enough so it does not turn to steam.

<u>Audit Sample Requirement:</u> The EPA Stationary Source Audit Sample Program was restructured and promulgated on September 30, 2010 and was made effective 30 days after that date. The Standard requires that the Facility or their representative <u>must</u> order audit samples if they are available, with the exception of the methods listed in 40 CFR 60, 60.8(g)(1). The TNI website is referred to for a list of available accredited audit Providers and audits (<u>www.nelac-institute.org/ssas/</u>). If samples are not available from at least two accredited Providers they are not required. Currently, accredited Providers offer audit samples for EPA Methods 6, 7, 8, 12, 13A, 13B, 26, 26A, 29 and 101A. Based on the above, Bullseye Glass is not required to obtain audit samples for this test program.

11. **Number of Sampling Replicates and their Duration:** Three (3) test runs of approximately sixteen hours at each location. Inlet and outlet testing will be simultaneous. In no case will sampling replicates be separated by twenty-four (24) or more hours, unless prior authorization is granted by the Department.

12. **Reporting Units for Results:** Results will be expressed as concentrations (ppmv, μg/dscm. or gr/dscf), as rates (lb/hr), removal efficiency (%), and on a production basis if that information is provided.

13. **Horizon Engrg. Contact:** Thomas Rhodes or
(503) 255-5050
Fax (503) 255-0505
E-mail trhodes@montrose-env.com

14. **Consultant:** John Browning
(503) 212-2515
Cell (503) 412-9842
E-mail jbrowning@bridgeh2o.com

15. **Source Site Personnel:** Dan Schwoerer
(503) 232-8887
Fax (503) 238-9963
E-mail danschwoerer@bullseyeglass.com

16. **Regulatory Contacts:** George Davis
(503) 229-5534
Fax (503) 229-6945
Email davis.george@deq.state.or.us

Michael Eisele
(503) 378-5070
Fax (503) 378-4196
E-mail EISELE.Michael@deq.state.or.us

17. **Applicable Process/Production/Control Information:** Operating data that characterize the source are considered to be:

- Type and quantity of material being processed – 1,200 to 1,350 pounds of batch materials to make dark green cathedral glass with a high chromium content. Cullet will not be used during the source test.
- Furnace temperature – Furnace to be regulated between the temperature of 2,100^{0}F and 2,575^{0}F as per usual production parameters.
- Redox settings – Combustion gasses to be mixed at a ratio of 1.00 parts natural gas for 1.90 to 1.80 parts oxygen as per usual production parameters, in a furnace plumbed with natural gas and liquid oxygen
- Baghouse pressure drop – Pressure readings will be tracked during the testing cycle
- All normally recorded process information

Process/Production/Control information is to be gathered for each test run by the Source Site Personnel and provided to Horizon for inclusion in the report.

The source must operate at the rate specified in the Permit during testing. Rates not in agreement with those stipulated in the Permit can result in test rejection for application to determine compliance or emission factor verification. Imposed process limitations could also result from atypical rates.

If the Permit does not specify a process rate for testing, we recommend a normal maximum rate.

18. **Source Test Audit Report:** Source Test Audit Report forms will be submitted along with the source test report for this testing.

19. **Plant Entry & Safety Requirements:** The test team will follow internal safety policies and abide by any site specific safety and entry requirements.

20. **Responsibilities of Test Personnel:** The test team will consist of one Project Manager and up to eight Technicians.

21. **Tentative Test Schedule:**

    April 25 (Mon): Mobilize and setup
    April 26 (Tues): Begin test Run 1
    April 27 (Wed): Begin test Run 2
    April 28 (Thurs): Begin test Run 3
    April 29 (Fri): Complete testing and demobilize

22. **Other Considerations:** None known

23. **Administrative Notes:** Unless notified prior to the start of testing, this test plan is considered to be approved for compliance testing of this source. A letter acknowledging receipt of this plan and agreement on the content (or changes as necessary) would be appreciated.

    The Department will be notified of any changes in source test plans prior to testing. It is recognized that significant changes not acknowledged, which could affect accuracy and reliability of the results, could result in test report rejection.

    Source test reports will be prepared by Horizon Engineering and will include all results and example calculations, field sampling and data reduction procedures, laboratory analysis reports, and QA/QC documentation. Source test reports will be submitted to you within 45 days of the completion of the field work, unless another deadline is agreed upon. Bullseye Glass should send one (1) hardcopy of the completed source test report to you at the address above.

Any questions or comments relating to this test plan should be directed to me.

Sincerely,

Thomas Rhodes, QSTI
District Manager
Horizon Engineering, an affiliate of Montrose Environmental Group, Inc.

For information on Horizon Engineering and Montrose Environmental, go to www.montrose-env.com

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Oregon
Kate Brown, Governor

Department of Environmental Quality
Western Region Salem Office
4026 Fairview Industrial Dr SE
Salem, OR 97302
(503) 378-8240
FAX (503) 373-7944
TTY 711

April 12, 2016

Eric Durrin
Bullseye Glass Company
3722 SE 21st Ave
Portland, OR 97202

Thomas Rhodes
Horizon Engineering
13585 NE Whitaker Way
Portland, OR 97230

Re: Bullseye Glass Company
ACDP Permit 26-3135-ST-01
Source Test Plan

Eric Durrin and Thomas Rhodes:

DEQ originally received the source test plan for testing the emissions from glass furnace T7 located at Bullseye Glass in Portland, OR on March 21, 2016. DEQ received the first revised plan on March 25, 2016, and final revised plan on April 8, 2016. The final plan details the methods and approach to determine the emission rate and removal efficiency of particulate matter (PM) from the baghouse inlet and exhaust, and the measurement of total chromium (Cr) and hexavalent chromium (Cr^{+6}) at the baghouse inlet. DEQ has reviewed the source test plan and is approving it with the following conditions:

GENERAL PROCESS CONDITIONS

1.) Only regular operating staff may adjust the production process and emission control parameters during the source performance tests and within two (2) hours prior to the tests. Any operating adjustments made during the source performance tests, which are a result of consultation during the tests with source testing personnel, equipment vendors or consultants, may render the source performance test invalid. Any adjustments made during the test must be recorded and included in the test report.

2.) Testing shall be performed while the furnace is making glass with the highest percentage of chromium normally used. The furnace must also be fired in the most oxidizing condition under which chromium containing glass is normally made. The ingredients in the batch must be the most oxidizing ingredients normally used to make chromium containing glass. Documentation stating and explaining this must be provided in the test report.

3.) During source testing the following process parameters must be monitored, recorded, and documented in the source test report. The process parameters below are to be reported for each individual test run and averaged for all test runs, if appropriate.
- Amount of total chromium in the batch (lbs)
- Type and quantity of material being processed
- Oxygen usage (quantity used, hourly minimum)
- Natural gas usage (quantity used, hourly minimum)
- Furnace temperature (°F, hourly minimum)
- Baghouse pressure drop (inches of water column, twice per test run)
- Weight of charges during each batch (lbs)
- Time of charges
- Weight of finished product (lbs)
- Duration of the charging period (hrs)
- Duration of refining period (hrs)
- All other normally recorded information

TOTAL CHROMIUM & HEXAVALENT CHROMIUM (EPA SW-846 METHOD 0061) CONDITIONS

4.) During sampling, make sure other sampling equipment is not interfering with isokinetic sampling.

5.) Take steps to minimize the blockage effects of the sampling probe in the test duct/stack.

6.) Testing must be performed using two ports located 90 degrees from each other.

7.) The sample shall be collected in a different plane (i.e., different set of ports and a port at a different angle) than the inlet particulate sample.

8.) To ensure that representative chromium samples are collected during these extended test intervals (~16 hours), four sequential traverses should be performed on each of the two ports. For example, sampling points should be moved every ten minutes (120 minutes per traverse), rather than performing a single traverse (40 minutes per point). The test run only needs to include one port change.

9.) Ensure the recirculating KOH cannot be lost out the sampling nozzle.

10.) With the exception of the sampling nozzle (glass) and the silica gel impinger, all of the sampling train components (including connecting fittings) shall be Teflon.

11.) In Section 10, Horizon notes that the pH of the KOH sample solution will be measured after the completion of the testing, which is required by the method. Given the duration of the testing you may, to make sure the pH of the absorbing solution remains above 8.5, momentarily pause the test to check the pH periodically throughout the run (e.g., every few hours). Any pH data collected shall be documented on the field data sheet. Leak checks must be completed any time the sampling system is opened. Leak checks of the equipment and any gain in volume by the dry gas meter due to the leak checks must also be documented on the field data sheets. Correct the final sample volume by the amount collected during the leak checks and use the corrected sample volume amount for emissions calculations.

12.) Equation 7.6.4 of the method has an error. If Horizon opts to perform a blank correction, please use the following equation:

m = [(S, ug/ml * Vls, ml) – (B, ug/ml * 300 ml)] x d

(Note: The above equation assumes that the impingers are initially charged with 300 mls of the KOH reagent)

13.) Verify the KOH recirculation rate is at least 50 ml/min.

14.) Record the nitrogen purge rate and duration.

15.) Following purging and filtration, the sample solution is to be transferred to polyethylene sample bottles.

16.) Following the test, the impinger solution shall be purged with nitrogen and filtered through an acetate membrane filter (0.45 um pore size); refer to Section 5.4.3 of the method.

17.) The volume of DI water used to rinse the sampling train directly affects the detection limit. The volume should be sufficient to quantitatively rinse the train; it should not be excessive. We recommend that a pre-measured volume of rinse water (e.g., 100 mls) be provided to the sample recovery person so that the same amount of rinse is used for each test.

18.) Take steps to make sure the level of hexavalent chromium in the KOH reagent is as low as possible before testing begins.

19.) Meticulously follow the procedures in section 7.1.2 to make sure the sampling trains are free of contaminates.

20.) The hexavalent chromium analyses are to be completed within 14 days of sample collection (Section 6.3 of the method).

21.) Hexavalent and total chromium test results must be reported as indicated below for each individual test run and averaged for all three test runs. Hand calculations must be provided for at least one test run.

- ng/dscm
- lbs/hr
- lbs/ton of chromium processed
- lbs/ton of glass produced

22.) Use the particulate removal efficiency to calculate the emission rate of hexavalent and total chromium emissions. Report results as indicated below for each individual test run and averaged for all three test runs. Hand calculations must be provided for at least one test run.

- ng/dscm
- lbs/hr
- lbs/ton of chromium processed
- lbs/ton of glass produced

Note that Item 22 data (baghouse *exhaust* chromium emissions) shall be clearly denoted in the report's summary table(s) as 'calculated (vs. measured) values'.

FLOW RATE AND MOISTURE (EPA METHODS 1, 2, & 4) CONDITIONS

23.) The exhaust duct configurations and flow measurements must meet the EPA Methods 1/1A & 2 criteria. Documentation including clear diagrams must be provided in the source test report.

24.) The sample locations must be checked for cyclonic flow. Documentation of this must be provided in the test report.

25.) Ensure that the manometer used to record pressure readings meets the criteria of Method 2 Section 6.2.

26.) Moisture content of the exhaust stack gas must be determined by EPA Method 4 for each test run. In addition, Section 12.1.7 of EPA Method 4 states "In saturated or moisture droplet-laden gas streams, two calculations of the moisture content of the stack gas shall be made, one using a value based upon the saturated conditions (alternate method) and one based upon the results of the impinger analysis (EPA Method 4). If this is the case, then ODEQ Method 4 (wet bulb/dry bulb) shall be used as the alternative method. At a minimum, two measurements of moisture content using ODEQ Method 4 shall be made for each run and averaged for the run. The lower of the two values as determined by EPA Method 4 and ODEQ Method 4 shall be considered correct for each run.

EXHAUST GAS COMPOSITION (EPA METHOD 3C/ASTM METHODS 1946) CONDITIONS

27.) N_2, O_2, CO_2, CO, CH_4, C_2H_6, and C_3H_8 concentrations must be determined to calculate the molecular weight of the exhaust. Collect sample at a constant rate over the duration of the test run. Record the sampling rate on the field data sheet.

28.) Immediately after the completion of the test run, close the bag valve and keep the bag under positive pressure until the sample is analyzed to ensure any leakage of the bag will not dilute the sample. A band around the bag should be sufficient to accomplish this although other measures may be taken that accomplish the same result. In the event that multiple bags are collected, record the start and end times of the collection periods.

29.) Analyze each bag separately and time weight the concentrations to get an average molecular weight over the duration of each test run.

30.) EPA Method 3A is cited in the test plan, DEQ understands that this is an inaccuracy and that Method 3A will not be used during this testing program. The methods referenced in this section will be used to determine the molecular weight in place of Method 3A.

PARTICULATE MATTER (EPA/ ODEQ METHOD 5) CONDITIONS

31.) During sampling, make sure other equipment is not interfering with isokinetic sampling.

32.) Additional (i.e., empty) impingers may be added between the second and fourth impinger to collect condensate from the flue gas.

33.) At the inlet sampling location, the particulate sample shall be collected in a different plane (i.e., different set of ports and a port at a different angle) than the chromium sample is being collected.

34.) Take steps to minimize the blockage of the sampling location with sampling equipment.

35.) To ensure that representative particulate samples are collected during these extended test intervals (~16 hours), four sequential traverses should be performed on each of the two ports. For example, sampling points should be moved every ten minutes (120 minutes per traverse), rather than performing a single traverse (40 minutes per point). The test run only needs to include one port change.

36.) If the filter becomes plugged to the point in which isokinetics can no longer be maintained pause the inlet and outlet sampling. Leak check the sampling system with the clogged filter; replace the filter; repeat the check the sampling system; make note of the dry gas meter's volume displacement caused by the leak checks; and continue testing. Correct the final sample volume by the amount collected during the leak checks and use the corrected sample volume amount for emissions calculations.

37.) For ODEQ Method 5, the method quantifiable limit (MQL) is 7 mg of PM, which should be taken into consideration when targeting a minimum sample volume and when calculating results. If less than 7 mg is collected, calculations shall be based not on the actual mass of PM collected but on the MQL of 7 mg as a "less than quantifiable limit" value.

38.) For both the inlet and outlet of the baghouse provide filterable, condensable and total PM test results. The results must be reported as follows for each test run and averaged for all three test runs. Complete hand calculations must be provided for at least one test run.

- gr/dscf
- lb/hour
- lb/ton of glass produced
- % removal efficiency based on lb/hour of the inlet and outlet results

GENERAL TESTING CONDITIONS

39.) The ODEQ must be notified of any changes in the source test plan and/or the specified methods prior to testing. Significant changes not acknowledged by the DEQ could be basis for invalidating an entire test run and potentially the entire testing program. Documentation of any deviations must include an evaluation of the impact of the deviation on the test data. Deviations may result in rejection of the data, requiring a retest.

40.) Method-specific quality assurance/quality control (QA/QC) procedures must be performed to ensure that the data is valid. Documentation of the procedures and results shall be presented in the source test report for review. Omission of this critical information will result in rejection of the data, requiring a retest.

41.) A copy of a completed Source Test Audit Report (STAR) for all applicable Methods performed must accompany the submittal of the Source Test Report. A copy of the STAR forms is available electronically from the regional source test coordinator.

42.) In an attempt to conserve natural resources and to minimize storage space requirements, the test report should be printed on both sides of each page within the document. DEQ recognizes this may not be feasible for some supporting documentation (i.e. figures, maps, etc.).

43.) The source test report shall be submitted to the DEQ within 45 days following the completion of the source test.

DEQ understands that the source test is scheduled for April 26-28, 2016. If you have any questions, please contact me at (503) 378-5070.

Sincerely,

Mike Eisele

Mike Eisele, PE
AQ Source Test Coordinator
Western Region-Salem

cc: George Davis, DEQ: NWR-AQ File

Quality Assurance Documentation
MAQS QSTI/QI Certification Dates
Qualified Individual (QI) Certificates
QMS Statement of Conformance

QSTI Certification Expiration Dates

QSTI Employee 26 April 2016	Cert. No.	Group 1 Expirations		Group 2 Expirations		Group 3 Expirations	
		Certificate	Exam (QI)	Certificate	Exam (QI)	Certificate	Exam (QI)
Andy Vella	2008-247	24 December 2017	24 June 2017	24 June 2017	24 June 2017	25 June 2017	25 June 2017
Brett Sherwood	-	-	25 February 2021	-	26 February 2021	-	-
Carl Slimp	2009-362	22 May 2018	22 May 2018	26 March 2018	26 March 2018	31 July 2018	31 July 2018
C. David Bagwell	2005-022	29 March 2020	29 March 2020	-	17 December 2020	29 March 2020	29 March 2020
Chris Hinson	2014-830	5 September 2018	5 September 2018	27 October 2018	27 October 2018	21 November 2018	21 November 2018
Danny Phipps	2016-915	16 December 2020	16 December 2020	17 December 2020	17 December 2020	16 March 2021	17 March 2021
David Wagner	2012-658	3 April 2017	3 April 2017	3 April 2017	3 April 2017	3 April 2017	3 April 2017
Jason French	2013-771	19 March 2018	5 August 2017	19 March 2018	11 December 2017	19 March 2018	6 August 2017
Joe Heffernan III	2009-325	16 December 2020	16 December 2020	16 December 2020	16 December 2020	23 March 2019	25 March 2018
John Lewis	2011-550	28 January 2020	28 July 2020	29 January 2020	29 January 2020	-	25 February 2021
Mark Stanfield	2009-337	25 January 2020	25 January 2020	-	-	5 April 2020	5 April 2020
Mihai Voivod	2016-916	25 February 2021	26 February 2021	29 July 2020	29 July 2020	17 December 2020	17 December 2020
Robert Rusi	2012-656	19 March 2017	19 March 2017	19 March 2017	19 March 2017	19 March 2017	19 March 2017
Scott Chesnut	2012-655	19 March 2017	19 March 2017	19 March 2017	19 March 2017	19 March 2017	19 March 2017
Tom Lyons	2012-721	30 July 2017	24 June 2017	30 July 2017	24 June 2017	30 July 2017	25 June 2017
Thomas Rhodes	2010-408	16 December 2020	16 December 2020	17 December 2020	17 December 2020	14 April 2020	25 March 2018

QSTI Employee 26 April 2016	Cert. No.	Group 4 Expirations		Group 5 Expirations	
		Certificate	Exam (QI)	Certificate	Exam (QI)
Andy Vella	2008-247	9 March 2020	9 March 2020	-	-
Brett Sherwood	-	-	-	-	-
Carl Slimp	2009-362	22 December 2018	22 December 2018	-	-
C. David Bagwell	2005-022	-	11 December 2017	-	-
Chris Hinson	2014-830	9 February 2019	9 February 2019	-	-
Danny Phipps	2016-915	17 March 2021	18 March 2021	-	-
David Wagner	2012-658	3 April 2017	3 April 2017	-	-
Jason French	2013-771	19 March 2018	11 December 2017	-	-
Joe Heffernan III	2009-325	17 December 2020	17 December 2020	-	-
John Lewis	2011-550	24 August 2016	26 February 2021	-	-
Mark Stanfield	2009-337	5 April 2020	5 April 2020	-	-
Mihai Voivod	2016-916	-	-	-	-
Robert Rusi	2012-656	19 March 2017	19 March 2017	-	-
Scott Chesnut	2012-655	19 March 2017	19 March 2017	-	-
Tom Lyons	2012-721	30 July 2017	25 June 2017	-	-
Thomas Rhodes	2010-408	9 March 2020	9 March 2020	-	-

Red type indicates expired certification or QI as of date above

Orange type indicates certification/QI within 6 months of expiration from date above

Green type indicates certification/QI valid for greater than 6 months from date above

SOURCE EVALUATION SOCIETY

SES

Qualified Source Testing Individual

LET IT BE KNOWN THAT

JASON T. FRENCH

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 20TH DAY OF MARCH 2013 AND EFFECTIVE UNTIL MARCH 19TH, 2018

Peter R. Westlin, QSTI/QSTO Review Board

Peter S. Pakalnis, 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.
2013-771

SOURCE EVALUATION SOCIETY

Qualified Source Testing Individual

LET IT BE KNOWN THAT

JOSEPH M. HEFFERNAN, III

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 17TH DAY OF DECEMBER 2015 AND EFFECTIVE UNTIL DECEMBER 16TH, 2020

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

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2009-325

SOURCE EVALUATION SOCIETY

SES

Qualified Source Testing Individual

LET IT BE KNOWN THAT

JOHN S. LEWIS

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 29TH DAY OF JULY 2015 AND EFFECTIVE UNTIL JULY 28TH, 2020

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

CERTIFICATE NO. 2011-550

SOURCE EVALUATION SOCIETY

SES

Qualified Source Testing Individual

LET IT BE KNOWN THAT

CHRISOPHER J. HINSON

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 6TH DAY OF SEPTEMBER 2013 AND EFFECTIVE UNTIL SEPTEMBER 5TH, 2018

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. 2014-830

1995

NORTH CAROLINA

SOURCE EVALUATION SOCIETY

SES

Qualified Source Testing Individual

LET IT BE KNOWN THAT

MIHAI V. VOIVOD

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 26TH DAY OF FEBRUARY 2016 AND EFFECTIVE UNTIL FEBRUARY 25TH, 2021

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

Bruce Randall QSTI/QSTO Review Board

CERTIFICATE NO. 2016-916

From: Theresa Lowe <tf_lowe@yahoo.com>
Sent: Wednesday, March 9, 2016 5:34:32 PM
To: Brett Sherwood
Cc: Gail Westlin
Subject: QSTI Score - Brett M. Sherwood

THIS EMAIL IS THE OFFICIAL NOTIFICATION OF YOUR SES QUALIFIED SOURCE TESTING INDIVIDUAL OR OBSERVER (QSTI/QSTO) EXAM(S) RESULTS (*Please Print Out for Your Records*)

To:	Brett M. Sherwood
Employed by:	Montrose Environmental
Phone:	503-255-5050
Email:	bsherwood@montrose-env.com

The Source Evaluation Society, through its contract with Eastern Technical Associates, has received the score of the exam(s) you completed on the date(s) as listed below. You are required to receive a score of 40 to pass an exam. As noted below, a "P" indicates you passed the exam, a "DNP" indicates that you did not pass the exam.

Group #	*Exam*	*Date of Exam*	*Exam #*	*Score*	*Status*
1	EPA Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods	2/25/16	12713		P
1A	Stack Gas Flow Rate Measurements Sampling Methods				
2	EPA Manual Gaseous Pollutants Source Sampling Methods	2/26/16	12715		P
3	EPA Gaseous Pollutants Instrumental Methods				
4	EPA Hazardous Metals Measurement Methods				
5	Part 75 CEMS RATA Testing				

NOTE: (1) The ECMPS AETB reporting requirements include a provision for an email address to be noted for the exam provider. Your exam provider is the Source Evaluation Society. Please use the following email address: qstiprogram@gmail.com. (2) Your exam score(s), per ASTM D7036-04, will be applicable for five years. You will need to re-take your exam(s) before expiration in order to maintain a current status. You are responsible for keeping track of scheduling for your re-test.

If you passed one or more exams, you are eligible to apply for your SES QSTI/QSTO qualification approval(s). To complete the qualification process, you will need to do the following: For New Applications / Additional Group Certificates / Renewals: Please check the SES Website (www.sesnews.org) under the link for the "SES QSTI/QSTO Program" for directions on how to apply for your certificate or contact Gail Westlin at gail_westlin@yahoo.com or Theresa Lowe at tf_lowe@yahoo.com.

If a QSTI/QSTO candidate receives notice that he or she did not pass a SES methods group exam(s), the QSTI/QSTO candidate ask the Committee for a review of their exam(s). Any review request should be sent to gail_westlin@yahoo.com or tf_lowe@yahoo.com. As part of the review, the Committee will provide references to methods for those questions missed.

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

7-27-15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

8/14/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

8/10/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

8/12/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

9/17/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

7/31/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

M Voivod
Employee Signature

7/27/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

7/27/15
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Paul L. Berce 2/17/16

Employee Signature Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Josh Muswieck
Employee Signature

2-17-16
Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

[signature]	2/25/16
Employee Signature	Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

MICHAEL WALLACE

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

________ Employee Signature

5/23/16 Date

MONTROSE
AIR QUALITY SERVICES

Quality Management System Conformance Statement

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

Employee Signature

5/17/2016
Date

Personnel Qualifications

JASON T. FRENCH, QSTI
PROJECT MANAGER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Source Test Individual (QSTI) Application #2013-771
  - Group I, Manual *Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, *Manual Gas Source Sampling Methods*
  - Group III, *Gaseous Pollutants Instrumental Methods*
  - Group IV, Hazardous Metals Measurements
- B.S. in Mechanical Engineering from the University of South Florida in Tampa, Florida, 2004
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Certified Visible Emissions Evaluator
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Jason French joined Horizon Engineering in February 2011. His previous experience includes working for 5 years as a staff engineer with an environmental and construction company based in Tallahassee, Florida as well as working for the Florida Department of Environmental Protection. He performs source emission testing and related activities, including writing quotes and source test protocols, field sampling, test equipment maintenance and calibration, equipment preparation, in-field data recording, calculations and training. He is thoroughly trained in all EPA source testing procedures and also experienced using methods from the National Council for Air & Stream Improvement (NCASI), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), American Society for Testing and Materials (ASTM) and many regional (Pacific Northwest and Northern California) agency methods.

JOHN S. LEWIS, QSTI (GI, II, IV)
FIELD TECHNICIAN II

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Source Test Individual (QSTI)
  - Group I, *Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, *Manual Gaseous Pollutants Source Sampling Methods*
  - Group IV, *Hazardous Metals Measurements*
- B.S. in Social Science and Geography from Frostburg State University, 1998
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

John Lewis has been with Horizon Engineering since 2008. He brings six years of prior experience working in education, transportation, and roof restoration system installation. He has performed source tests at hundreds of industrial sources. He performs source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is thoroughly trained in all EPA source test procedures 2008-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

JOSEPH M. HEFFERNAN III, QSTI (GI-IV)
PROJECT MANAGER/TEAM LEADER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Source Test Individual (QSTI)
  - Group I, *Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, Manual Gas Source Sampling Methods
  - Group III, Gaseous Pollutants Instrumental Methods
  - Group IV, *Hazardous Metals Measurements*
- B.S. in Physical Education from Northern Illinois University, 1999
- Minor in Marketing, with emphasis in Sports Marketing
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL DEVELOPMENT

- Stationary Source Sampling and Analysis for Air Pollutants (SSSAAP) Conference, 2008, 2011

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Joe Heffernan has been with Horizon Engineering since 2004. He brings four prior years experience from another air pollution testing organization in Illinois for a total of more than 12 years of professional experience in the field of air quality. He has performed source tests at hundreds of industrial sources domestically and internationally and has developed the skills necessary to earn the title of Project Manager. He performs source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is thoroughly trained in all EPA source test procedures 2000-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

Chris Hinson, E.I.T., QSTI (GI-IV)
PROJECT MANAGER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Source Test Individual (QSTI)
  - Group I, *Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, *Manual Gas Source Sampling Methods*
  - Group III, *Gaseous Pollutants Instrumental Sampling Methods*
  - Group IV, *Hazardous Metals Measurement Sampling Methods*
- Engineer in Training (E.I.T.) Certification
- Bachelors of Science, Nuclear Engineering, 2012 – Purdue University
- Certified Visible Emissions Evaluator
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Chris Hinson has been with Horizon Engineering, LLC since 2014. He has performed source tests at hundreds of industrial sources. He performs source emission testing and activities related to source emission testing, including field sampling, laboratory analysis, test equipment maintenance and calibration, equipment preparation, in-field data recording and calculations. Chris has performed greenhouse gas testing and monitoring at many different facilities. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

MIHAI VOIVOD
FIELD TECHNICIAN II

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Individual (QI)
  - Group II, *Manual Gas Source Sampling Methods,* (passed exam, application pending)
- B.S. in Biotechnical and Ecological Systems Engineering from Babes Bolyai University in Cluj, Romania, 2009
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Mihai Voivod has been with Horizon Engineering since September 2012. He brings 3 years of prior professional experience in the electronics manufacturing industry working for Silicon Forest Electronics in Vancouver, Washington and during an internship at a Romanian laboratory. At Horizon, he performs source emission testing and activities related to source emission testing, including field sampling, test equipment fabrication, maintenance, and calibration, equipment preparation, and in-field data recording. He is being trained to perform all EPA source test procedures and is also learning methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

His experience in the electronics manufacturing industry included operating a selective solder machine and an automated optical inspection (AOI) machine. His education specialty was laboratory sampling analysis and instrumentation operation and troubleshooting.

BRANDON CRAWFORD
FIELD TECHNICIAN I

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.S. in Environmental Science from Oregon State University, Corvallis, Oregon, 2013, Specialized in Environmental Conservation and Sustainability
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- DOT dangerous goods ground shipping training
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Brandon Crawford has been with Horizon Engineering since June 2014. He brings previous industrial experience as an intern for ATI Albany Operations/Wah Chang. He is being trained to perform source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is being trained in all EPA source test procedures 2002-present. He is also learning to use methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

BRETT SHERWOOD
FIELD TECHNICIAN I

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.S. in Environmental Science from Washington State University, Pullman, Washington, 2012
- Certificate in Geographic Information Systems, University of Washington, 2013
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Brett Sherwood has been with Horizon Engineering, LLC since June 2014. His previous experience included survey work performing APS surveying and mapping, working as an environmental technician for the King County Department of Natural Resources and Parks performing surface and groundwater sampling, and working as a technician with the State of Washington Department of Fish and Wildlife ocean sampling program. He is being trained to perform source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is receiving training in all EPA source test procedures from 2002 to present. He is also learning to use methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

PATRICK A. TODD
SHOP STEWARD/FIELD TECHNICIAN

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Working towards Associates of Facility Maintenance Technology at Portland Community College
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Patrick Todd has been with Horizon Engineering since 2009. He is the shop steward and equipment maintenance expert. He performs source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is thoroughly trained in all EPA source test procedures 2009-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

Josh Muswieck
FIELD TECHNICIAN I

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.S. in in Environmental Science, Oregon Institute of Technology, Klamath Falls, Or 2015
- Opacity & Visual Emissions Certified (EPA Method 9)
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protections, MSDS review, toxic and hazardous substances)
- DOT Medical Card
- Transportation Worker Identification Credential (TWIC) approved
- Respirator Fit-Tested
- Red Cross First Aid & CPR Certified
- Aerial Boom/Scissor Lift Certified Operator

PROFESSIONAL EXPERIENCE

Josh Muswieck joined Horizon Engineering in 2016. He has previous work experience as a Biological Science Technician for the USGS and Research Assistant for Oregon Tech Environmental Science Department. He is receiving training in all EPA source test procedures and is also learning to use methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

PAUL LAWAI'A BERCE
FIELD TECHNICIAN I

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.S. in Environmental Science from Oregon State University, Corvallis, Oregon, 2015
- C-Stop certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- DOT Medical Card
- Transportation Worker Identification Credential (TWIC) approved
- Respirator fit tested
- Lift equipment operator certified

PROFESSIONAL EXPERIENCE

Paul Berce has been with Montrose Air Quality Service since February 2016. His previous experience included work as an invasive species eradication Field Associate 1 for the Maui Invasive Species Committee, a non-profit, community and county funded organization on Maui, Hawaii. There, he led field crews on eradication and containment of target plant and animal species through survey methodologies and point source treatment. He was trained in the proper identification/handling of chemicals (pesticides and herbicides) and their responsible and proper application. He is receiving training in all EPA source test procedures and is learning to use methods from the National Council for Air &Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

SLEIGHT HALLEY
FIELD TECHNICIAN I

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.S. in Chemistry from Carroll College, Helena, Montana, 2012
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- DOT Medical Card
- Transportation Worker Identification Credential (TWIC) Approved

PROFESSIONAL EXPERIENCE

Sleight Halley has been with Horizon Engineering since January, 2016. His previous experience included work as an analytical chemist with Analytical 360 LLC in Yakima, Washington. He is receiving training in all EPA source test procedures and is also learning to use methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

THOMAS A. RHODES, E.I.T., QSTI (GI-IV)
DISTRICT MANAGER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Qualified Source Test Individual (QSTI)
  - Group I, *Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, *Manual Gaseous Pollutants Source Sampling Methods*
  - Group III, *Gaseous Pollutants Instrumental Methods*
  - Group IV, *Hazardous Metals Measurements*
- Engineer in Training (E.I.T.) Certification, 2001
- B.S. in Chemical Engineering from University of California in Santa Barbara, 2001
- Attended Allan Hancock College in Santa Maria, California, 1996-1998
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- North Slope Training Co-operative class for Unescorted North Slope Safety Orientation (Awareness Level)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL DEVELOPMENT

- Stationary Source Sampling and Analysis for Air Pollutants (SSSAAP) Conference, 2008

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)
- American Chemical Society (ACS)

PROFESSIONAL EXPERIENCE

Thomas Rhodes has been with Horizon Engineering since 2002. He brings three prior years experience as an engineering associate and engineering intern for several companies. He has performed source tests at hundreds of industrial sources. He performs source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, and in-field data recording. He is thoroughly trained in all EPA source test procedures 2002-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

MICHAEL E. WALLACE, P.E.
SENIOR ENGINEER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Professional Engineer (P.E.) from the State of Oregon, 2002-present
- B.S. in Mechanical Engineering from Oregon State University in Corvallis, Oregon, 1989
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL DEVELOPMENT

- Stationary Source Sampling and Analysis for Air Pollutants (SSSAAP) Conference, approximately 5 years

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Mike Wallace has been with Horizon Engineering since 1991. He is responsible for performing calculations, formulating spreadsheets, quality assurance review, and operating Horizon's gas chromatograph. He is thoroughly trained in all EPA source test procedures 1991-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

ANDY VELLA, P.E., QSTI (GI-IV)
ENGINEER
TECHNICAL WRITER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- Professional Engineer (P.E.) Oregon license #87091PE
- Qualified Source Test Individual (QSTI)
  - Group I, *Manual Gas Volume and Flow Measurements and Isokinetic Particulate Sampling Methods*
  - Group II, *Manual Gas Source Sampling Methods*
  - Group III, *Gaseous Pollutants Instrumental Sampling Methods*
  - Group IV, *Hazardous Metals Measurement Sampling Methods*
- B.S. in Chemical Engineering from University of Illinois in Urbana, IL, 2005
- Minor in Mathematics
- Certified Visible Emissions Evaluator
- C-Stop Certified (includes refinery operations, industrial accident prevention, PPE, LOTO, HAZCOM/HAZMAT, confined space, emergency response, respiratory protection, MSDS review, toxic and hazardous substances)
- Aerial Platform Certified
- Transportation Worker Identification Credential (TWIC) Approved
- International Air Transport Association (IATA) Trained
- Respirator Fit-Tested
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL MEMBERSHIPS

- Source Evaluation Society (SES)

PROFESSIONAL EXPERIENCE

Andras Vella has been with Horizon Engineering since 2011. He brings six prior years experience from Clean Air Engineering in Illinois. His primary duty before joining Horizon was FTIR repair, operation, and data review. He has performed source tests at hundreds of industrial sources. He performs source emission testing and activities related to source emission testing, including field sampling, test equipment maintenance and calibration, equipment preparation, in-field data recording, data reduction and analysis, quality assurance review and report preparation. He is thoroughly trained in all EPA source test procedures 2005-present. He is also experienced using methods from the National Council for Air & Stream Improvement (NCASI), Oregon Department of Environmental Quality (ODEQ), California Air Resource Board (CARB), National Institute for Occupational Health and Safety (NIOSH), Occupational Safety and Health Administration (OSHA), and the American Society for Testing and Materials (ASTM).

MAURI FABIO
TECHNICAL REPORT WRITER

EDUCATION/PROFESSIONAL CERTIFICATIONS/TRAINING

- B.A. in Geology from University of Hawaii at Manoa in Honolulu, HI, 2011
- Certified Visible Emissions Evaluator
- Adult CPR Certified
- Standard First Aid Certified

PROFESSIONAL EXPERIENCE

Mauri Fabio joined Horizon Engineering in 2016. Her current responsibilities include data reduction and analysis, quality assurance review, and report preparation. She has a year experience with the United Stated Geological Survey (USGS) with laboratory analysis, data collection and processing, testing, field research, report preparation, and mapping preparation. She has experience with laboratory instrumentation such as a scanning electron microscopy (SEM) and energy dispersive x-ray microanalysis (EDS). Field work and data collection in Death Valley and worked with the deformation group at the USGS on Mt. Hood for reconnoitering potential sites for remote instrumentation.

Total Chromium & Hexavalent Chromium Data Collection

Description of Total Chromium & Hexavalent Chromium Testing

Raw Analytical Test Results for Cr & Cr^{+6}

Field Data Sheets Relating to Cr & Cr^{+6} Testing

Total Chromium and Hexavalent Chromium Data Collection

The source testing of Glass Furnace T7 and Baghouse BH-1 on April 26-29, 2016 included testing of total chromium and chromium VI per EPA Method 0061. The purpose of this testing was to establish a maximum allowable chromium III usage rate based on potential chromium VI emissions pursuant to temporary rules provided in OAR 340-244-9040.

Bullseye is not proposing to use the April 26-29, 2016 Method 0061 testing to establish a maximum allowable chromium III usage rate. The preliminary data received and a subsequent evaluation of the operating parameters during the test indicate the data is inconclusive and is not representative of past or future operating conditions.

Analytical data for total chromium and chromium VI and field data collected during the testing is included in this report. The data shows significant variation of potential chromium emissions across the three test runs indicating inconclusive results. In addition, chromium VI was detected in most of the samples at concentrations above the total chromium results indicating potential interference.

Further, in order to lower the furnace exhaust gas temperatures to protect the Teflon probes required by Method 0061, ambient air was introduced into the furnace exhaust stream prior to entering the baghouse. Introducing ambient air into the furnace exhaust likely influenced the detected levels of chromium VI during the test. The furnace exhaust configuration combined with the ambient air cooling methods used during the source test is not representative of past or future source operation planned at the facility and Bullseye is not requesting that DEQ approve a chromium usage rate based on these results. If Bullseye seeks a future maximum chromium III usage rate pursuant to the procedures described in OAR 340-244-9040, a new source test plan will be submitted to DEQ for review and approval.

HORIZON ENGINEERING

PROJECT: 57202-BULLSEYE GLASS

CLIENT # H007
REPORT # 16-271

SUBMITTED BY:
CHESTER LabNet
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TIGARD, OR 97223
(503)624-2183/FAX (503)624-2653
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CHESTER LabNet

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Case Narrative

Date: May 5, 2016

General Information

Client:	Horizon Engineering
Client Number:	H007
Report Number:	16-271
Sample Description:	Impinger Trains
Sample Numbers:	16-S425 – 14-S447

Analysis

Analytes:	Cr VI, Total Cr
Analytical Protocols:	SW-846 Method 0061
Analytical Notes:	IC-PCR was used to measure hexavalent chromium and ICP was used to measure total chromium. The filter and probe rinse samples were digested per EPA method 29 and taken to 250 mL prior to analysis by ICP. Results have not been blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

Paul Duda 5/5/16

Project Manager Date
Paul Duda

Lab ID: 16-S425
Client ID: 1A Teflon Filter Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	32.4	0.500	8.11	0.125

Lab ID: 16-S426
Client ID: 1A HNO3 Rinse Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	45.8	0.500	11.5	0.125

Lab ID: 16-S427
Client ID: 1A KOH Imp Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 500. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	1040	0.020	518.	0.010
Total Cr	1070	0.500	536.	0.250

Lab ID: 16-S428
Client ID: 1B Teflon Filter Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	82.0	0.500	20.5	0.125

Lab ID: 16-S429
Client ID: 1B HNO3 Rinse Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	16.7	0.500	4.17	0.125

Lab ID: 16-S430
Client ID: 1B KOH Imp Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 460. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	559.	0.020	257.	0.009
Total Cr	549.	0.500	253.	0.230

Lab ID: 16-S431
Client ID: 1C Teflon Filter Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	35.1	0.500	8.78	0.125

Lab ID: 16-S432
Client ID: 1C HNO3 Rinse Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	18.3	0.500	4.57	0.125

Lab ID: 16-S433
Client ID: 1C KOH Imp Inlet
Site: Bullseye Glass
Sample Date: 4/27/16
Sample Volume: 485. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	2050	0.020	994.	0.010
Total Cr	1990	0.500	964.	0.242

Lab ID: 16-S434
Client ID: 2 Teflon Filter Inlet
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	33.6	0.500	8.39	0.125

Lab ID: 16-S435
Client ID: 2 HNO3 Rinse Inlet
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	8.04	0.500	2.01	0.125

Lab ID: 16-S436
Client ID: 2 KOH Imp Inlet
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 480. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	2160	0.020	1,030	0.010
Total Cr	2020	0.500	972.	0.240

Lab ID: 16-S437
Client ID: 3 Teflon Filter Inlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	36.9	0.500	9.22	0.125

Lab ID: 16-S438
Client ID: 3 HNO3 Rinse Inlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	2.74	0.500	0.684	0.125

Lab ID: 16-S439
Client ID: 3 KOH Imp Inlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 545. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	790.	0.020	431.	0.011
Total Cr	790.	0.500	431.	0.272

Lab ID: 16-S440
Client ID: 3 Teflon Filter Outlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 250. mL

	µg/L		µg/sample	
Analyte	Conc.	MDL	Conc.	MDL
Total Cr	26.1	0.500	6.52	0.125

Lab ID: 16-S441
Client ID: 3 HNO3 Rinse Outlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 250. mL

	µg/L		µg/sample	
Analyte	Conc.	MDL	Conc.	MDL
Total Cr	1.10	0.500	0.276	0.125

Lab ID: 16-S442
Client ID: 3 KOH Imp Outlet
Site: Bullseye Glass
Sample Date: 4/29/16
Sample Volume: 485. mL

	µg/L		µg/sample	
Analyte	Conc.	MDL	Conc.	MDL
Cr VI	205.	0.020	99.4	0.010
Total Cr	198.	0.500	95.8	0.242

Lab ID: 16-S443
Client ID: Filter Blank #1
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

	µg/L		µg/sample	
Analyte	Conc.	MDL	Conc.	MDL
Total Cr	< MDL	0.500	< MDL	0.125

Lab ID: 16-S444
Client ID: Filter Blank #2
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

	µg/L		µg/sample	
Analyte	Conc.	MDL	Conc.	MDL
Total Cr	< MDL	0.500	< MDL	0.125

Lab ID: 16-S445
Client ID: H2O Blank
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	< MDL	0.500	< MDL	0.125

Lab ID: 16-S446
Client ID: 0.1N HNO3 Blank
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 250. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Total Cr	< MDL	0.500	< MDL	0.125

Lab ID: 16-S447
Client ID: KOH Blank
Site: Bullseye Glass
Sample Date: 4/28/16
Sample Volume: 790. mL

Analyte	µg/L Conc.	µg/L MDL	µg/sample Conc.	µg/sample MDL
Cr VI	1.06	0.020	0.837	0.016
Total Cr	0.843	0.500	0.666	0.395

QA/QC Report

Client Name: Horizon Engineering
Project Number: H007
Analytical Technique: ICP - Optima 8300
Sample Description: SW-846 0061 filter and probe rinse
Report Number: 16-271

Blank Data

Analyte	Sample ID	Measured Conc. µg/L	MDL Conc. µg/L
Cr	ICB	< MDL	0.500
Cr	Prep_Blk	< MDL	0.500
Cr	CCB	< MDL	0.500
Cr	CCB	< MDL	0.500
Cr	CCB	< MDL	0.500

*: Method Blank concentration in µg/filter

Calibration QC

Analyte	Sample ID	Standard Conc. µg/L	Measured Conc. µg/L	Percent Recovery
Cr	ICV	2500	2510	100.3
Cr	*CRI*	*2.50*	*2.74*	*109.6*
Cr	CCV	2500	2420	96.7
Cr	CCV	2500	2450	98.0
Cr	CCV	2500	2380	95.4
Cr	CCV	2500	2320	92.8

CRI Limits: 70% - 130% Recovery

Replicate Data

Analyte	Sample ID	Sample Conc. µg/L	Replicate Conc. µg/L	RPD
Cr	16-S425	32.45	34.73	6.79
Cr	16-S426	45.84	45.12	1.58
Cr	16-S440	26.07	26.78	2.69
Cr	16-S441	1.105	0.820	29.6 #

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

Laboratory Control Sample/Matrix Post Spike Analysis

Analyte	Sample ID	Sample Conc. µg/L	Spike Conc. µg/L	Spike Amount µg/L	Percent Recovery
Cr	16-S428	82.05	2451.	2500.	94.8
Cr	16-S429	16.68	2374.	2500.	94.3
Cr	16-S440	26.07	2461.	2500.	97.4
Cr	16-S441	1.105	2376.	2500.	95.0

Percent Recovery = (spike - sample)/spike amount*100
*: per EPA CLP protocol, control limits do not apply if spike concentration is less than 25% of the sample concentration

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Duplicates: 20% RPD *Spikes: ± 25%*

QA/QC Report

Client Name: Horizon Engineering
Project Number: H007
Analytical Technique: IC-PCR
Sample Description: SW-846 Method 0061 Impinger Catch
Report Number: 16-271

Blank Data

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

*: Method Blank concentration in µg/filter

Calibration QC

Analyte	Sample ID	Standard Conc. µg/L	Measured Conc. µg/L	Percent Recovery
Cr VI	ICV	1.00	0.98	97.9
Cr VI	CCV	1.00	0.95	95.2

Duplicate Data

Analyte	Sample ID	Sample Conc. µg/L	Replicate Conc. µg/L	RPD
Cr VI	16-S427	1040	1010	2.64

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

Laboratory Control Sample/Matrix Spike Analysis

Analyte	Sample ID	Sample Conc. µg/L	Spike Conc. µg/L	Spike Amount µg/L	Percent Recovery
Cr VI	16-S439	790.	1810	1000	102.

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

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Replicates: ± 20% RPD *Post Spikes: ± 25%*

QA/QC Report

```
Client Name:            Horizon Engineering
Project Number:         H007
Analytical Technique: ICP - Optima 8300
Sample Description:     SW-846 Method 0061 Impinger Catch
Report Number:          16-271
=====================================================
```

Blank Data

Analyte	Sample ID	Measured Conc. µg/L	MDL Conc. µg/L
Cr	ICB	< MDL	0.500
Cr	CCB	< MDL	0.500

*: Method Blank concentration in µg/filter

Calibration QC

Analyte	Sample ID	Standard Conc. µg/L	Measured Conc. µg/L	Percent Recovery
Cr	ICV	2500	2480	99.4
Cr	*CRI*	*2.50*	*2.55*	*102.2*
Cr	CCV	2500	2510	100.5

CRI Limits: 70% - 130% Recovery

Duplicate Data

Analyte	Sample ID	Sample Conc. µg/L	Duplicate Conc. µg/L	RPD
Cr	16-S427	1071.	1075.	0.37

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

Laboratory Control Sample/Matrix Spike Analysis

Analyte	Sample ID	Sample Conc. µg/L	Spike Conc. µg/L	Spike Amount µg/L	Percent Recovery
Cr	16-S430	549.3	2821.	2500.	90.9

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

QA/QC Limits
Continuing Calibration: ± 10% *LCS: ± 20%*
Duplicates: 20% RPD *Spikes: ± 25%*

CHESTER LABNET

SOURCE SAMPLE RECEIPT CHECKLIST

Client Horizon Date 5/2/16

Runs 6 + Blks Report

Custody Seals Inspected, If Present	NA	
Chain-of-Custody Form Inspected	✓	
CoC present with samples?	✓	*
CoC indicate analytical methodology to be used? (eg M29 etc)	✓	!!
CoC indicate if compliance testing? (esp. M26)	Not Stated	!!
M26 samples have Thiosulfate added in field?	NA	!!
M29 indicate FH/BH separate or combined?	NA	!!
Has Form Been Signed?	✓	
Have Date and Time Custody Released Been Noted on Form?	✓	
All Sample Containers Inspected	✓	
Does Number of Samples Match Number on CoC Form?	✓	!!
Do All Sample ID Numbers Match Those on the CoC Form?	✓	!!
Did client mark sample volumes prior to shipment?	✓	*
If required by method, did client vent samples prior to shipment?	NA	
Are the Sample Containers Intact?	✓	!!
Are signs of leakage present?	NO	*
Chain-of-Custody Form Signed and Dated by CLN	✓	
Corrective Actions		
Client Contacted Due to Mismatching Sample ID Numbers		
Client Contacted Due to Broken Sample Container(s)	5/3/16	
Client Contacted Due to Leaking Sample Container(s)		
Client contacted for verification of methodology?		
Corrective Actions Documented?		
Corrective Actions Accomplished?		

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

Signed Lisa Ball

Notes

16-271

Company Name: Horizon Eng.		
Contact: Thomas Rhodes	Phone: 503-255-5050	
E-Mail Address: trhodes@montrose-env.com	Fax	
Report Address: 13585 NE Whitaker Way		
City: Portland	State: OR	Zip: 97230
Billing Address: Same		
City: —	State: —	Zip: —
PO #	Project: 57202 - Bullseye Glass	

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cln@chesterlab.net

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Analysis Requested

Turn Around Time
☐ Standard
☑ Rush ASAP (Specify)

LabNet ID	Field Sample ID	Site	Sample Date	Volume (m^3)	Particle Size	Analysis Requested	Remarks
16-5425	1A teflon filter	Inlet	4/27/16	—	—		
426	1A HNO_3 Rinse	Inlet	"	—	—		
427	1A KOH Imp.	Inlet	"	—	—		
428, 429, 430	1B (Same as 1A)	Inlet	"	—	—	SEE	3 samples
431, 432, 433	1C (Same as 1A)	Inlet	"	—	—		3 Samples
434, 435, 436	2 (Same as 1A)	Inlet	4/28/16	—	—	NOTES	3 Samples
437, 438, 439	3 (Same as 1A)	Inlet	4/29/16	—	—		3 samples
440, 441, 442	3 (Same as 1A)	Outlet	4/29/16	—	—		3 Samples
16-5445	H_2O Blank	—	4/28/16	—	—		
5446	.1 N HNO_3 Blank	—	4/28/16	—	—		
5447	KOH Blank	—	4/28/16	—	—		
443, 444	Filter Blanks (x2)		4/28/16	—	—		~~Total Samples~~: 2 samples CN

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time	Notes
[signature] 5/2/16	Barbara Butler B.B. 5/2/16	Total Samples: 23
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time	EPA 0061 Analysis on <u>ALL</u> samples for Cr^{6+} & Total Cr
Barbara Butler 5-2-16 13:38	[signature] 5.2.16 13:40	

HORIZON ENGINEERING 16-5702

247

RAW DATA

Available upon request

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

PAGE 1 OF 4

Date 4/26/16
Test Method 0061
Concurrent Testing ODEQ 5
Run # 1
Operator SDML Support Joe H.
Temperature, Ambient (Ta) 83°F
Moisture ~10% Tdb — Twb —
Press., Static (Pstat) -.30 Press., Bar (Pb) 29.90
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .3100
2 .3100 } .3103
3 .3110

ALT-011
Std TC (ID/°F) SL/83
Stack TC (ID/°F) 2-2/83
Continuity Check (↑) or ↓

Client: Bullseye Glass
Facility Location: Portland, OR.
Source: Furnace T-7
Sample Location: Inlet of Baghouse

Probe 2-2 (g/s) Cp .8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0@6 Lo 0@6 Post @ @
Nozzle ~~.3107~~ .3103 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: .005 cfm 15 inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		1730	363.109				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1 12	10		365.29	.020	.169	.17	172			67	82	82	4
2 11	20		—	.115	.989	.99	119			67	82	81	4
3 10	30		374.61	.080	.694	.69	112			61	86	81	4
4 9	40		377.38	.032	.268	.27	138			60	90	82	3
5 8	50		380.67	.050	.419	.42	187			63	89	83	3
6 7	60		383.96	.046	.373	.37	161			62	92	84	3
☆ 7 6	70	1840/1850	385.935	.016	.132	.13	151			62	93	85	2
8 5	80		389 —	.051	.383	.38	212			64	91	87	3
9 4	90		392.45	.050	.375	.38	215			63	94	89	3
10 3	100		394.80	.013	.097	.10	215			60	96	89	2
11 2	110		397.00	.023	.180	.18	186			63	96	89	2
12 1	120		399.88	.033	.278	.28	141			63	95	91	3
13 1	130		406.01	.181	1.37	1.4	209			61	97	91	5
14 2	140		409.38	.033	.245	.25	227			56	~~9~~ 102	92	~~5~~ 3
15 3	150		413.84	.106	.781	.78	232			58	98	92	5
16 4	160		417.96	.075	.558	.56	227			59	102	92	4
17 5	170		—	.045	.350	.35	193			61	101	93	3
18 6	180		424.05	.044	.342	.34	193			63	99	92	3
19 7	190		426.89	.030	.248	.25	153			63	98	93	3
20 8	200		429.03	.019	.145	.15	204			63	96	93	3
21 9	210		431.11	.019	.139	.14	236			64	95	92	3
22 10	220		433.22	.021	.162	.16	195			65	95	92	3
☆ 23 11	230	2130/2133	435.651	.028	.216	.22	196			61	95	91	3
24 12	240	2143	438.30	.029	.234	.23	165			51	94	91	3
25													

Notes:
☆ 1840 → Paused to check Ph, Resumed at 1850
☆ 2130 → Paused to check Ph, Resumed at 2133

B:\Shared files\Field\Data Sheets\Method 5\Method 5_PDX-v1.pdf

Reviewed by [signature], DEQ 4/27/2016

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

PAGE 2 OF 4

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Furnace T-7
Sample Location: Inlet

Date 4/26/16
Test Method OO61
Concurrent Testing ODEQ 5
Run # 1

Glass Nozzle Measurements
1 ,3100
2 ,3100
3 ,3110
,3103

Probe 2-2 (g/s) Cp ,8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O — Pre: Hi 0 @ 6, Lo 0 @ 6; Post 0 @ 5, 0 @ 5

Operator John Support Joe H.
Temperature, Ambient (Ta) 74°F
-6% Moisture ~~10%~~ Tdb 229 Twb 114
Press., Static (Pstat) -,30 Press., Bar (Pb) 29,9
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) SL / 83
Stack TC (ID/°F) 2-2 / 83
Continuity Check (↑) or ↓

Nozzle ,3103 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 2 dH@ 1,97675 Y 0,99949
Meter Leak Check — Pretest: ,005 cfm 15 inHg; Post: ,010 cfm 12 inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
								Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
			2143	438.30										
1	12	250		441.02	,032	,266	,27	147			51	94	91	3
2	11	260		—	,039	~~,327~~ ,357	~~,33~~ ,36	143			51	95	90	3
3	10	270		447.59	,040	,370	,37	136			51	95	90	3
4	9	280	2225	450.15	,022	,207	,21	127			51	96	91	3
5	8	290	2321	453.12	,022	,183	,18	203			54	95	91	3
6	7	300		456.62	,041	,380	,38	120			66	89	87	3
7	6	310		460.15	~~,037~~ ,048	,425	,43	147			67	89	86	3
8	5	320		463.58	,049	,412	,41	180			66	90	86	3
9	4	330		466.73	,046	,361	,36	226			67	91	86	3
10	3	340		469.66	,040	,313	,31	227			65	91	85	3
11	2	350		—	,042	,331	,33	223			64	92	86	3
12	1	360		475.80	~~,08~~ ,043	,369	,37	169			62	93	87	3
13	1	370		480.26	,088	,757	,76	167			62	93	87	5
14	2	380		485.12	,094	,804	,80	172			60	95	87	4
15	3	390		489.875	,088	,760	,76	167			61	96	87	4
16	4	400		492.455	,023	,201	,20	161			60	96	87	3
17	5	410		494.97 496	,031	,257	,26	189			62	94	87	3
18	6	420		496.~~986~~ 996	,019	,155	,16	201			63	92	88	3
19	7	430		499.381	,026	,226	,23	160			63	92	87	3
20	8	440		502.54	,040	,359	,36	141			62	91	88	3
21	9	450		505.561	,038	,335	,34	152			61	92	87	4
22	10	460		508.275	,029	,267	,27	125			61	93	87	4
23	11	470		510.80	,027	,251	,25	120			62	92	88	4
24	12	480	239 4/27/16	512.962	,018	,168	,17				63	92	87	3
25		~~490~~												

12 → Volume before resuming 450.697

Notes: 2225 → At 282 min, 10 sec, paused to switch out trains
Volume 450.645 Leak check ,000 @ 7 inHg

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Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

PAGE 3 OF ~~3~~ 4 BC

Client: BULLSEYE GLASS
Facility Location: PORTLAND, OR
Source: FURNACE T7
Sample Location: INLET

Date 4/26/16 - 4/27/16
Test Method 0061
Concurrent Testing M5
Run # 1
Operator BC Support JM, JF, BS
Temperature, Ambient (Ta)
Moisture 6% Tdb Twb
Press., Static (Pstat) -.30 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

Glass Nozzle Measurements

1	.3100	.3103
2	.3100	
3	.3110	

ALT-011
Std TC (ID/°F) 83° JL
Stack TC (ID/°F) 83° 2-2
Continuity Check ↑ or ↓

Probe 2-2 (g)/s) Cp .8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @5 Post @
Lo 0 @5 @
Nozzle .3103 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: 0.006 cfm 15 inHg
Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	Pump Vacuum inHg (Pv)
☆		04:44	514.368										
1	490		517.197	.034	.293	.29	156			62	81	79	3
2	500		519.443	.022	.189	.19	156			63	82	79	3
3	510		522.537	.039	.328	.33	173			60	84	79	3
4	520		524.533	.020	.172	.17	159			57	86	80	3
5	530		526.753	.023	.198	.20	160			56	87	80	3
6	540		529.358	.030	.258	.26	161			57	87	80	3
7	550		531.579	.026	.228	.23	149			58	87	81	3
8	560		533.648	.017	.146	~~.14~~ BC .15	162			57	86	81	2
9	570		536.757	.044	.367	.37	179			57	85	82	3
10	580		538.989	.022	.182	.18	184			56	86	81	3
11	590		541.114	.019	.168	.17	140			57	86	80	3
12	600		543.239	.018	.159	.16	142			56	85	82	3
13 12	610		545.363	.018	.158	.16	141			57	85	81	3
☆ 14 11	620	07:04 / 07:12	547.382	.017	.150	.15	143			56	86	81	3
15 10	630		549.625	.023	.200	.20	153			59	84	82	3
16 9	640		552.109	.0276	.238	.24	158			58	84	81	3
17 8	650		554.175	.020	.181	.18	129			57	85	82	3
18 7	660		556.566	.025	.224	.22	130			58	85	81	3
19 6	670		558.300	.015	.133	.13	140			58	86	82	3
20 5	680		559.973	.014	.122	.12	151			59	86	81	3
21 4	690		561.650	.015	.132	.13	149			60	87	82	3
22 3	700		563.749	.021	.185	.19	148			60	87	83	3
23 2	710		565.493	.015	.132	.13	150			61	86	82	3
24 1	720		567.165	.014	.123	.12	149			62	86	83	3
25 1	730		568.634	.012	.102	.10	170			62	87	83	3

Notes:

☆ LEAK CHECK/TRAIN CHANGE FROM 512.962 - 514.368

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

PAGE 4 OF 4

Client: BULLSEYE GLASS
Facility Location: PORTLAND, OR
Source: FURNACE 7
Sample Location: INLET

Date 4/26/16 - 4/27/16
Test Method 0010
Concurrent Testing M5
Run # 1

Glass Nozzle Measurements
1 .3100
2 .3100
3 .310
.303

Probe 2-2 (g/s) Cp .8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @5 Post 0 @7
Lo 0 @5 0 @10

Operator BC Support JM, JF, BS
Temperature, Ambient (Ta)
Moisture 6% Tdb Twb
Press., Static (Pstat) -.30 Press., Bar (Pb) 29.9
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 83
Stack TC (ID/°F) 88 2-2
Continuity Check ↑ or ↓

Nozzle .303 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: 0.006 cfm 15 inHg
Post: 0.008 cfm 10 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
2	740		570.476	.017	.146	.15	161			61	87	84	3
3	750		572.584	.021	.182	.18	159			60	87	83	3
4	760	09:30	574.147	.020	.173	.17	158			58	87	84	3
5	770												
6	780												
7													
8													
9													
10													
11													
12													

Notes:

Field Data Sheet

switched nozzles just before starting run

PAGE 1 OF 4

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

.2583 ← .2580, .2580, .2590

Glass Nozzle Measurements
1 ~~.3100~~
2 ~~.3100~~
3 ~~.3110~~
~~.3103~~

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Furnace T-7
Sample Location: Inlet

Date 4/27/16
Test Method 0061
Concurrent Testing ODEQ 5
Run # 2
Operator Schult? Support Joe H.
Temperature, Ambient (Ta) 75°F
Moisture ~4% Tdb 202 Twb 105
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected? NO If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) SL / 75
Stack TC (ID/°F) 2-1 / 74
Continuity Check ↑ or ↓

Probe 2-1 (g/s) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @20 Post @; Lo 0 @12 @
Nozzle ~~.3103~~ .2583 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y .99949
Meter Leak Check (.001 @ 7) Pretest: ~~.012~~ cfm ~~10~~ inHg; Post: cfm inHg
changed nozzles

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
								Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
			1730	575.268										
1	1	10		—	.036	.122	.12	141			67	78	78	2
2	2	20		579.55	.053	.205	.21	147			62	80	78	2
3	3	30		581.95	.055	.206	.21	166			59	81	78	2
4	4	40		583.76	.031	.121	.12	197			57	84	79	2
5	5	50		585.74	.040	.155	.16	203			58	84	80	2
6	6	60		587.71	.035	.141	.14	182			56	86	82	2
7	7	70		—	.040	.175	.18	129			56	87	83	2
8	8	80		591.98	.038	.152	.15	186			56	88	84	2
9	9	90		593.87	.033	.132	.13	188			56	89	84	2
10	10	100		595.91	.036	.142	.14	195			58	89	85	2
11	11	110		597.77	.033	.129	.13	204			56	89	86	2
12	12	120		599.52	.030	.114	.11	226			57	89	85	2
13	12	130		601.70	.044	.181	.18	169			58	88	85	2
14	11	140		603.56	.035	.149	.15	149			55	89	86	2
☆ 15	10	150	2000 / 2004	605.697 / 605.697	.035	.147	.15	159			57	89	85	2
16	9	160		608.13	.045	.183	.18	176			54	88	86	2
17	8	170		610.26	.034	.139	.14	173			55	89	85	2
18	7	180		612.25	.036	.151	.15	161			56	89	86	2
19	6	190		613.91	.022	.092	.09	160			56	90	86	2
20	5	200		615.54	.023	.100	.10	134			58	90	86	2
21	4	210		—	.023	.092	.09	188			58	90	86	2
22	3	220		618.68	.021	.080	.08	218			58	89	86	2
23	2	230		620.15	.020	.077	.08	217			58	89	86	2
24	1	240	2134	621.77	.028	.107	.11	219			58	89	87	2
25														

Notes: used the stack temp. of the ODEQ 5 for point #12 because the thermocouple was out of the stack.

☆ Paused at 150 min. to check the ph. (2000)

Field Data Sheet

PAGE 2 OF 4

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR.
Source: Furnace T-7
Sample Location: Inlet

Date 4/27/16
Test Method 0061
Concurrent Testing ODEQ 5
Run # 2
Operator John Support Joe H.
Temperature, Ambient (Ta) 75°F
Moisture ~3% Tdb 156 Twb 95
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .2580
2 .2580 → .2583
3 .2590

ALT-011
Std TC (ID/°F) 52 / 75
Stack TC (ID/°F) 2-1 / 74
Continuity Check ↑ or ↓

Probe ~~2-22-1~~ (g/s) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @20 Post @ Lo 0 @12 @
Nozzle .2583 Oven — Imp. Outlet <35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check .001 @ 7 Pretest: ~~.012~~ cfm ~~10~~ inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		2134	621.77				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1 1	250		623.74	.035	.139	.14	191			58	89	87	2
2 2	260	2156	625.73	.033	.143	.14	163			56	89	86	2
3 3	270	2159	627.97	.029	.126	.13	156			56	89	86	2
4 4	280		~~631.~~	.023	.099	.10	167			52	89	86	2
5 5	290		631.50	.022	.093	.09	180			55	89	86	2
6 6	300	2241	633.14	.022	.090	.09	213			57	89	86	2
7 7	310	2310	634.58	.018	.071	.07	224			58	89	86	2
8 8	320		636.74	.038	.166	.17	156			60	85	85	2
9 9	330	2339	639.40	.055	.245	.25	144			56	85	85	2
10 10	340	2343	642.20	.058	.251	.25	162			52	86	83	2
11 11	350		644.81	.059	.245	.25	187			53	86	83	2
12 12	360	0009	647.37	.066	.265	.27	211			52	87	83	~~2~~ 3
13 12	370		650.04	.064	.253	.25	221			51	87	83	3
14 11	380		652.71	.060	.235	.24	227			51	87	83	3
15 10	390		655.41	.065	.270	.27	188			53	87	83	3
16 9	400		657.—	.042	.185	.19	151			52	87	83	2
17 8	410		659.90	.044	.198	.20	137			54	87	83	2
18 7	420		661.77	.022	.098	.10	145			54	87	83	2
19 6	430		663.402	.021	.094	.09	139			56	87	83	2
20 5	440		664.885	.020	.0898	.09	139			56	87	83	2
21 4	450		666.186	.015	.062	.06	190			56	86	83	2
22 3	460		667.628	.022	.086	.09	209			57	86	83	2
23 2	470		668.985	.020	.079	.08	221			57	86	83	2
24 1	480	02:09	670.246	.019	~~.079~~ .08	.079	189			56	86	83	2
25													

Notes: ★ 262 min → paused to check ph ~~(2157)~~ (2156) – Resumed at (2159)
★ 305 min → Paused to allow plant personell to purge. (2241) → Resumed at (2310)

★ Notes on Back

More Notes on Back

~~Ø~~ Paused ~~off~~ at 334 min, (2339) <Checking the ph again>
- Resumed at (2343)

Field Data Sheet

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MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye
Facility Location: Portland, OR.
Source: Furnace T-7
Sample Location: Inlet

Date 4/27/16 - 4/28/16
Test Method 0061
Concurrent Testing M5
Run # 2
Operator BC Support JM, JF, BS
Temperature, Ambient (Ta)
Moisture ~3% Tdb Twb
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .2580 Teflon
2 .2580 .2583
3 .2590

ALT-011
Std TC (ID/°F) 75° 2
Stack TC (ID/°F) 74° 2-1
Continuity Check ↑ or ↓

Probe 2-1 Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @20 Lo 0 @12 Post @ @
Nozzle .2583 Oven — Imp. Outlet
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: .001 cfm 7 inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		02:38	670.246				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	490		671.663	.017	.076	.08	138			56	82	83	2
2	500		673.173	.022	.098	.10	140			58	84	82	2
3	510		674.598	.021	.093	.09	143			56	84	81	2
4	520		675.813	.016	.073	.07	130			57	85	81	2
5	530		677.088	.017	.077	.08	133			57	84	82	2
6	540		678.319	.015	.067	.07	134			57	85	82	2
7	550		679.739	.021	.096	.10	127			58	85	82	2
8	560		681.490	.030	.132	.13	149			58	84	81	2
9	570		683.563	.036	.156	.16	156			58	85	81	2
10	580		685.064	.025	.108	.11	159			56	84	81	2
11	590		686.526	.022	.095	.10	160			57	84	81	2
12	600		688.095	.023	.100	.10	155			58	84	80	2
13 12	610		689.712	.022	.095	.10	161			57	84	81	2
14 11	620		691.371	.027	.117	.12	158			58	85	81	2
15 10	630		692.987	.026	.113	.11	159			58	85	82	2
16 9	640		694.599	.031	.133	.13	165			57	86	82	2
17 8	650		696.289	.030	.131	.13	153			57	84	81	2
18 7 ✱	660	05:30 05:45	697.900	.024	.105	.11	156			56	84	81	3
19 6	670		699.013	.016	.070	.07	149			58	82	79	3
20 5	680		700.240	.019	.084	.08	148			59	83	79	3
21 4	690		701.431	.015	.067	.07	140			60	84	80	3
22 3	700		702.445	.014	.063	.06	137			60	83	79	3
23 2	710		703.583	.015	.066	.07	145			60	83	80	3
24 1	720		704.724	.015	.067	.07	139			60	82	79	3
25 1	730		705.860	.013	.058	.06	142			61	82	79	3

Notes: ✱ PAUSED FOR pH CHECK @ 05:30

Field Data Sheet

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MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND, OR
Source: FURNACE T-7
Sample Location: ~~OUTLET~~ Inlet PF 5/9/16

Date 4/27/16 ~ 4/28/16
Test Method 0061
Concurrent Testing M5
Run # 2
Operator BC Support JM, JF, BS
Temperature, Ambient (Ta)
Moisture ~3% Tdb Twb
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

Glass Nozzle Measurements

1	.2580	.2583
2	.2580	
3	.2590	

ALT-011
Std TC (ID/°F) 75° JL
Stack TC (ID/°F) 74° 2-1
Continuity Check ↑ or ↓

Probe 2-1 (G/S) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @20 Post 0 @10
Lo 0 @12 0 @6
Nozzle .2583 Oven — Imp. Outlet -35
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: 0.001 cfm 7 inHg
Post: 0.010 cfm 5 inHg

	Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts) Amb:	PROBE °F (Tp) Amb:	OVEN Filter °F (To) Amb:	IMPINGER Outlet °F (Ti) Amb:	METER Inlet/Avg. °F (Tm-in) Amb:	METER Outlet °F (Tm-out) Amb:	Pump Vacuum inHg (Pv)
1	2	740		707.037	.017	.075	.08	143			60	83	80	3
2	3	750		708.100	.016	.070	.07	149			60	82	79	3
3	4	760		709.301	.017	.076	.08	141			61	82	79	3
4	5	770		710.792	.021	.095	.10	133			61	82	80	3
5	6	780		712.292	.024	.107	.11	139			60	82	79	3
6	7	790		713.652	.021	.092	.09	150			60	81	78	3
7	8	800		714.757	.016	.071	.07	142			60	80	78	3
8	9	810		715.840	.016	.071	.07	139			60	81	78	3
9	10	820		717.542	.031	.137	.14	141			61	80	78	3
10	11	830		719.207	.029	.128	.13	143			60	81	78	3
11	12	840		720.354	.015	.066	.07	146			61	82	78	3
12	12	850		721.466	.016	.071	.07	145			61	82	79	3
13	11	860		722.816	.018	.081	.08	136			61	82	78	3
14	10	870		724.408	.026	.117	.12	134			62	82	79	3
15	9	880		726.134	.029	.130	.13	133			62	82	78	3
16	8	890	09:30	726.733	.030	.135	.14	134			63	82	79	3
17	7													
18	6													
19														
20														
21														
22														
23														
24														
25														

Notes:

Field Data Sheet

PAGE 1 of 4

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

- At 1735 did a wet bulb/dry bulb, Dry=205, wet=115 ~ 6.8%

Client: Bullseye Glass
Facility Location: Portland, OR.
Source: Furnace T-7
Sample Location: Inlet

Date 4/28/16
Test Method 0061
Concurrent Testing ODEQ 5
Run # 3
Operator John Support Joe H.
Temperature, Ambient (Ta) 86°F
Moisture ~3% Tdb — Twb —
Press., Static (Pstat) -.3 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements (Teflon)
1 .2580
2 .2580
3 .2590
.2583

ALT-011
Std TC (ID/°F) JL / 86°F
Stack TC (ID/°F) 2-2 / 86°F
Continuity Check (↑) or ↓

Probe 2-2 ~~(g/s)~~ Cp .8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @15 Post @ ; Lo 0 @16 @
Nozzle .2583 Oven — Imp. Outlet 1-20
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: .010 cfm 8 inHg ; Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Fv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
		1700	727.156										
1 12	10		729.24	.039	.173	.17	151			66	85	84	2
2 11	20		731.36	.037	.163	.16	153			65	85	84	2
3 10	30		733.50	.041	.169	.17	197			65	86	84	2
4 9	40		735.48	.032	.131	.13	202			65	88	85	2
5 8	50		737.15	.021	.087	.09	198			64	90	87	2
6 7	60		738.82	.026	.102	.10	196			63	92	87	2
7 6	70		740.60	.025	.108	.11	153			62	93	89	2
8 5	80		742.26	.027	.102	.10	236			62	95	90	2
9 4	90		744.37	.043	.161	.16	249			63	95	91	2
10 3	100		746.19	.031	.116	.12	252			60	96	92	2
11 2	110		748.70	.061	.227	.23	256			62	97	93	3
12 1	120		751.60	.067	.282	.28	187			58	98	93	3
13 1	130		754.63	.071 ~~.305~~	.305	.31	174			56	100	94	3
14 2	140		757.35	.062	.245	.25	242			56	100	95	3
15 3	150	1930	760.28	.072	.279	.28	253			58	100	95	3
16 4	160		762.41	.038	.146	.15	262			55	100	95	3
17 5	170		764.71	.046	.180	.18	252			57	99	95	3
18 6	180		766.70	.030	.119	.12	243			56	98	95	2
19 7	190		768.72	.030	.137	.14	149			57	98	95	3
20 8	200		770.68	.030	.139	.14	138			58	97	95	3
21 9	210		772.19	.019	.081	.08	189			57	97	95	2
22 10	220		773.70	.020	.081	.08	223			60	97	94	2
23 11	230	2050 / 2118	775.680	.021	.082	.08	253			61	96	93	3
24 12	240	2128	778.23	.054	.226	.23	201			66	94	93	3
25													

Did a wet bulb/dry bulb at 2050 wet → 115 dry → 225 ~6%

JL 4/28/16

Notes: * Paused at 2050 to allow plant personell to purge. (230 min. of run time) (Also checked the ph at this time) - Resumed testing at 2118

Field Data Sheet

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HORIZON ENGINEERING LLC
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR.
Source: Furnace T-7
Sample Location: Inlet

Date 4/28/16
Test Method OO61
Concurrent Testing ODEQ 5
Run # 3
Operator John L. Support Joe H.
Temperature, Ambient (Ta) 76°F
Moisture ~3% Tdb ~ Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .2580
2 .2580 → .2583 Teflon
3 .2590

ALT-011
Std TC (ID/°F) JL / 86°F
Stack TC (ID/°F) 2-2 / 86°F
Continuity Check (↑) or ↓

Probe 2-2 (g/s) Cp .8364 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 15 Post @ ; Lo 0 @ 16 @
Glass Nozzle .2583 Oven — Imp. Outlet 1-20
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: .010 cfm 8 inHg ; Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
		2128	778.23										
1	250		780.55	.046	.195	.20	191			57	93	92	3
2	260		782.86	.040	.181	.18	152			57	94	91	3
3	270		784.71	.028	.119	.12	192			56	94	91	2
4	280		786.19	.023	.094	.09	215			59	93	91	2
5	290		787.61	.013	.053	.05	209			61	93	91	2
6	300		788.97	.020	.079	.08	233			64	93	91	3
7	310		790.70	.024	.098	.10	212			61	93	91	3
8	320		792.96	.042	.181	.18	182			58	94	91	4
9	330		795.74	.061	.270	.27	165			53	95	92	4
10	340		———	.069	.309	.31	158			50	96	91	4
11 ☆	350	2327	801.78	.074	.326	.33	169			50	96	91	5
12	360	2331 2332	804.82	.081	.351	.35	179			49	96	92	5
13	370		~~607~~ 807.65	.068	.276	.28	222			53	95	92	5
14	380		810.50	.075	.300	.30	232			50	95	92	~~7~~ 9 JL 4/28/16
15	390		812.82	.047	.186	.19	240			49	95	92	6
16	400		815.24	.051	.215	.22	194			52	94	91	10
17	410		817.10	.029	.122	.12	170			52	94	91	8
18	420		818.72	.024	.107	.11	158			55	94	91	8
19	430	0046	820.11	.020	.089	.09	160			57	93	91	8
20	440	1302	822.08	.024	.114	.11	121			57	93	90	15 →
21	450		823.487	.023	.093	.09	220			63	91	89	2
22	460		824.885	.022	.089	.09	217			63	91	89	2
23	470		826.432	.028	.112	.11	230			61	91	89	2
24	480	0147	827.991	.026	.104	.10	226			62	91	89	2
25													

Vacuum 2in. after [illegible]

Notes: ☆ Paused at 2327 to check ph. - Resumed testing at ~~2332~~ 2331 (359 min. of testing)
☆ Paused at (434 min) 0046 - leak check .014 @ 18 in Hg → [illegible] silica gel to decrease the vacuum.
DGM [illegible] 821.032 [illegible]

Leak check after shaking siliza gel .011 @ 1inHg

260

DGM = 821,245 before resuming. → Resumed testing at 1302

Field Data Sheet

PAGE 3 of 4

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND, OR
Source: FURNACE T-7
Sample Location: B INLET

Date 4/28/16 - 4/29/16
Test Method 0061
Concurrent Testing M5
Run # 3
Operator BC Support JM, CH, BS, PB
Temperature, Ambient (Ta)
Moisture ~3% Tdb — Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .2580
2 .2580 } .2583
3 .2593

ALT-011
Std TC (ID/°F) 86° JL
Stack TC (ID/°F) 86° 2-2
Continuity Check ↑ or ↓

Probe 2-2 (g/s) Cp .840 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 15 Post @ ; Lo 0 @ 16 @
Nozzle .2583 Oven — Imp. Outlet
Filter — Heat Set — °F
Meter Box 2 dH@ 1.97675 Y 0.99949
Meter Leak Check Pretest: 0.011 cfm 7 inHg ; Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
		02:14	827.991										
1	490		829.240	.016	.071	.07	162			62	90	88	2
2	500		830.600	.019	.084	.08	160			62	89	87	2
3	510		832.168	.022	.098	.10	168			62	88	86	2
4	520		833.589	.018	.081	.08	147			60	88	86	2
5	530		834.982	.020	.087	.09	170			59	88	86	2
6	540		836.070	.013	.056	.06	178			60	88	86	2
7	550		837.237	.014	.060	.06	177			61	88	86	2
8	560		838.152	.010	.043	.04	182			60	88	86	2
9	570		839.260	.014	.061	.06	167			61	89	86	2
10	580		840.332	.012	.053	.05	164			59	89	87	2
11	590		841.442	.016	.068	.07	182			60	89	87	2
12	600		842.576	.014	.062	.06	155			60	89	87	2
13 12	610		843.628	.014	.063	.06	147			58	89	87	2
14 11	620		844.856	.015	.067	.07	150			59	89	86	2
15 10	630		846.241	.020	.091	.09	146			60	89	86	2
16 9	640		847.539	.017	.076	.08	150			56	88	86	2
17 8	650		848.646	.014	.059	.06	182			56	88	86	2
18 7	660		849.745	.014	.063	.06	146			57	89	86	2
19 6	670		850.990	.017	.078	.08	137			56	89	86	2
20 5	680		852.087	.012	.055	.06	140			56	88	86	2
21 4	690		852.977	.011	.049	.05	157			57	88	86	2
22 3	700		854.138	.017	.075	.08	161			59	87	86	2
23 2	710	Re: .05 / Sc: .13	855.269	.013	.057	.06	167			59	88	86	2
24 1	720		856.347	.012	.052	.05	171			60	87	86	2
24 1	730		—	.015	.066	.07	163			59	86	84	2

Notes:
B:\Shared files\Field\Data Sheets\Method 5\Method 5_v2.pdf

PAUSE FOR pH CHECK

Field Data Sheet

PAGE 4 of 4

HORIZON ENGINEERING
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: BULLSEYE GLASS
Facility Location: PORTLAND, OR
Source: FURNACE T-7
Sample Location: INLET

Date 4/28/16 – 4/29/16
Test Method OS(0)
Concurrent Testing M5
Run # 3
Operator BC Support JM, CH, BS, PB
Temperature, Ambient (Ta)
Moisture ~3% Tdb — Twb —
Press., Static (Pstat) -0.3 Press., Bar (Pb) 30.10
Cyclonic Flow Expected ? N If yes, avg. null angle — degrees

Glass Nozzle Measurements
1 .2580
2 .2580 } .2583
3 .2590

ALT-011
Std TC (ID/°F) 86° JL
Stack TC (ID/°F) 86° 2-2
Continuity Check ↑ or ↓

Probe 2-2 (g/s) Cp .836 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @15 Post 0 @ 7; Lo 0 @16 0 @ 6
Nozzle .2583 Oven — Imp. Outlet 1-20
Filter — Heat Set — °F
Meter Box 2 dH@ 1.9765 Y 0.99949
Meter Leak Check Pretest: 0.011 cfm 7 inHg; Post: 0.014 cfm 16 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
2	740		858.599	.013	.057	.06	162			60	88	86	2
3	750		859.634	.012	.053	.05	163			58	87	85	2
4	760		860.785	.012	.053	.05	159			58	86	84	2
5	770		862.156	.015	.066	.07	161			58	86	84	2
6	780	07:23	863.542	.018	.079	.08	161			57	87	84	2
* 7	790	07:26	864.725	.013	.056	.06	179			58	87	84	2
8	800		866.200	.020	.085	.09	183			57	87	85	2
9	810		867.738	.022	.101	.10	134			58	87	85	2
10	820		869.219	.019	.087	.09	140			57	88	85	2
11	830		870.403	.011	.058	.06	138			59	88	86	2
12	840		871.714	.015	.071	.07	120			58	88	86	2
12	850		873.100	.016	.075	.08	124			60	89	86	2
11	860		874.597	.019	.089	.09	121			61	89	87	2
10	870		875.977	.016	.073	.07	145			60	90	86	2
9	880	07:00	876.368	.014	.061	.06	163			60	89	86	2
8	890												
7	900												
6													
5													
4													
3													
2													
1													

Notes:

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505
www.montrose-env.com

Sample Recovery Worksheet

Method 0061

Client: Bullseye
Facility Location: Portland, OR
Operator: JF, JH

Date: 4/26 4/27/16
Source: Glass Furnace T7
Sample Location: Inlet

Balance Calibration (1000, 500, 200 g) Tolerance must be within ± 1.0%
Need one per each 3-run test: 998 / 499 / 200

IMPINGER CONTENTS	4/27/16 JH **RUN 1** a	**RUN ~~2~~** 1b	**RUN ~~3~~** 1c
Container, condensate & rinse, grams	~~771~~ 606.2	578	593
Container & condensate, grams	366	385	400
Empty container, grams	104.7	104.2	104.8
Initial volume, ml	300	300	300
Initial contents	.5N KOH	KOH	KOH
Initial concentration	0.5 M	0.5 M	0.5 M
Net water gain, ml			
Condensate appearance	Clear	Clear	Clear
Level marked on container	✓	✓	✓
pH of condensate	~9	~9	~9.5
Rinsed with	DI H_2O / 0.1 N HNO_3		
Solvent Name and Lot No.	DI H_2O: 2122 →	→	→
Solvent Name and Lot No.	HNO_3: 1856 →	→	→

SILICA GEL (w/impinger, top off)			
Final weight, grams	791 640	JF 4/27/16 ~~765~~ 765	941
Initial weight, grams	741 520 620	JF 4-27 ~~520~~ 745	~~520~~ 926.4
Net gain, grams			

TOTAL MOISTURE GAIN			
Impingers and silica gel, grams			

FILTERS			
Front filter number			
Front filter appearance			
Back filter number			

4/26 R2 2237 | Purge 4/27 03:27-03:57 | Purge 4/27 09:53-

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Sample Recovery Worksheet

Client: Bullseye
Date: 4/26 - 4/28
Facility Location: Portland OR
Source: T7
Operator: JF JH
Sample Location: Inlet

Balance Calibration (1000, 500, 200 g) Tolerance must be within ± 1.0%
Need one per each 3-run test: 998 1499 1200

IMPINGER CONTENTS	**RUN 1**	**RUN 2**	**RUN 3**
Container, condensate & rinse, grams		588	656
Container & condensate, grams		450	453.2
Empty container, grams		105	104
Initial volume, ml		300	300
Initial contents		KOH	KOH
Initial concentration		0.5 M	0.5 M
Net water gain, ml			
Condensate appearance		light grn tint	light green
Level marked on container			
pH of condensate		9.5	9.5
Rinsed with		DI H_2O / HNO_3	→
Solvent Name and Lot No.		DI H_2O 2122	→
Solvent Name and Lot No.		HNO_3	
SILICA GEL (w/impinger, top off)			
Final weight, grams		830	904
Initial weight, grams	520	JF 4-28-11 ~~520~~ 797	~~520~~ 881
Net gain, grams			
TOTAL MOISTURE GAIN			
Impingers and silica gel, grams			
FILTERS			
Front filter number		NA	NA
Front filter appearance			
Back filter number			

Run 2: Purge w/ N_2 09:45 10:15 10 l/min
Run 3: Purge w N_2 09:27 - 09:57 10 l/min

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

.210 / .210 / .209 → .2096

Glass Nozzle Measurements
1 ~~.256~~
2 ~~.256~~ → .2556
3 ~~.255~~
MV 4/28/16

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Furnace 7
Sample Location: outlet

Date 4/28/16
Test Method 0061
Concurrent Testing 5, 3A (gases)
Run # 2

Probe 2-1 (g / s) Cp .828 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @6 Lo 0 @6 Post @ @

Operator MV Support PT, JH
Temperature, Ambient 73 (Ta)
Moisture 3% Tdb Twb
Press., Static (Pstat) | Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) MV / 74
Stack TC (ID/°F) 2-1 / 73
Continuity Check ↑ or ↓

Nozzle ~~.2556~~ .2096 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 29 dH@ 1.739 Y 0.98764
Meter Leak Check Pretest: 0.005 cfm 5 inHg
Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			463.489				Amb: 135	Amb:	Amb: ?	Amb: 63	Amb: 68	Amb: 68	
1	10	1700	465.39	.07	.11	.11	141			40	65	66	1
2	20		467.30	.07	.11	.11	139			63	68	67	1
3	30		469.01	.06	.10	.10	132			62	68	66	1
4	40		470.400	.04	.06	.06	150			62	68	68	1
5	50		472.091	.06	.094	.09	163			65	70	68	1
6	60		473.107	.02	.03	.03	167			63	71	69	1
7	1:10		474.678	.04	.06	.06	156			64	71	69	1
8	1:20		475.815	.03	0.05	0.05	155			63	72	70	1
9	1:30		477.128	.03	.05	.05	170			63	72	70	1
10	1:40		478.634	.04	.06	.06	172			63	73	71	1
11	1:50		480.040	.04	.06	.06	162			62	73	71	1
12	2:00		481.504	.05	.08	.08	120			60	68	68	1
13	2:10		483.165	.05	.08	.08	122			58	68	67	1
14	2:20		484.423	.04	.06	.06	143			57	67	65	1
15	2:30		485.885	.04	.06	.06	167			57	67	65	1
16	2:40		487.244	.04	.06	.06	178			57	66	64	1
17	2:50		488.726	.05	.075	.08	182			57	66	64	1
18	3:00		490.119	.04	.06	.06	176			57	66	64	1
19	3:10		491.421	.03	.046	.05	160			57	65	63	1
20	3:20		492.601	.04	.064	.06	140			57	65	63	1
21	3:30		493.840	.03	.047	.05	155			58	65	63	1
22	3:40		494.905	.05	.077	.08	166			58	65	63	1
23	3:50		496.610	.05	.076	.08	172			58	65	63	1
24	4:00		497.256	.01	.015	.02	176			57	65	63	1
25	4:10		497.887	.01	.015	.02	150			58	65	63	1

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Furnace T7
Sample Location: outlet

Date 4/28/16
Test Method 0061
Concurrent Testing 5, 3A (gasses)
Run # 3

Glass Nozzle Measurements
1 .210
2 .210
3 .209
.2096

Probe 2-1 (g/s) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @6 Lo 0 @6 Post @ @

Operator MV Support PT, JH
Temperature, Ambient 73 (Ta)
Moisture 3 %, Tdb — Twb —
Press., Static (Pstat) 1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) MV 74
Stack TC (ID/°F) 2-1 73
Continuity Check ↑ or ↓

Nozzle .2096 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 29 dH@ 1.739 Y 0.98764
Meter Leak Check Pretest: 0.005 cfm 5 inHg Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
							Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	4:20		499.656	.06	.095	.01	151			59	65	63	1
2	4:30		500.951	.03	.047	.05	158			58	66	64	1
3	4:40		502.135	.03	.047	.05	154			58	66	65	1
4	4:50		503.825	.05	.081	.08	138			58	67	65	1
5	5:00		505.232	.05	.079	.08	150			57	67	65	1
6	5:10		506.616	.04	.062	.06	158			58	68	65	1
7	5:20		507.915	.04	.062	.06	163			59	68	65	1
8	5:30		509.440	.05	.078	.08	161			59	67	65	1
9	5:40		511.024	.05	.085	.09	110			57	66	65	1
10	5:50		512.666	.05	.085	.09	140			57	66	64	1
11	6:00		514.195	.05	.082	.08	127			57	66	64	1
12	6:10		515.800	.06	.097	0.10	135			57	66	64	1
13	6:20		517.621	.06	.10	0.10	120			57	66	64	1
14	6:30		519.307	.05	.08	.08	138			56	65	63	1
15	6:40		520.630	.04	.06	.06	152			56	65	62	1
16	6:50		521.888	.03	.046	.05	164			57	65	62	1
17	7:00		523.140	.03	.046	.05	167			57	65	62	1
18	7:10		524.380	.03	.047	.05	158			57	65	62	1
19	7:20		525.898	.05	.079	.08	147			57	65	63	1
20	7:30		527.341	.05	.080	.08	139			56	65	63	1
21	7:40		529.235	.06	.096	.10	136			55	64	62	1
22	7:50		531.022	.06	.099	.10	123			55	64	62	1
23	8:00	1:09	532.496	.05	.079	.08	144			54	64	62	1
24	8:10	1:33	532.751	.07	.11	.11	150			55	62	63	1
25	8:20		535.315	.07	.11	.11	142			55	64	63	1

Notes:

532.496
532.752 } leak check 0.005 @ 5"

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Restart 24 (1:33) at 1:38

2 of 4

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bulls eye Glass
Facility Location: Portland, OR
Source: Furnace T7
Sample Location: Outlet

Date 4/28/16
Test Method 0061
Concurrent Testing 5, gasses
Run # 3

Glass Nozzle Measurements
1 .210
2 .210
3 .209

Probe 2-1 (g / s) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 6 Lo 0 @ 6 Post @ @

Operator MV Support PT, JH
Temperature, Ambient (Ta) —
Moisture 3% Tdb — Twb —
Press., Static (Pstat) 1 Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? No If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) MV / 74
Stack TC (ID/°F) 2-1 / 73
Continuity Check ↑ or ↓

Nozzle .2096 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 29 dH@ 1.739 Y 0.98764
Meter Leak Check Pretest: 0.005 cfm 15 inHg
Post: cfm inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2) (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			—				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	8:30		537.164	.03	.048	.05	129			56	64	61	1
2	8:40		538.965	.08	.127	.13	135			57	64	60	1
3	8:50		—	.07	.111	.11	135			56	64	61	1
4	9:00		542.499	.07	.111	.11	132			54	65	62	1
5	9:10		544.364	.07	.111	.11	132			55	65	61	1
6	9:20		545.871	.07	.111	.11	130			54	62	60	1
7	9:30		547.105	.05	.079	.08	129			55	64	62	1
8	9:40		549.220	.08	.131	.13	131			56	64	60	1
9	9:50		550.462	.05	.082	.08	133			55	63	62	1
10	10:00		551.631	.04	.065	.07	133			56	64	61	1
11	10:10		552.789	.03	.049	.05	129			56	64	62	1
12	10:20		553.571	.03	.049	.05	125			56	64	63	1
13	10:30		555.037	.03	.049	.05	128			56	63	64	1
14	10:40		556.218	.03	.049	.05	131			56	63	63	1
15	10:50		—				131			54	65	64	1
16	11:00		558.509	.05	.082	.08	131			55	64	64	1
17	11:10		560.005	.03	.049	.05	131			56	63	62	1
18	11:20		561.527	.03	.049	.05	132			51	64	62	1
19	11:30		563.017	.03	.049	.03	134			56	62	61	1
20	11:40		564.096	.03	.049	.05	132			54	63	61	1
21	11:50		565.107	.03	.049	.05	130			55	~~63~~ 62	61	1
22	12:00		566.062	.03	.049	.05	129			53	62	62	1
23	12:10		567.288	.03	.049	.05	128			54	64	62	1
24	12:20		568.133	.03	.049	.05	129			52	64	63	1
25	12:30		569.003	.03	.049	.05	129			53	62	62	

Notes:

Field Data Sheet

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505

Client: Bullseye Glass
Facility Location: Portland, OR
Source: Furnace J7
Sample Location: Outlet

Date 4/29/16
Test Method 5 0061
Concurrent Testing 5
Run # 3

Glass Nozzle Measurements

1	.210
2	.210
3	.209

Probe 2-1 (g / s) Cp .8248 Heat Set — °F
Post-Test Pitot Inspection (NC=no change, D=damaged)
Pitot Lk Rate in H2O@in H2O Pre: Hi 0 @ 6 Post 0 @6; Lo 0 @ 6 0 @6

Operator MV Support PT, JH
Temperature, Ambient (Ta) —
Moisture 3% Tdb — Twb —
Press., Static (Pstat) | Press., Bar (Pb) 30.1
Cyclonic Flow Expected ? NO If yes, avg. null angle — degrees

ALT-011
Std TC (ID/°F) 2-1 / 74
Stack TC (ID/°F) MV / 73
Continuity Check ↑ or ↓

Nozzle .2096 Oven — Imp. Outlet 1-35
Filter — Heat Set — °F
Meter Box 29 dH@ 1.739 Y 0.98764
Meter Leak Check Pretest: 0.005 cfm 5 inHg; Post: .012 cfm 6 inHg

Traverse Point Number	Sampling Time min (dt)	Clock Time (24 hr)	Dry Gas Meter Reading cuft (Vm)	Velocity Head in H2O (dPs)	Orifice Pressure in H2O DESIRED	Orifice Pressure H2O ACTUAL (dH)	STACK °F (Ts)	PROBE °F (Tp)	OVEN Filter °F (To)	IMPINGER Outlet °F (Ti)	METER Inlet/Avg. °F (Tm-in)	METER Outlet °F (Tm-out)	Pump Vacuum inHg (Pv)
			—				Amb:	Amb:	Amb:	Amb:	Amb:	Amb:	
1	12:40		570.251	.03	.049	.05	127			52	62	62	1
2	12:50		572.113	.03	.049	.05	124			52	61	61	1
3	13:00		573.973	.03	.049	.05	123			52	60	61	1
4	13:10		574.149	.03	.049	.05	122			52	62	61	1
5	13:20		575.154	.03	.049	.05	123			51	61	61	1
6	13:30		576.164	.03	.049	.05	123			52	62	61	1
7	13:40		577.172	.03	.049	.05	123			52	61	61	1
→ 8	13:50		579.223	.02	.0328	.03	125			56	63	62	1
9	14:00		580.435	.02	.0328	.03	125			57	65	64	1
10	14:10		581.561	.02	.0328	.03	125			58	64	64	1
11	14:20		~~[illegible]~~										
12	14:30		583.627	.03	~~.0328~~ .049	.05	123			58	66	65	1
13	14:40		584.721	.02	.328	.03	118			60	68	65	1
14	14:50		585.807	.02	.328	.03	115			60	67	66	1
15	15:00		586.009	.02	.328	.03	119			60	67	66	1
16	15:10	9:00	587.579	.02	.328	.03				59	66	67	1
17	15:20												
18	15:30												
19	15:40												
20	15:50												
21	16:00												
22	16:												
23													
24													
25													

Notes:

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→ Pause @ 7:33

0061

MONTROSE AIR QUALITY SERVICES
13585 NE Whitaker Way
Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505
www.montrose-env.com

Sample Recovery Worksheet

Client: Bullseye
Date: 4-29-16
Facility Location: Portland, OR
Source: Glass Furnace T7
Operator: JF
Sample Location: Outlet

Balance Calibration (1000, 500, 200 g) Tolerance must be within ± 1.0%
Need one per each 3-run test: 999 / 499 / ~~500~~ 200

IMPINGER CONTENTS	**RUN 1**	**RUN 2**	**RUN 3**
Container, condensate & rinse, grams			596
Container & condensate, grams			423
Empty container, grams			105
Initial volume, ml			300
Initial contents			KOH
Initial concentration			0.5 M
Net water gain, ml			
Condensate appearance			Clear
Level marked on container			✓
pH of condensate			9.5
Rinsed with			DI H_2O / HNO_3
Solvent Name and Lot No.			DI H_2O: 2122
Solvent Name and Lot No.			HNO_3: 1856
SILICA GEL (w/impinger, top off)			
Final weight, grams			759
Initial weight, grams	520	520	~~520~~ 736
Net gain, grams			
TOTAL MOISTURE GAIN			
Impingers and silica gel, grams			
FILTERS			
Front filter number			NA
Front filter appearance			
Back filter number			

Purge w/ N_2
10:40-11:10
10 L/min

MONTROSE AIR QUALITY SERVICES
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Portland, OR 97230
Phone (503) 255-5050
Fax (503) 255-0505
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EPA METHOD 1
TRAVERSE POINT LOCATIONS

Client: Bullseye Glass Facility Location: Portland OR
Source: T7 - Baghouse outlet Sample Location: Roof
Date: 6/6/16 Initials: PT
Top Ports

Traverse Point Number	Traverse Point Location (inches)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Duct Dimensions and Port Locations E W

Inside of far wall to outside of nipple, F 14 | 13 7/8
Inside of near wall to outside of nipple, N 1 5/8 | 1 5/8
Nearest downstream disturbance, A 27 1/2
Nearest upstream disturbance, B 69 1/2
Circular: Inside Diameter, F-N 12 3/8 | 12 1/4
Rectangular: Width______" Depth______"
Rectangular Equiv. Diameter: (2*W*D)/(W+D)________"
Number of Ports: 2

Duct characteristics:

Construction: Steel PVC Fiberglas Other ________
Shape: Circular Rectangular Elliptical
Orientation: Vertical Horizontal Diagonal (~ angle: ___°)
Flow straighteners: Yes No
Stack Extension: Yes No
Cyclonic Flow Expected: Yes No
Cyclonic Flow Measured & Documented: Yes No
Average Null Angle <20°: Yes No N/A
Meets EPA M-1 Criteria: Yes No (If "No", explain why)

Test port sketch or comments

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This is The Last Page of the Report