State of Oregon
Department of Environmental Quality Memorandum

Date: 6/26/2017

To: File/Dave Kauth
From: Mike Eisele

Subject: Source Test Review Report
Bullseye Glass Company
Permit Number: 26-3135-ST-01

Test Dates: March 26-28, 2017
Date Report Received: May 15, 2017
Source Testers: Montrose
DEQ Observed: Yes

Test Results Summary:
This review report provides a comprehensive analysis of the source test performed by Montrose Air Quality Services on behalf of Bullseye Glass. Testing was performed on March 26-28, 2017 at the exhaust of a three zone baghouse that is attached to Furnaces 1-9, 11-14, and 20. The purpose of the testing was to show compliance with Federal and State rules and to determine an emission rate of hexavalent chromium.

Test results showed compliance with both Federal and State rules. Also, data collected during the testing will be used by air modelers to establish daily and annual chrome usage rates. The tests conducted and the subsequent validated data collected allowed DEQ to complete these evaluations.

For this testing total chromium was assumed to be equal to hexavalent chromium for the purposes of establishing a maximum chromium usage allowance.

I) Source Description: Glass melting furnaces

II) Process (es)/Emissions Unit(s) Tested: Furnaces 1-9, 11-14, and 20 were tested after being filtered by the three zone baghouse. Two of the three zones of the baghouse were used during the testing. One zone was offline. This is consistent with normal operation of the three zone baghouse.

III) Test Purpose: To determine the compliance status and emission rates of particulate matter (PM) and metals (As, Cd, Cr, Co, Pb, Mn, Ni, Se) following the filtration of the furnace emissions controlled by the three zone baghouse.

IV) Testing Location(s):

Three Zone Baghouse Outlet:

Diameter:	23.7"
Number traverse points utilized:	24

V) Testing Methodology: The following testing methods were utilized during the testing program:

Flow Rate, O_2 & CO_2, & Moisture Content: EPA Methods 1, 2, 3A & 4
Filterable Particulate: EPA Method 5
Total Particulate: ODEQ Method 5
Metals (As, Cd, Cr, Co, Pb, Mn, Ni, Se): EPA Method 29

VI) Summary of Results: The testing parameters, test results, emission factors and operating parameters are summarized in Tables 1 & 2:

TABLE 1: National Emissions Standards for Hazardous Air Pollutants Subpart SSSSSS Testing

TESTING PARAMETERS (PM and Metals)	Run 1	Run 2	Run 3	Average	Emission Limits
Test Date	3/26/2017	3/26-27/2017	3/27/2017	--	--
Test Time	1713-2124	2232-0248	0430-0841	--	--
Exhaust Gas Temperature (ºF)	273	270	265	269	--
Exhaust Gas Moisture (%)	4	4	4	4	--
Exhaust O_2 (% dry vol)	20.8	20.2	20.9	20.6	--
Exhaust CO_2 (% dry vol)	2.1	2.4	1.7	2.0	--
Exhaust Gas Flow Rate (dscfm)	4800	4900	4700	4800	--
PM Sample Volume (dscf)	229.9	210.3	199.6	213.3	--
Filterable Mass of PM Collected (mg)	1.41	1.19	1.95	1.52	--
Filterable Particulate (PM) Emissions:					
• gr/dscf	0.00009	0.00009	0.00015	0.00011	--
• lb/hr	0.0149	0.0155	0.0238	0.0181	--
• lb/ton of glass produced	0.030	0.027	0.057	0.038	0.20
Arsenic (As) Emissions:					
• mg/dscm	NA	<4.1E-04	NA	NA	--
• lb/test run	<2.7E-05	<3.0E-05	<3.1E-05	<2.9E-05	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Cadmium (Cd) Emissions:					
• mg/dscm	NA	2.0E-04	4.7E-05	NA	--
• lb/test run	1.2E-05	1.5E-05	3.3E-06	9.9E-06	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Chromium (Cr) Emissions:					
• mg/dscm	NA	2.5E-04	1.4E-04	NA	--
• lb/test run	1.7E-05	1.9E-05	9.7E-06	1.5E-05	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Cobalt (Co) Emissions:					
• mg/dscm	NA	2.0E-04	7.4E-05	NA	--
• lb/test run	1.5E-05	1.5E-05	5.2E-06	1.2E-05	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Lead (Pb) Emissions:					
• mg/dscm	NA	1.3E-03	NA	NA	--
• lb/test run	1.0E-04	9.7E-05	2.2E-05	7.3E-05	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Manganese (Mn) Emissions:					
• mg/dscm	NA	8.4E-04	2.9E-04	NA	--
• lb/test run	3.5E-04	6.2E-05	2.1E-05	1.4E-04	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Nickel (Ni) Emissions:					
• mg/dscm	NA	3.3E-04	1.5E-04	NA	--
• lb/test run	1.5E-05	2.5E-05	1.1E-05	1.7E-05	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Selenium (Se) Emissions:					
• mg/dscm	NA	2.1E-03	6.2E-04	NA	--
• lb/test run	1.1E-04	1.6E-04	4.4E-05	1.0E-04	--
• lb/ton of glass produced	NA	NA	NA	NA	--
Total NESHAP SSSSSS Metal HAP Emissions (As, Cd, Cr, Pb, Mn, Ni):					
• lb/ton of glass produced	0.0010	0.00044	0.00023	0.00072[b]	0.02
Isokinetic Variation (%)	104	104	103	104	--
Baghouse Pressure Drop BH1/BH2 (inches of water column)	1.8/2.0	2.0/2.4	2.3/2.6	2.0/2.3	--
Baghouse Temperature (ºF)	NA	NA	NA	NA	--
Product Types	1311, 100, 1122, 1445, 1234				--
Production (lb of glass produced/hr)[a]	1006	1135	834	992	--

[a] Assumes a linear glass production rate from the start of the first charge to the end of the refining process.
[b] The third run was not included in the test average because furnace 1 only operated for four minutes during this test run.
NA means not available, not provided, or report needs correction.

TABLE 2: State Required Testing

TESTING PARAMETERS (Outlet PM)	Run 1	Run 2	Run 3	Average	Emission limits
Test Date	3/27/2017	3/27-28/2017	3/28/2017	--	--
Test Time	1722-2133	2234-0248	1011-1218	--	--
Exhaust Gas Temperature (ºF)	272	272	265	270	--
Exhaust Gas Moisture (%)	4	4	4	4	--
Exhaust O_2 (% dry vol)	20.8	20.3	20.7	20.6	--
Exhaust CO_2 (% dry vol)	2.4	2.8	1.7	2.3	--
Exhaust Gas Flow Rate (dscfm)	4500	5200	4800	4800	--
PM Sample Volume (dscf)	175.3	199.4	91.3	155.3	--
Filterable Mass of PM Collected (mg)	2.12	1.10	0.95	1.39	--
Condensable Mass of PM Collected (mg)	13.7	13.2	9.1	12.0	--
Total Mass of PM Collected (mg)	15.8	14.3	10.0	13.4	--
Filterable Particulate (PM) Emissions:					
• **gr/dscf**	0.00019	0.00009	0.00016	0.00014	0.005
• **lb/hr**	0.0073	0.0038	0.0065	0.0059	--
• **lb/ton of glass produced**	NA	NA	NA	NA	--
Condensable Particulate (PM) Emissions:					
• **gr/dscf**	0.0011	0.0009	0.0016	0.0012	--
• **lb/hr**	0.042	0.040	0.065	0.049	--
• **lb/ton of glass produced**	NA	NA	NA	NA	--
Total Particulate (PM) Emissions:					
• **gr/dscf**	0.0013	0.0010	0.0017	0.0013	0.10
• **lb/hr**	0.049	0.044	0.072	0.055	--
• **lb/ton of glass produced**	NA	NA	NA	NA	--
Isokinetic Variation (%)	105	104	104	104	--
Baghouse Pressure Drop BH1/BH2 (inches of water column)	2.0/2.3	2.6/3.0	NA/NA	NA/NA	--
Baghouse Temperature (ºF)	292/290	294/292	NA/NA	NA/NA	--
Product Types	1311, 100, 1122, 1120, 1429, 1445, 1105, 1234, 1824, 1834, 1428, 1838, 1858, 1129, 1808				-- --
Production (lb of glass produced/hr)	NA	NA	NA	NA	--

NA means not available, not provided, or report needs correction.

VII) Concerns & Comments:

1) Bullseye must provide DEQ an amendment to the test report by no later than July 14, 2017 that includes the following:
    - Production rates for each glass furnace for each test run for both sets of test runs;
    - Baghouse temperatures during the Subpart SSSSSS testing;
    - Baghouse data during the fourth run of the second day of testing (DEQ required PM testing);
    - mg/dscm concentrations and lb/ton of glass produced emission rates for each metal HAP. DEQ understands a conservative value will be provided for arsenic and lead when exact values cannot be determined; and
    - Corrected PM emission rates in units of lb/ton of glass produced for DEQ required PM testing.
2) The cobalt audit sample was outside of the acceptable range, it was reported as being higher than it actually was. Therefore, it is likely the values reported for the test runs were also higher than they actually were. The audit sample was reported as 15.14 µg/filter. The audit sample value was 12.0 µg/filter. The acceptable range is 9.0-15.0 µg/filter.
3) The furnaces were not operating when the first 40 CFR Part 63 Subpart SSSSSS/chrome usage rate test run started. The five furnaces came on within the first hour. In the test report submitted on May 15, 2017 the production rate of glass did not take into account the delayed start of the furnaces. This error was corrected in the final report.
4) Furnace 1 only produced glass for four minutes during the third run. This run was not used to determine compliance with 40 CFR Part 63 Subpart SSSSSS.
5) During the third run of the second day of testing (testing for particulate to show compliance with Oregon rules) the ending leak check of the sampling equipment failed. A fourth run was completed.

VIII) Overall Evaluation: The test methods conducted and the data provided were sufficient to determine compliance with the emission standards and to determine the rate at which chrome is emitted. However more data is needed to describe process parameters and to calculate other emission concentrations and emission factors. The additional data needed must be provided to DEQ no later than July 14, 2017.

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Acronym List

BH1/BH2 = Baghouse No. 1 and Baghouse No. 2
EPA = Environmental Protection Agency
HAP = Hazardous Air Pollutant
ODEQ = Oregon Department of Environmental Quality
PM = Particulate Matter
^{o}F = Degrees Fahrenheit
mg = Milligrams
µg = Microgram
lbs = Pounds
” = Inches
hrs = Hours
% = Percent
% dry vol = Percent on a Dry Volume Basis
O_2 = Oxygen
CO_2 = Carbon Dioxide
dscfm = Dry Standard Cubic Feet per Minute
dscf = Dry Standard Cubic Feet
gr/dscf = Grains per Dry Standard Cubic Foot
mg/dscm = Milligrams per Dry Standard Cubic Meter
lb/hr = Pounds per Hour
lb/ton of glass produced = Pounds per Ton of Glass Produced
tons/hr = Tons per Hour
As = Arsenic
Cd = Cadmium
Cr = Chromium
Pb = Lead
Mn = Manganese
Ni = Nickel
Se = Selenium
Co = Cobalt