POLLUTION CONTROL HEARINGS BOARD
STATE OF WASHINGTON

ARDAGH GLASS, INC., Appellant, v. PUGET SOUND CLEAN AIR AGENCY, Respondent.	PCHB No. 15-120 FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER

INTRODUCTION

Puget Sound Clean Air Agency (Agency) issued General Regulatory Order No. 10606 (GRO), imposing new emission limits on two of Ardagh Glass, Inc.'s (Ardagh) furnaces at its Seattle container glass plant. Ardagh appealed the GRO to the Pollution Control Hearings Board (Board).

The Board conducted a hearing in this matter at its hearing room in Tumwater, Washington, on October 17-21, 2016. The Board was comprised of Board Chair Thomas C. Morrill, and Member Kay M. Brown, presiding.[1] Attorneys Lori Terry Gregory, Jennifer A. Dold, and Stephanie G. Weir represented the Agency. Attorneys John W. Carroll, Kurt A. Kissling, and Svend A. Brandt-Erichsen represented Ardagh.

The Board received the sworn testimony of witnesses, admitted exhibits, and heard opening statements on behalf of the parties.

[1] Member Joan M. Marchioro was not present at the hearing and did not participate in this decision.

After the end of the hearing, and at the request of the presiding officer, the parties submitted copies of OMB Circular A-94. OMB Circular A-94 is a document that was mentioned by witnesses and referenced in exhibits admitted at the hearing. Because the parties could not agree on a joint submittal, both Ardagh and the Agency made separate submittals. These submittals are hereby admitted into the record as Exhibits A-79 (Ardagh's submittal) and R-89 (the Agency's submittal).

Written closing arguments were filed on November 23, 2016.

Having fully considered the record in this matter the Board enters the following decision.

FINDINGS OF FACT

A. Ardagh and its Seattle plant

1.

Ardagh[2] operates 110 glass and metal manufacturing facilities in 22 countries, including 15 glass making plants in North America. Ex. R-48; Krulic Testimony, Vol. 3, p. 476. Ardagh operates a glass container plant located at 5801 E. Marginal Way S, Seattle, Washington. Ex. R-4, p. R054797. The Seattle plant has operated in this location since 1931. Van Slyke Testimony, Vol. 1, p. 43. The Ardagh Seattle plant is the only glass container facility in the Agency's jurisdiction, and one of only two glass container facilities in the state of Washington. *Id*., Vol. 1, p. 62.

[2] Ardagh's predecessor was Saint-Gobain Containers, Inc. Ex. R-4, p. R054797. For simplicity, the name Ardagh will be used to refer to both Saint-Gobain and Ardagh.

2.

The Ardagh Seattle plant is located on a triangular shaped multi-block property in the Duwamish Valley in South Seattle. Ex. R-23. The Duwamish Valley is the industrial center for the City of Seattle and one of the largest industrial areas in the state. Rasmussen Testimony, Vol. 3, p. 466. The Ardagh plant has one of the largest footprints in the area, but its site is still congested. Aerial photographs show that the site is heavily developed with buildings and equipment. Ex. A-56; Heller Testimony, Vol. 4, p. 700; Van Slyke Testimony, Vol. 1, pp. 45-46.

3.

The Ardagh plant is located near two residential communities, Georgetown and South Park. It is about one third to one half mile from a playfield where soccer and little league activities occur, and about the same distance to residences. Van Slyke Testimony, Vol. 1, pp. 44-46. Georgetown has a population of 1,249 with 12% of its residents below the federal poverty level, and 22% considered of minority race. South Park's population is 4,711 with 24% of its residents below the federal poverty line and 38% considered of minority race. Van Slyke Testimony, Vol. 1, pp. 53-54; Ex. R-4, Tab 2B, p. R054903. The area, referred to as the Greater Duwamish Area, has been designated by the Agency as a Highly-Impacted Community. Van Slyke Testimony, Vol. 1, p. 147. Highly-Impacted Communities are identified based on a combination of impaired air quality; socioeconomic factors; and disproportionate health burdens. The Greater Duwamish Area is ranked No. 5 on a list of 20 of the most Highly-Impacted Communities within the Agency's four county area. Strange Testimony, Vol. 2, pp. 408-412, Ex. R-25. It has one of the highest rates of asthma in the state of Washington. Rasmussen Testimony, Vol. 3, p. 468.

4.

The Seattle plant's primary product is wine bottles. To produce this product it has four glass melting furnaces. Ex. R-4, p. R054797. Raw materials, which are primarily sand, soda ash, and limestone are mixed with colorants and refining agents in batches. Recycled glass, called cullet, can also be added to the mix. The batches are then fed into melting furnaces which typically operate at temperatures in excess of 2,500 degrees Fahrenheit. After melting and fully mixing in the melting furnace, molten glass is then drawn from the furnace and separated into "gobs" of glass. The gobs are then formed into the final bottle shape. Ex. R-83, p. R031190; R-4, p. R054798.

5.

The furnaces at issue in this case are Furnaces 2 and 3, which are the subject of the GRO. These furnaces are natural gas fired, and were converted to oxyfuel approximately 25 years ago. The main benefit of this conversion was to reduce Nitrogen Oxides (NOx) emissions, reduce fuel consumption, and increase furnace capacity. Ex. R-83, pp. R031192-193; Ex. R-4, tab 3, p. R054934.

6.

Furnace 2 has a capacity (maximum pull rate) of 220 tons of glass production per day. During source testing, Furnace 2 averaged a pull rate of 191 tons per day with a maximum of 218 tons per day since 1994. Ex. R-83, p. R031193. Furnace 3 has a capacity of approximately

215 tons per day. During source testing Furnace 3 averaged a pull rate of 201 tons per day with a maximum of 214 tons per day since 1994. *Id.*

B. <u>Emissions, limits and compliance</u>

7.

Furnaces 2 and 3 operate 24 hours a day, 7 days a week, 365 days a year, and emit particulate matter (PM) and sulfur dioxide (SO2). Ardagh is classified as a major source of pollutants because its emissions of criteria pollutants[3] are greater than 100 tons per year. In the Agency's four-county area for the last two years, Ardagh has been the largest source of SO2 and fine particulate matter (PM 2.5) reported for all stationary sources. Van Slyke Testimony, Vol. 1, pp. 49-50.

8.

Ardagh's emissions are subject to various existing emissions limits which are based on local, state, and federal air quality regulations. The limits have been added at various times and for different reasons to each emission unit, and are layered one on top of the other. The older limits remain applicable even though new limits are added. Van Slyke Testimony, Vol. 1, pp. 63-67.

9.

Since the first limits were imposed, the Seattle plant has had difficulty meeting its limits consistently. These compliance problems have led to the issuance of multiple notices of violations and assessment of penalties by the Agency, which were resolved through entry of

[3] Criteria pollutants are pollutants for which there is an established National Ambient Air Quality Standard (NAAQS). WAC 173-400-030 (21).

consent decrees between the Agency and Ardagh in 2003, 2007, and 2010. Van Slyke Testimony, Vol. 1, pp. 74-82; Exs. R-54, R-55.

10.

As a result of a provision in the 2007 Consent Decree, Ardagh installed an experimental emissions control device, called a Tri-Mer Cloud Chamber Scrubber (Cloud Scrubber) on Furnace 5. The Cloud Scrubber began operating in 2009. Ex. R-55; Van Slyke Testimony, Vol. 1, p. 82. Since the Cloud Scrubber was put into service, Furnace 5 has been in compliance with its emissions standards. Furnace 5's emissions would also meet the emissions standards in the GRO. Van Slyke Testimony, Vol. 1, pp. 82-83. Ardagh also agreed, in the 2007 Consent Decree, to submit an analysis of reasonably available control technologies (RACT) 18 months prior to its anticipated major rebuilds of Furnaces 2 and 3. Ex. R-55, pp. R048413-414.

11.

The 2010 Consent Decree pertained to alleged violations of Federal Clean Air laws at the Seattle plant and facilities in other states. The Environmental Protection Agency (EPA) and the Agency were parties to this Consent Decree. Ex. R-56, p. R039315. The 2010 Consent Decree addressed multiple Ardagh facilities including the Seattle plant. As a result of the 2010 settlement, Furnaces 2 and 3 were required to meet specific emissions limits on filterable PM and SO2 through the use of process controls.[4] Ex. R-56, pp. 039364-372. Ardagh also agreed to

[4] Process controls are procedures that are used during glass making to lower emissions. Add-on control technology is equipment that captures emissions that are generated during glass making. Add-on control technology is also referred to as end-of-pipe or end-of-stack controls. Grega Testimony, Vol. 3, p. 567.

install continuous emission monitoring systems (CEMS) for Furnaces 2 and 3. Van Slyke Testimony, Vol. I, p. 184; Ex. R-56, p. R039390.

12.

Ardagh's existing emissions limits for all emissions units at the Seattle plant are summarized in an air operating permit that was issued by the Agency in June of 2007, and has been amended three times. Ex. R-53.[5] PM and SO2 emission limits are stated in terms of a mass limit, which is in pounds of pollutant emitted for every ton of glass produced. PM limits are also stated in terms of a concentration limit, which is in grains of pollutant per dry standard cubic feet (gr/dscf). Van Slyke Testimony, Vol. 1, p. 65; Krulic Testimony, Vol. 3, pp. 548, 556, 557.

13.

There are two types of PM, filterable and condensable, which are distinguished by the way they are measured. The ratio of filterable to condensable PM varies, and is affected by the type of emissions controls in use. When the two types of PM are combined, they are referred to as total PM. Emission limits are based on total PM or filterable PM, depending on which type of measurement is required. The Agency requires regulated entities to measure total PM. Libicki Testimony, Vol. 4, pp 724-725; Van Slyke Testimony, Vol. 5, pp. 908-912.

14.

Applicable limits for Furnace 2, prior to the issuance of the GRO, include:

[5] Although the permit states on its face that it expires on June 6, 2012, Mr. Van Slyke testified that the permit is effective until it is re-issued because Ardagh has a complete operating permit renewal application on file with the Agency. Van Slyke Testimony, Vol. 1, p. 214. The Agency has not issued the renewal because it is waiting until some of the present controversies are resolved. The resolution of these controversies could result in changes to the permit. *Id*.

- 0.05 gr PM/dscf established by Agency Regulation I, Section 9.09A;
- 0.5 lb Total PM/ton of glass pulled, which is a limit based on an Agency permit issued in 1994;
- 1.0 lb of filterable PM/ton of glass pulled, which is a limit set by federal regulation 40 CFR §60.293(b)(1);
- 1.0 lb Total PM/ton of glass pulled, which is required by GRO 10963;
- 1.6 lb SO2/ton of glass pulled, established by an Agency permit in 1994; and,
- 1.5 lb SO2/ton glass pulled as a thirty-day rolling average, which is required by GRO 10963.

Van Slyke Testimony, Vol. 1, pp. 65-67; Ex. R-53, pp. R000899-905; Ex. R-76, p. R005765.

15.

Applicable limits for Furnace 3, prior to the issuance of the GRO, include:

- 0.05 gr PM/dscf established by PSCAA Regulation I, Section 9.09A;
- 1.0 lb filterable PM/ton of glass pulled, which is a limit set by federal regulation 40 CFR §60.293(b)(1);
- 1.0 lb Total PM/ton of glass pulled, which is required by GRO 10963; and,
- 1.5 lb SO2/ton as a thirty-day rolling average, which is required by GRO 10963.

Van Slyke Testimony, Vol. 1, pp. 65- 67; Ex. R-53, pp. R000899-905; Ex. R-76, p. R005765.

16.

Ardagh currently uses process controls to limit PM and SO2 emissions from Furnaces 2 and 3. As noted above, process controls are procedures that are used to ensure that the furnaces make quality glass while lowering emissions. Through the use of process controls, some emissions are not generated. Process controls include adjusting factors such as: furnace temperature, burner maintenance, oxy-gas ratios, internal furnace pressures, amount of sulfur in a batch mix, batch wetting, and cullet usage. In contrast, add-on control technology captures emissions that are generated during the glass making process. Grega Testimony, Vol. 3, pp. 567-568; Ex. R-82, p. R031544.

17.

By managing the use of sodium sulfate as a fining agent in the glass melting process, Ardagh limits SO2 emissions through process controls. PM emissions are also limited through managing the use of raw material inputs (primarily salt cake[6] and cullet) and monitoring furnace operations. Grega Testimony, Vol. 3, pp. 567-579. Ardagh's use of process controls has become more effective in recent years. Part of the improvement is due to the installation of CEMS for SO2. CEMS devices provide real-time measurements for SO2 emissions. CEMS devices were installed on Furnace 3 in 2010 and Furnace 2 in 2015. Grega Testimony, Vol. 3, pp. 584-587.

[6] Salt cake is sodium sulfate. Grega Testimony, Vol. 3, p. 572.

18.

Although Ardagh's Seattle plant has had a history of compliance issues, Furnace 2 has been in compliance with its SO2 limit since 2007, and has been in compliance with its PM limits since 2013. Van Slyke Testimony, Vol. 2, p. 225; Ex. R-4, Tab 2, p. R054905. Between 2007 and 2015, Furnace 3 had no exceedances of its SO2 and PM mass limits and did not exceed its PM concentration loading limit. Van Slyke Testimony, Vol. 2, pp. 259-260. However, Furnace 3 recently exceeded its grain loading standard in an emissions test on August 5, 2015. Ex. R-77.

C. <u>RACT</u>

19.

In 2010, Ardagh scheduled repair and maintenance work for Furnace 3 that Ardagh determined triggered a requirement in the 2007 Consent Decree that Ardagh must submit a RACT analysis 18 months prior to its anticipated major rebuild of the Furnace. Ex. R-83, p. R031293. RACT is:

> [T]he lowest emission limit that a particular source or source category is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. RACT is determined on a case-by-case basis for an individual source or source category taking into account the impact of the source upon air quality, the availability of additional controls, the emission reduction to be achieved by additional controls, the impact of additional controls on air quality, and the capital and operating costs of the additional controls.

RCW 70.94.030(20)

Ardagh retained Trinity Consultants (Trinity) to prepare the RACT analysis for Furnace 3. Trinity used a 5-step approach to its analysis, which is comparable to the approach identified by the EPA for best available control technology (BACT)[7] analysis. *Id.*, p. R031298. Trinity initially identified five control technologies potentially available for control of PM (Cloud Scrubber, Dry Electrostatic Precipitator (ESP), Wet ESP, Wet Gas Scrubber, and Baghouse) and three control technologies potentially available for control of SO2 (Cloud Scrubber, Dry Scrubber with ESP, and Wet Gas Scrubber). *Id*., pp. R031299, R031307. Trinity also listed process controls as available controls for PM and SO2. *Id*.

20.

Trinity used the approach to eliminate technologically infeasible options, rank the remaining control technologies by cost effectiveness, evaluate the most effective controls, and select RACT. Trinity concluded that use of a baghouse was technologically infeasible due to concerns about the fabric filters operating in a high temperature environment with significant moisture. *Id*., pp. R031300. Trinity also performed an economic feasibility calculation on the other technologies to determine if they were economically feasible. *Id*., pp. R031300-310.

21.

The determination of whether a control technology is economically feasible is based, in part, on a cost effectiveness calculation which attempts to show how much it will cost, per ton of a contaminate removed, to employ a particular control technology. Van Slyke Testimony, Vol. 1, pp. 122-124. Although there is no regulatory figure of a certain cost per ton against which technologies must be measured to determine economic feasibility, the Agency looks to a $10,000.00 per ton figure that has been applied by EPA as a gauge for whether a technology may

[7] Under federal law, BACT is required for permitting of major new sources in areas that are in attainment with NAAQS. Ex. R-83, p. R031353.

or may not be economically feasible. However, the Agency does not consider $10,000.00 per ton as a ceiling for cost effectiveness. Pade Testimony, Vol. 2, pp. 344-346.

22.

Trinity's cost effectiveness numbers for the control technologies it considered technologically feasible ranged from $14,769.00 to $44,192.00 per ton of PM removed, and $16,712.00 to $23,100.00 per ton of SO2 removed. Ex. R 83, pp. R031314-334. In particular, Trinity evaluated the cost effectiveness of a dry ESP for Furnace 3 to be $16,806.00 per ton of PM removed. The cost effectiveness for a dry scrubber and dry ESP for controlling SO2 emissions was calculated to be $16,712.00 per ton. Ex. R-83, pp. R031305, R031309. Trinity determined that all of the evaluated control technologies were economically infeasible in light of the cost effectiveness numbers, and concluded that the use of process controls should be the basis for meeting RACT for Furnace 3. *Id*., pp. R031306, R031310; Van Slyke Testimony, Vol. 1, pp. 98-99.

23.

The Agency reviewed Trinity's RACT analysis and determined it was incomplete. Instead of requesting additional information from Trinity, the Agency chose to perform its own RACT analysis for Furnace 3. Ex. R-83, p. R31347. The Agency's draft analysis, dated February 10, 2011, reviewed available emissions data from the Seattle plant, considered control technologies in use on other glass container furnaces, summarized existing federal, state, and international emission limits for glass container furnaces, and then reviewed the limited information available in EPA's RACT/BACT/LAER[8] Clearinghouse (RBLC). *Id*., pp R031347-60.

24.

The Agency performed its own cost effectiveness calculation of three control technologies that would reduce emissions of both PM and SO2: an E-Tube wet ESP; a Cloud Scrubber; and a baghouse with a dry scrubber. *Id*., pp. R031360-365. The Agency's analysis included separate cost effectiveness numbers for SO2 and PM and combined cost effectiveness numbers for SO2 and PM. *Id*.[9] The Agency's analysis applied a 4.4% interest rate in its calculation of costs.[10] The Agency's combined cost effectiveness numbers ranged from $3,804.00 to $9,315.00 per ton of pollutants (SO2 and PM) removed. The Agency's separate cost effectiveness numbers ranged from $11,916.00 to $33,647.00 per ton for PM and $5,588.00 to $12,881.00 per ton for SO2. The cost effectiveness numbers generated by the Agency led it to conclude that a wet ESP was cost effective. The Agency acknowledged, however, that an E-Tube wet ESP has never been used on a glass container furnace. The Agency also concluded that the appropriate RACT emission limits for Furnace 3 were 0.2 lb of Total PM per ton of glass produced, and 0.6 lb of SO2 per ton of glass produced on a 24-hour average, as determined by a CEMS. *Id*., p. R031362.

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[8] "LAER" stands for "Lowest Achievable Emission Rate" and is the standard required under federal law for areas not meeting the NAAQS. Ex. R-83, p. R031353.

[9] The combined cost effectiveness numbers evaluate the costs per ton for capturing more than one pollutant if a control technology captures more than one pollutant. Pade Testimony, Vol. 2, pp. 329-332; Ex. R-16.

[10] The estimate of costs in the cost effectiveness calculation includes a capital recovery factor which is based on an interest rate. OMB Circular A-4 provides for applying either a 3% or 7% interest rate. OMB Circular A-4 also allows using interest rates from OMB Circular A-94 which vary and are based on the Treasury borrowing rate. Ex. R-83, p. R031361; Ex. A-76, Attachment A, p. 2-14. A higher interest rate will result in higher total costs and higher costs per ton of pollutant removed. Ex. A-76, pp. 5-6.

25.

The Agency shared its draft RACT analysis with Ardagh. In response, Ardagh hired another consultant, ENVIRON, to analyze whether wastewater (referred to as blowdown) from a wet ESP could be reused at the Seattle plant for batch wetting. Ex. R-83, p. R031184. In a RACT Supplemental Assessment dated September, 2012, ENVIRON concluded that the variability of the total amount of sulfur and the concentration of specific sulfur compounds in the blowdown would make reuse of the wastewater infeasible. This is currently a problem for Furnace 5 which uses a Cloud Scrubber that generates blowdown. Because Ardagh reuses the blowdown from the Cloud Scrubber, Furnace 5 can produce only colorless or oxidized colored glass, and not reduced colored glass. Reduced color glass is the major volume glass for the Seattle plant which primarily produces wine bottles. *Id*., pp. R031211-214. Like the Agency, ENVIRON noted that a wet ESP has never been implemented as control technology on a glass container furnace. *Id*., p. R031201.

26.

In its analysis, ENVIRON also addressed the other two technologies identified by the Agency: the Cloud Scrubber and a dry scrubber plus baghouse. Ex. R-83, p. R031215. ENVIRON expanded the analysis to address both Furnaces 2 and 3. It concluded that a single control system would be more cost effective to design, install and operate for the two furnaces, than two separate control systems. *Id*., p. R031189. ENVIRON concluded that the Cloud Scrubber was not technologically feasible for Furnaces 2 and 3, primarily because of the problems with reuse of blowdown. *Id*., pp. R031215-216. It also concluded that a baghouse and dry scrubber, while technologically feasible, was not cost effective at $28,497.00 per ton of PM removed, and $15,545.00 per ton of SO2 removed, using the same 4.4% interest rate applied by the Agency.[11] *Id*., pp. R031217, R031290-291. ENVIRON concluded that RACT for Furnaces 2 and 3 should be based solely on process controls. *Id.*, p. R031187.

27**.**

Following further discussions between the Agency, ENVIRON, and Ardagh, an additional supplemental RACT document dated July 2013 was submitted by ENVIRON. Ex. R-84; Van Slyke Testimony, Vol. 1, pp. 118-122. The document included 18 months of additional data provided by the CEMS from Furnace 3. Based on this data, ENVIRON proposed a reduced emissions rate for SO2 for both Furnaces 2 and 3 which it asserted could be achieved through existing process controls. *Id*., p. R003377. The proposed new SO2 limit for Furnaces 2 and 3 was 1.5 lb of S02 per ton of glass produced. For Furnace 2 this was a decrease from a prior limit of 1.6 lb per ton, and for Furnace 3 this was a decrease from a prior limit of 2.5 lb per ton. *Id*. The July 2013 Supplemental RACT document also included additional information regarding the physical constraints posed by the Seattle facility and concluded that ENVIRON and the Agency had significantly underestimated the cost of installing control technologies on the site. *Id*., pp. R003379, 89-91.

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[11] ENVIRON did not calculate a combined cost effectiveness number, but its individual numbers are similar to the Agency's individual numbers of $24,724.00 per ton for PM and $12,239.00 per ton for SO2. The Agency's number for combined PM and SO2 dollars per ton was $8,187.00 for the bag house technology. Ex. R-83, pp. R031361-365. If Ardagh had performed a calculation for the combined PM and SO2 number in its 2012 analysis, it would likely have determined the combined PM and SO2 dollars per ton number was approximately $10,057.00 (this figure results from dividing Ardagh's projected total annual costs of $1,045,879.00 by its total projected amount for annual emission reduction of 104 tons). *See* Ex. R-83 at R031290-91.

28.

The 2013 Supplemental RACT analysis included new cost effectiveness calculations based on the higher costs ENVIRON asserted should have been applied. Ex. R-84, pp. R003393-399. In projecting emissions reductions, ENVIRON also included a calculation that applied its proposed emission limit of 1.5 lb per ton for SO2.[12] The scenario applying the proposed 1.5 lb per ton limit for SO2 resulted in lower projected emissions captured, which led to higher cost effectiveness numbers.[13] *Id.*, pp. R003397-398. The range of cost effectiveness numbers calculated by ENVIRON for removal of SO2 and PM combined, using one control device for both furnaces, was $11,311 to $19,791 per ton. *Id.* R003398. ENVIRON did not include the Cloud Scrubber in its cost effectiveness calculations because Tri-Mer Corporation was no longer offering it as a technology for use for glass container furnaces. *Id.*, p. R003379. ENVIRON also expressed concern about using fabric filters for emission control in glass furnaces. Instead of evaluating a baghouse and dry scrubber technology, ENVIRON added calculations for a ceramic filter system because this was the new system Tri-Mer was recommending instead of the Cloud Scrubber. *Id.*, pp. R003389, R003449. The cost per ton for removal of SO2 and PM combined, using a single ceramic filter system for Furnaces 2 and 3,

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[12] ENVIRON outlines two scenarios for calculating emissions reductions: The first, which it calls "Scenario 1-Permit/GCD Limits", compared the existing permitted limits with the proposed limits in the Agency's RACT Order. The second scenario is called "Incremental" because it applies ENVIRON'S proposed SO2 limit of 1.5 lb per ton rather than the existing permit limits of 1.6 lb per ton for Furnace 2 and 2.5 lb per ton for Furnace 3. Ex. R-84, p. R003397.

[13] Lower projected emission reductions increase the cost per ton number and higher projected emission reductions decrease the cost per ton number. Pade Testimony, Vol. 2, p. 384.

was either $11,885.00 or $15,284.00, depending upon which scenario ENVIRON used to calculate emissions reductions. *Id.*, p. R003398.

29.

ENVIRON concluded that none of the technologies it considered to be technologically feasible were cost effective. Therefore, it concluded that RACT should be based on process controls. Ex. R-84, pp. R003401-402. ENVIRON proposed RACT limits for Furnaces 2 and 3 of 1.5 lb of SO2 per ton of glass produced; .5 lb of total PM per ton of glass produced for Furnace 2; and 1.0 lb of total PM per ton of glass produced for Furnace 3. *Id.*, p. R003402.

30.

The Agency, Ardagh, and ENVIRON continued meeting, talking, and sharing information. The Agency considered the information provided by Ardagh, and made changes to its RACT analysis when it concluded changes were technically valid and warranted. Van Slyke Testimony, Vol. I, p. 121; Ex. R-62.

31.

The Agency's final RACT Analysis was expanded to address Furnace 2 as well as Furnace 3. It was also updated to include emissions data from October 2010 through March 2014. Ex. R-4, Tab 3, pp. R054938-946. The Agency added more discussion of the blowdown problem for both the Wet ESP and Cloud Scrubber. *Id.*, at pp. R054955-956. In its cost calculations the Agency ran additional scenarios for wet ESPs and Cloud Scrubbers based on single or combined control devices for the two furnaces, assuming different waste water recycling rates, and adding in costs for on-site waste water recycling treatment or disposal of waste water off site. *Id*., at p. R054957; Ex. R-8, pp R034291-1 through 7. The Agency also ran additional scenarios for a baghouse and scrubber based on a single or combined control device for the two furnaces, using updated numbers provided by Ardagh, and assuming different rates of recycling. Ex. R-4, Tab 3, p. R054957; R-8, pp. R034291-8 through 11. Where cost numbers had been provided without documentation, the Agency compared the cost estimates with EPA cost estimating guidance and other sources of cost estimation data. Ex. R-62.

32.

The Agency ran cost effectiveness calculations using two different methodologies for measuring emissions reductions. The first, referred to as "potential cost effectiveness" or "potential to potential", compares the total potential emissions under the current permit limit with the total potential emissions under the proposed RACT permit limits. The second method, referred to as "actual cost effectiveness" or "actual to actual" compares the current emission levels being generated by Furnaces 2 and 3[14] with the emission levels predicted after the installation of the proposed technology.

33.

The cost effectiveness numbers contained in the Agency's final RACT analysis for wet ESPs ranged from $3,530.00 per ton of combined PM and SO2 removed, to $21,570.00 per ton of combined PM and SO2 removed. Ex. R-8, pp. 34291-1 through 4. The cost effectiveness numbers for Cloud Scrubbers ranged from $7,979.00 per ton of combined PM and SO2 removed to $16,311.00 per ton of combined PM and SO2 removed. Ex. R-8, pp. 34291-5 through 7. The

[14] The emission rate used to calculate the current actual emission was a long term average that was developed using emission data going back to 1994. Van Slyke Testimony, Vol. V, pp. 967-968

cost effectiveness numbers for dry scrubbers and baghouses ranged from $6,157.00 per ton of combined PM and SO2 removed to $25,106.00 per ton of combined PM and SO2 removed. In each instance, the lower cost effectiveness numbers were based on the potential to potential analysis and the higher cost effectiveness numbers were based on the actual to actual analysis. Ex. R-8, pp. 34291-8 through 11.

34.

The Agency again concluded that control technologies were reasonably available. It noted that all three technologies it evaluated (E-Tube Wet ESP, Cloud Scrubber, and baghouse and scrubber) were under $10,000.00 per ton for combined PM and SO2 removed based on its potential to potential emissions reductions calculations. It concluded that RACT emissions limits for Furnace 2 and 3 were 0.20 lb of Total PM per ton of glass produced, and 0.6 lb of SO2 per ton of glass produced on a 24-hour average, as determined by a CEMS. The Agency added an additional 30-day rolling average for S02 of 0.50 lb per ton. Ex. R-4, Tab 3, pp. R054961-962.

D. <u>GRO and response to comments</u>

35.

On July 1, 2014, the Agency published the GRO and its Final RACT dated June 30, 2014 (Final RACT). Ex. R-4, p. R054800. The Agency conducted a public hearing on July 31, 2014, and accepted written comments on the proposed GRO until August 22, 2014. *Id.* The Agency responded in writing to all of the comments it received, including the 293 comments submitted in a 27-page document from Ardagh. Ex. R-4, Tab 2, Ex. A, pp. R054866-892; Van Slyke Testimony, Vol. 1, pp. 132-133.

36.

The Agency did not revise the Final RACT in response to comments. Van Slyke Testimony, Vol. 1, pp. 134-135, 159-160. Instead the Agency addressed comments in a separate response to comments documents. Ex. R-4, Tab 2. The Agency may choose to revise its proposal based on comments but did not do so in this instance. Van Slyke Testimony, Vol. 2, p. 290.

37.

One topic included in the comments from the public was concern about health issues. Individuals in the communities surrounding the Seattle plant were concerned about exposures to emissions and resulting health impacts and asked that the Agency consider these health impacts in their RACT decision. Ex. R-4, Tab 2, Attachment A, pp. R054846, 847, 860. Mr. Van Slyke contacted Kathy Strange, the technical analysis manager with the Agency, to assist in addressing these comments. Strange Testimony, Vol. 2, p. 396; Van Slyke Testimony, Vol. 1, p. 161.

38.

The Agency's technical analysis team maintains 13 air quality monitors throughout the agency's four-county area that measure ambient air pollution. The Agency's monitoring focusses on fine particle pollution. Strange Testimony, Vol. 2, pp. 394-395. The NAAQS for PM 2.5 is 35 micrograms per cubic meter (ug/m3) on a daily basis, and 12 ug/m3 on an annual average. *Id.*, p. 413. Congress has directed EPA to establish NAAQS at a level which are requisite to "protect the public health" and allow for "an adequate margin of safety." 42 U.S.C. §7409(b)(1). The area where the Seattle plant is located is in attainment with the NAAQs. Strange Testimony, Vol. 2A, p. 7.

39.

One of the Agency's monitors is located on East Marginal Way, about three-quarters of a mile north of Ardagh's Seattle plant. For the last decade or more, the annual levels of fine particulate matter at the Marginal Way monitor have been higher than any monitor in the Agency's four-county area. Strange Testimony, Vol. 2, pp. 414-415. For one day in 2012 and 11 days in 2013, this area exceeded a more stringent, unenforceable health goal established by the Agency.[15] Strange Testimony, Vol 3, p. 439. The area's steady annual average rate of PM 2.5 is 10 ug/m3. *Id*., Vol. 2A, p. 27. Ardagh's Seattle plant emits at a steady rate, 365 days a year and its emissions are reflected in the 10 ug/m3 annual average. *Id*.

40.

Ms. Strange testified regarding the negative health impacts of exposure to PM and SO2. PM exposure causes increased rates of heart attack, respiratory illnesses, strokes, and premature death. SO2 also causes respiratory illnesses. Strange Testimony, Vol. 2, pp. 397-410. Ms. Strange stated that there is no threshold or safe level of PM. *Id*., p. 408. The Agency asserts that for every reduction in PM and SO2, there is an equivalent relative improvement to health. *Id*., p. 397; Ex. R-4, Tab 2, p. R054818.

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[15] The more stringent Agency goal is (25 ug/m3) for particulate matter on an annual basis. Strange Testimony, Vol. 2, pp. 413-415; Vol 2A, p. 24.

41.

Ms. Strange also testified about the results of an EPA model she used called the Cost Benefits Risk Assessment (COBRA). COBRA is a screening tool that provides preliminary estimates of the impact of air pollution emission changes on ambient PM air pollution concentrations, and then translates this into health impacts. Strange Testimony, Vol. 2, pp. 416-420. The model user inputs PM emissions reductions. The model then estimates how those reductions in emissions could impact air quality, and how those changes in air quality may result in improvements in health outcomes. Strange Testimony, Vol. 2, pp. 418-420.

42.

Because COBRA was developed by the EPA to calculate the costs and benefits of regulations, it was not designed to evaluate the impact of using control technology on a single source. The potential health impacts are also not focused on the area around a single source but are projections based on potential impacts throughout a County. Libicki Testimony, Vol. 4, pp. 732-735.

43.

The emissions reduction data Ms. Strange entered into the model was provided to her by Mr. Van Slyke. That data was based on the Agency's potential to potential analysis. The emissions reductions estimated by Mr. Van Slyke were 43.4 tons of PM 2.5 and 114.7 tons of SO2 on an annual basis. Ex. R-24, p. R054542; Van Slyke Testimony, Vol. 2, p. 255. These numbers are greater than the total actual emissions of PM 2.5 and SO2 from Furnaces 2 and 3 in 2015, which were 34 tons of PM2.5 and 75 tons of SO2. Ex. A-77, p. 1; Krulic Testimony, Vol.

3, pp. 489-493. Ms. Strange acknowledged that she applied the numbers that she was given and did not confirm whether they were the actual emission rates. She also acknowledged that if the numbers for emission reduction in her calculations were too high, the health benefits would be less than the projected health outcomes in her analysis. Strange Testimony, Vol. 2A, p. 15.

44.

The output that the COBRA model provided was included in a table in the Agency's response to comments. It shows the projected health outcomes for 2017 in King County as a whole based on the anticipated emissions reductions. Strange Testimony, Vol. 2, pp. 416-422; Ex. R-4, Tab 2, p. R054818. The benefits ranged from preventing 46.2 asthma exacerbations and 231 work loss days, to reduction of 1.34 to 3.04 adult deaths and .003 infant deaths. *Id*. The model did not predict where in King County these projected health benefits will occur. Libicki Testimony, Vol. 4, pp. 733-735.

45.

The GRO emissions limits, which were included in the Final RACT, were not changed based on public health considerations or any of the comments the Agency received. Van Slyke Testimony, Vol. 2, p. 290; Ex. R-4, Tab 3, p. R054962. The Agency did make one change in the GRO in response to the comments it received: It changed paragraph 8 of the GRO regarding the GRO's effective date. Ex. R-4, p. R054800; Van Slyke Testimony, Vol. 1, pp. 133-138.

46.

On July 23, 2015, the Agency issued General Regulatory Order 10963 amending the SO2 emission limits for Furnaces 2 and 3 to the 1.5 lb per ton limit that was proposed by Ardagh in

ENVIRON's 2013 RACT analysis. Van Slyke Testimony, Vol. 1, p. 212; Ex. R-76, p. R-005765. The order provides that Ardagh will use process controls to meet those limits. Ex. R-76, p. R-005762.

47.

The Agency staff provided a packet of information to the Agency's Board of Directors on September 1, 2015, in anticipation of the Board meeting on September 24, 2015. Van Slyke Testimony, Vol. 1, p 137; Ex. R-4. In the packet, and at hearing, the Agency explained that in establishing RACT limits for Furnaces 2 and 3, it considered the impact of Ardagh's emissions on air quality; the availability of additional controls; the emissions reductions to be achieved by additional controls; the impact of additional controls on air quality; the capital and operating costs of the additional controls; and other relevant factors. Ex. R-4, p. R054801. Included in other relevant factors were Furnaces 2 and 3's compliance history since the 2007 Consent Decree; the Agency's view of the lack of effectiveness of process controls to achieve compliance; the fact that the Greater Duwamish Area is a highly-impacted area with residents residing in close proximity to a number of industrial sources of pollution; and the projected health benefits from the new RACT emissions limits based on the COBRA modeling. *Id*., pp. R054804-805.

48.

On September 24, 2015, the Board of Directors approved and issued the GRO. Van Slyke Testimony, Vol. 1, p 153; Ex. R-4, Tab 1, pp. R054807-808. The GRO imposes the following limits[16] on Furnaces 2 and 3:

- PM emissions (total) shall not exceed 0.20 lb per ton of glass melted.
- SO2 emissions shall not exceed 0.60 lb per ton of glass melted on a 24-hour rolling average and 0.50 lb per ton of glass melted on a 30-day average as determined by CEMS.

The GRO also states that these limits will be effective two years after the approval date of the GRO, which would be September 24, 2017. Ex. R-4, Tab 1, p. R054809. The GRO does not require the use of any specific control technology. Van Slyke, Vol. I, pp. 113-114. However, the limits in the GRO cannot be met by using process controls. The Agency established the limits with the intent that emissions control equipment would have to be applied to meet the new limits. Van Slyke Testimony, Vol. 2, pp. 273-274, Vol. 5, p. 988.

49.

The emission limit set in the GRO for Total PM (.20 lb per ton) is more stringent than any other glass container facility in the United States. Ex. A-74. This limit is more stringent than the similar EPA limit set in 1980 for glass container facilities of .2 lb per ton filterable because filterable PM is only a portion of Total PM and .20 is more stringent than .2. Van Slyke Testimony, Vol. 2, pp. 235-238. It is also more stringent than the limit at the Bennu facility (.27

[16]The GRO also addresses exceptions and special limits for conditions such as startup, maintenance, and idling. Ex. R-4, Tab 1, p. R054809.

lb per ton Total PM), which is the only other glass container facility in Washington, and which is currently employing a baghouse and scrubber. Krulic Testimony, Vol. 3, p. 528.

E. <u>Technical feasibility</u>

50.

The most common technology applied to control both PM and SO2 in the glass container industry in the United States is process controls, followed by a dry ESP and scrubber. Ex. A-74; Ex. R-4, Tab 3, p. R054956. Both Ardagh and the Agency agree that a dry ESP and scrubber are technologically feasible for the Seattle plant. Ardagh's testifying expert opined in his report that this type of technology could achieve the emissions limits contained in the GRO. Ex. A-76, p. 17.

51.

A new technology, called a ceramic filter, is a dry system that controls both PM and SO2. Ex. R-39. Ardagh is currently using this technology at another facility. It is a dry system that can be adjusted to handle a wide range of temperatures. Grega Testimony, Vol. 3, pp. 587-590. The ceramic filter technology is Ardagh's preferred choice for Furnaces 2 and 3 over other emissions control options except process controls. *Id.*, p. 590.

52.

While the Agency did not have detailed information regarding the ceramic filter when it was performing its RACT analysis, the Agency now considers a ceramic filter to be technologically feasible because it is currently in service on a glass container furnace and Ardagh was able to obtain a vendor proposal for this technology. Van Slyke Testimony, Vol. 5, p. 900.

The vice president of engineering for Ardagh stated that the ceramic filter technology would achieve the emissions limits contained in the GRO. Heller Testimony, Vol. 4, p. 719.

53.

A project engineer for Ardagh testified that installation of a ceramic filter system at the Seattle plant would take a minimum of 2 years from the date Ardagh management approved the expenditure of funds for the project. His opinion is based on an analysis of prior installations of emissions control technology at other Ardagh plants. He also testified that other technologies with a larger footprint could require more installation time. Ex. A-55; Stoller Testimony, Vol. 3, pp. 634-635.

54.

The three additional technologies considered technologically feasible by the Agency are a baghouse with a dry scrubber; an E-Tube wet ESP; and a Cloud Scrubber. Ex. R-4, Tab 3, pp. R054955-957.

55.

A dry scrubber and baghouse technology injects absorbent on the front end to react with the SO2 and the exhaust gas. It then collects the particulate in the reacted reagent in the baghouse with the filter system behind. Van Slyke Testimony, Vol. 1, p. 173. The baghouse is made of fabric. Grega Testimony, Vol. 3, p. 599. This system controls both PM and SO2. Ex. R-83, p. R031194.

56.

As previously mentioned, the only other glass container facility in Washington, Bennu Glass in Kalama, is using a baghouse and dry scrubber to control both PM and SO2 emissions on its furnace. Ex. R-4, Tab 3, p. R054953. Bennu received its final air permit in 2011. Ex. R-43, at R033470 and 490. It is the only glass container furnace out of 89 furnaces in the United States to use a baghouse. Ex. A-74. Based on the information it reviewed, the Agency determined that the baghouse technology in use at the Bennu facility would meet the emissions limits in the GRO. Van Slyke testimony, Vol. 1, pp. 131, 173.

57.

Bennu's furnace is rated at 275 tons per day of glass production, which is based on the size of its furnace. Ex. R-43, p. R033491. By comparison, combined Furnaces 2 and 3 have a permitted capacity of 435 tons per day and a design capacity of 555 tons per day. Ex. A-55. The Agency has recognized that fabric filter baghouses "can be the choice for smaller furnaces". Ex. R4, Tab 3, p. R054946.

58.

Fabric baghouses can experience operational and maintenance problems when used on glass furnaces. Dirlam Testimony, Vol. 4, p. 774. The fabric itself has narrow temperature ratings, while glass furnaces have more variable temperatures. If the temperatures get too cold, it creates condensation which creates corrosion and bag binding. If the temperature is too high it also creates problems. Grega Testimony, Vol. 3, pp. 598-601. There is a risk of a heat exchanger failure, which could allow uncooled furnace exhaust gas to reach the fabric filters and destroy them, requiring a shutdown and replacement of every bag. Dirlam Testimony, Vol. 4. p. 775.

59.

Ardagh had two factories that have since closed that used fabric filter baghouses. Dirlam Testimony, Vol. 4, p. 774. While baghouses can be made to work on glass container furnaces, it is challenging. Grega Testimony, Vol. 3, pp. 598-601. Both Mr. Grega, who is furnace maintenance and abatement manager for Ardagh, and Mr. Dirlam, who is director of furnaces for Ardagh, have had personal experience with the use of a fabric baghouse, and both are of the opinion that a fabric baghouse is not technologically feasible for Furnaces 2 and 3. Grega Testimony, Vol. 3, pp. 557-558, 598, 601; Dirlam Testimony, Vol. 4, pp. 763, 774-775. However, Mr. Heller, the vice president of engineering for Ardagh, testified that Ardagh had not yet concluded whether a fabric baghouse was feasible for the Seattle plant. Ex. A-50; Vol. 5, p. 721. The first RACT Analysis submitted on behalf of Ardagh by Trinity concluded that a fabric baghouse was not technically feasible, whereas the second RACT analysis submitted on behalf of Ardagh by ENVIRON concluded that a fabric baghouse was technically feasible. Ex. R-83, pp. R031216, R031300.

60.

The Agency, while recognizing that fabric baghouses have maintenance issues, maintains its position that a fabric baghouse and scrubber is technically feasible. Van Slyke Testimony, Vol 5, p. 898. Its position is primarily based on the use of the fabric baghouse and scrubber at Bennu and the Agency's review of the Bennu operations. Van Slyke testimony, Vol 1, pp. 173-

174. In addition, Ardagh was able to obtain a proposal from a vendor to install a fabric baghouse for its Henderson furnace. Heller Testimony, Vol. 4, p. 699. The Agency considers receiving a bid from a vendor as an indication that the vendor considers the equipment feasible. Van Slyke Testimony, Vol. 5, p. 898.

61.

Another technology considered technically feasible by the Agency is an E-Tube Wet ESP. Ex. R-4, Tab 3, p. R054956. This wet technology uses a wet system to quench the gas which also provides SO2 controls, followed by particulate removal. Van Slyke Testimony, Vol. 5, p. 901. The Agency obtained a quote from a vendor of the technology that warranted that the system will remove 90% of PM and SO2 emissions. Ex. R-4, Tab 3, p. R054956. The technology has not been used on a glass container furnace. Van Slyke Testimony, Vol. 5, p. 901; Ex. R-83, p. R031201.

62.

Wet technologies in general have not been widely used by the glass container industry. Ex. A-76, pp. 3-7. No glass container furnace in the United States uses a wet ESP for emissions control. Exs. A-74; A-76, p. 3. Ardagh previously employed a wet scrubber at a facility in California but was forced to replace the system with a dry scrubber due to the significant problems associated with the wet technology. Dirlam Testimony, Vol. 4, pp. 777-778. The primary concern with the use of wet technology is the generation of wastewater. Ex. R-83, pp. R031204-214. The glass container industry has little experience handling wet waste streams.

Ex. A-76, p. 6. Another significant concern with the use of wet technology is corrosion. Emmel Testimony, p. 823.

63.

The first RACT Analysis submitted on behalf of Ardagh by Trinity identified wet ESPs and wet scrubbers as technologically feasible. Ex. R-83, p. R031299. The second RACT analysis submitted on behalf of Ardagh by ENVIRON, and the supplemental RACT analysis submitted by ENVIRON, concluded that wet technologies were not feasible. Exs. R-83, pp. R031201-218; R-84, p. R003393. Ardagh's testifying expert Tom Emmel opined that the wet technology relied upon by the Agency was not feasible. Emmel Testimony, Vol. 5, p. 843.

64.

The Agency maintains its opinion that the E-Tube Wet ESP is a technologically feasible option for the Seattle plant. Van Slyke Testimony, Vol. 5, p. 901. The Agency acknowledges that corrosion is a concern, but notes that wet technologies are used in other industries with similar corrosion issues. *Id.*, p. 903.

65.

The final technology that the agency asserts is technologically feasible is the Cloud Scrubber. The Cloud Scrubber uses a highly charged water droplet and controls both PM and SO2 in various states. Like a wet gas scrubber or wet ESP, it generates wastewater, referred to as blowdown. Blowdown must either be disposed of or reused for batch wetting. Ex. R-83, p. R031215.

66.

The Seattle plant is currently using a Cloud Scrubber on Furnace 5. The Cloud Scrubber was installed in 2009 on an experimental basis. Ex. R-55. Furnace 5 is the only glass container furnace in the U.S. to use this technology. Ex. A-74. The manufacturer of the Cloud Scrubber is no longer offering the device as an option for glass container furnaces. Exs. A-39, A-67.

67.

Ardagh engineers testified about the problems the company has experienced using the Cloud Scrubber. Grega Testimony, Vol. 3, pp. 597, 598; Kariko Testimony Vol. 4, p. 816; Dirlam Testimony, Vol. 4, p. 776, 777. The company struggles with corrosion issues and employs a full time mechanic to keep the Cloud Scrubber operating. Kariko Testimony, Vol. 4, p. 816. The use of recycled batch water for Furnace 5 limits the furnace's production to colorless glass only. Ex. R-84, pp. R03380-381. The Cloud Scrubber is in poor condition due to corrosion and will have to be either refurbished or replaced soon. Heller Testimony, Vol. 4, p. 720.

68.

The Agency maintains that the Cloud Scrubber is technologically feasible, although it admits its long term feasibility has not yet been proven. Ex. R-4, Tab 3, p. R054946. The Agency focusses its conclusion on the fact that Furnace 5 is meeting its emissions limits with the Cloud Scrubber. Van Slyke Testimony, Vol. 5, p. 896.

F. Economic feasibility

69.

The Agency's economic analysis evolved over time. In its initial draft the Agency used what it referred to as "[a] standard approach for evaluating the cost-effectiveness of control equipment [which] is described in EPA's Control Cost Manual." Ex. R-83, p. R031360. It calculated a cost effectiveness number in dollars per ton of pollutants removed for its three recommended technologies. *Id*., pp. R031363-365.[17] In the Final RACT, the Agency again addresses cost-effectiveness in terms of dollars per ton of pollutants removed. *Id.*, pp. R054955-962. In the background section of the Final RACT, the Agency states that in its previous 2013 RACT analysis it had provided "justification for a cost-effectiveness threshold of $10,000.00 per ton of pollutants removed." Ex. R-4, Tab 3, p. R-054935.

70.

In its Final RACT analysis, the Agency identified cost-effectiveness thresholds from other jurisdictions including the Midwest Regional Planning Organization, which deemed controls in the range of $2,000.00 to $4,000.00 per ton to be cost effective for the glass manufacturing sector (Ex. R-4, Tab 3, p. R-54952); Washington State Department of Ecology's (Ecology) conclusion that $7,123.00 per ton of S02 removed was cost effective for a Best Available Retrofit Technology (BART) determination for a cement kiln in Seattle (*Id*., p. R054959); the Bay Area Air Quality Management District's published BACT cost-effectiveness

[17] In the Final RACT, the Agency also eludes to the idea that another appropriate analysis could be based on the cost the emissions controls add to each product produced, such as each glass bottle, but then does not explore this idea further. Ex. R-4, Tab 3, p. R054955.

criteria of a maximum of $5,300.00 per ton of PM10 and $18,300.00 per ton for S02, in 2002 dollars (*Id*., p. R054960); and the South Coast Air Quality Management District's new source review guideline maximum of $4,500.00 per ton for PM 10 and $10,100.00 per ton for SO2, in 2003 dollars (*Id.*). In its Final RACT, the Agency states that the federal government considers costs of under $10,000.00 per ton of pollutants removed to be reasonable. Ex. R-4, Tab 3, p. R054961.

71.

Mr. Van Slyke testified that the Agency considered cost-effectiveness broadly in the context of all of the other statutory RACT factors set out in Washington law. Van Slyke Testimony, Vol. 1, p. 139; Ex. R-4, pp. R54802-805. He explained that the Agency considers what is economically reasonable in light of the costs that other plants have absorbed in employing technology to control emissions. Van Slyke Testimony, Vol. 5, p. 948. He explained that the Agency takes into account the fact that other glass container facilities with similar emissions control devices are still able to operate, and expressed the viewpoint that use of emissions control technology is becoming more common in the industry. *Id*., p. 948. In Mr. Van Slyke's opinion, the increased use of emissions control technology in the glass container industry indicates that emissions control technology is cost effective on a macro level. *Id*., p. 145.

72.

Ardagh's testifying expert opined that the Agency's cost-effectiveness calculations and analysis contained numerous errors. First, Mr. Emmel asserted that the Agency underestimated the retrofit costs associated with installing emission controls at the existing Seattle plant. Mr.

Emmel stated that the Agency erred by not using the actual site specific cost estimates provided by Ardagh. Ex A-76, p. 3.

73.

The second error identified by Mr. Emmel concerning the manner in which the Agency calculated its cost effectiveness numbers is the capital recovery factor applied by the Agency. The capital recovery factor used by the Agency was .8%, which Mr. Emmel argued is significantly lower than the 7% rate most agencies have used since the publication of EPA's 6th Edition of the Control Cost Manual in 2002. Ex. A-76, p. 5; Emmel Testimony, Vol. 4, pp. 792-793. Mr. Emmel testified that EPA recommends the use of a 7% interest rate. *Id.*, p. 794. In his report he points out that the cost-effectiveness threshold developed by Ecology for the cement kiln in Seattle was based on a 7% interest rate. Ex. A-76, p. 6.

74.

The third error identified by Mr. Emmel concerning the cost-effectiveness calculations is the Agency's projected emissions reductions. As noted above, the Agency calculated emissions reduction using the actual to actual and the potential to potential methods. Mr. Emmel's opinion is that the most appropriate method compares actual emissions to future potential emissions. He stated that this method most accurately reflects likely emissions reductions. Ex. A-76, p. 7; Emmel Testimony, Vol. 4, p. 808. Ardagh's other testifying expert, Dr. Libicki, agreed that actual to future potential is the proper method to calculate emissions reduction. Libicki Testimony, Vol. 4, pp. 729-730.

75.

Because the Agency did not use the actual to future potential method, Mr. Emmel argued the Agency overestimated the emissions reductions that would be realized by the evaluated control technologies. *Id.*, pp. 7-10. Mr. Emmel also questioned the Agency's decision to use emissions data over a 20-year period in calculating the actual emission amount for Furnaces 2 and 3.[18] Mr. Emmel stated that inclusion of emissions data that does not reflect the recent actual emissions of Furnaces 2 and 3 resulted in the Agency overestimating current emissions and overestimating the projected emissions reductions. Emmel Testimony, Vol. 4, pp. 811-812.

76.

The fourth error identified by Mr. Emmel is the Agency's decision to combine PM and SO2 in its cost-effectiveness calculations. In his opinion, this is inconsistent with the approach used by EPA and other agencies in which cost-effectiveness thresholds were calculated for single pollutants. Mr. Emmel points to the Bay Area Air Quality Management District's published BACT cost-effectiveness criteria of a maximum of $5,300.00 per ton for PM10 and $18,300.00 per ton for S02, in 2002 dollars; and the South Coast Air Quality Management District's new source review guideline maximum of $4,500.00 per ton for PM 10 and $10,100.00 per ton for SO2 in 2003 dollars. Ex. A-76, p. 11. When pollutants are combined in the cost-effectiveness calculation, the total amount of projected emissions reductions increases in relation to the total costs of implementing the technology and thus the costs per ton of pollutants removed goes

[18] For example, Mr. Emmel asserts that using a 20-year emission rate average results in emissions of 1.4 tons per year for Furnace 2, whereas, a current four year average results in .81 tons per year of emissions. Emmel Testimony, Vol. 4, p. 812.

down. Mr. Emmel contends that combined pollutant cost-effectiveness values should not be compared to single pollutant cost-effectiveness values as they are not comparable figures. *Id*.

77.

Finally, Mr. Emmel stated that the Agency should have determined a cost-effectiveness threshold for its RACT determination. Mr. Emmel did not argue for a specific cost-effectiveness threshold but rather identified RACT determinations in which costs per ton below $3,000.00 were considered reasonable and costs per ton over $3,000.00 were considered unreasonable. Emmel Testimony, Vol. 4, pp. 826-827. Ardagh's other expert, Ms. Libicki, acknowledged that there are a range of thresholds that have been applied by different agencies in different situations. She stated that BACT determinations often apply a $10,000.00 per ton threshold, and for non-attainment areas in California, a $20,000.00 per ton threshold may be applied. Libicki Testimony, Vol. 4, pp.752-753. Mr. Emmel also prepared a RACT cost-effectiveness calculation for installing a dry ceramic system. His cost and emission capture figures resulted in cost-effectiveness values for Furnaces 2 and 3 for PM at $135,303.00 per ton, and for SO2 at $87,794.00 per ton. The combined dollar per ton figure for PM and SO2 was $54,800.00. Ex. A-76, pp. 17-19.

78.

In response to Mr. Emmel's first alleged error that the Agency under estimated the costs of the evaluated control technologies, the Agency testified that use of a study level evaluation to estimate costs is allowed by the EPA Control Cost Manual. Ex. R-11, pp. R029569, 78-80. The Agency also reviewed vendor quotes (Ex. R-9); post-construction cost reports for installation of the Cloud Scrubber on Furnace 5 (Ex. R-19); information provided by Ardagh on the costs of installation of other control equipment on other furnaces (Van Slyke Testimony, Vol. 1, p. 145); and actual cost data from the Bennu Glass scrubber/baghouse installation. Pade Testimony, Vol. 2, p. 343. Mr. Pade also ran a variety of cost-effectiveness calculations using information from Ardagh and some of the cost numbers from the 2013 ENVIRON RACT analysis. Pade Testimony, Vol. 2, p. 333; Ex. R-8.

79.

Although the Agency included a variety of cost information in its calculations, the Board finds that some of the Agency's cost-effectiveness calculations underestimated costs. For example, the Agency's estimate of the demolition costs necessary to allow for installation of emissions control equipment at the Seattle plant was $2,373.00. The Agency arrived at this figure by using an online calculator to determine the demolition costs for a 3,000 square foot warehouse. Pade Testimony, Vol. 2, pp. 368, 369; Ex. R-81. Subsequent estimates of demolition costs, prepared by a third-party engineering firm based on a site specific analysis, estimated the costs to be $253,875.00, a figure that was based on non-union labor. The Seattle plant is a union shop, so this figure would increase with the application of local labor costs. Ex. A-1, p. AG1020298; Heller Testimony, Vol. 4, p. 709. The Agency may have been justified in rejecting some of the cost estimates provided by Ardagh for demolition, but the Agency's use of an online calculator and the resultant cost estimate of $2,373.00 for demolition costs was unreasonable.

80.

In response to Mr. Emmel's second alleged error that the Agency should have applied a 7% interest rate, Mr. Van Slyke explains that the Agency's use of the .8% interest rate for its capital recovery factor is based on a government circular, A-94, that is referenced in the EPA Cost Control Manual, 6th Edition, published January 2002. Van Slyke Testimony, Vol. 5, pp. 959-961; Ex. R-11, pp. 2-13, ftn. 1. The rates in Circular A-94 vary annually and are based on Treasury borrowing rates. Ex. R-4, Tab 3, p. R054957. The Agency considers the rates in Circular A-94 to be more representative of the current low interest environment. Van Slyke Testimony, Vol. 5, p. 961. The 2013 ENVIRON RACT analysis that was submitted on behalf of Ardagh applied the .8% rate. Ex. R-84, p. R003399. Mr. Emmel also acknowledged that the EPA Cost Manual allows the use of interest rates based on Circular A-94. Emmel Testimony, Vol. 4, p. 850.

81.

The Board finds that the Agency's decision to use interest rates from Circular A-94 in the capital recovery calculation was supportable based on the guidance from EPA and the explanation provided by the Agency.

82.

In response to Mr. Emmel's third alleged error, the manner in which the Agency calculated the expected emissions reduction for the evaluated control technologies, the Agency defends its choice of the actual to actual and potential to potential calculation methods. According to the Agency, comparing actual to actual emissions, or potential to potential emissions takes into account all pollutants to be reduced by a control technology. The Agency disagrees that comparing actual emissions to future allowable is the best method, or even an appropriate method, because comparing actual emissions to future allowable emissions does not account for all of the emissions the device could remove, which would have the effect of making control technology appear more expensive. Van Slyke Testimony, Vol. 5, pp. 916-917.

83.

The Agency also defended its choice to use an average of the emissions records dating back to 1994 to establish the current actual emissions rate. Mr. Pade testified that he wanted to be as comprehensive as possible. Pade Testimony, Vol. 2, p. 305. He also acknowledged that using the last four years of data could establish a lower baseline because the pounds per ton of PM emitted from the furnaces in the last four years is lower than it was in the 1990's and 2000. *Id.*, pp. 374-375. Mr. Van Slyke testified that in his opinion, all of the data since 1994 is a "relevant indication of what the company not only has done but also could do in the future." Van Slyke Testimony, Vol. 5, pp, 911-912.

84.

The Board finds that the Agency's decision to use data from 1994 forward to establish a rate that was supposed to reflect actual emissions rate was not reasonable, given the general decrease in emissions reflected in the more recent data. This decision resulted in an overstatement of the amount of emissions reductions. The Board finds that the appropriate method for calculating actual emissions in this instance would be to look at more recent data that accurately reflects the current emissions rate of the facility.[19]

85.

In response to Mr. Emmel's fourth alleged error that the Agency should not have combined cost-effectiveness figure for PM and SO2, the Agency explains that it's combined calculation for PM and SO2 was based on EPA guidance. Pade Testimony, Vol. 2, pp. 329-332; Ex. R-16. The EPA guidance, which was provided in a March 24, 1997, letter from EPA to the Georgia Department of Natural Resources, explains that when a particular control device results in the substantial reduction of more than one regulated pollutant, the cost effectiveness of the control device can be calculated by dividing the annualized cost of the control device by the total of both pollutants removed. *Id*. Mr. Pade stated that the evaluated control technologies will control both PM and SO2 and that the two pollutants are interrelated pollutants of concern for Furnaces 2 and 3. The pollutants are interrelated because if there is more SO2, there will be more PM because the SO2 reacts with caustic vapors and oxygen to form particulates. Pade Testimony, Vol. 2, p. 303. The Board finds that the Agency's decision to combine pollutants in its determination of emissions reductions as a part of the cost-effectiveness calculation was supportable based on guidance from EPA.

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[19]The Board also notes that the emission limits for SO2 applied by the Agency in its potential to potential calculations in its Final RACT analysis were not updated to reflect the 1.5 lb per ton limit that had been adopted by the Agency in July 2015. If the current 1.5 lb per ton limit had been used in the potential to potential calculation, the projected emission reductions would have been lower. Pade Testimony, Vol. 2, pp. 373-374.

86.

In response to Mr. Emmel's fifth alleged error that the Agency should have identified and applied a cost-effectiveness threshold amount, the Agency asserted that it is not required to set a threshold amount that is applied to all cost-effectiveness analysis or even to set a threshold for each individual RACT analysis. Van Slyke Testimony, Vol. 1, p. 179. Mr. Van Slyke stated that costs have to be evaluated through a case by case determination based on the facts of the specific source and considering all of the other RACT factors. *Id*. Mr. Van Slyke testified that EPA considers cost-effectiveness to have too many limitations to be used as the major decision making factor in setting standards and that is it not practical to identify a numerical criterion which represents an upper limit in cost per unit of pollutant removed. Van Slyke Testimony, Vol. 1, p. 166; Ex. R-17, p. 66748. The Agency also argues that, although $10,000.00 per ton is often used by EPA, costs above $10,000.00 per ton may be reasonable in specific cases. Pade Testimony, Vol. 2, pp. 344-346. The Agency did not state an amount that would be too high in terms of costs per ton, but did indicate that costs up to $30,000.00 per ton could be reasonable in a particular situation. *Id.*

87.

Any Conclusion of Law deemed to properly be considered a Finding of Fact is hereby adopted as such.

CONCLUSIONS OF LAW

1.

The Board has jurisdiction over the subject matter and the parties pursuant to RCW 43.21B.110(1). The Board reviews the issues *de novo*. WAC 371-08-485(1). The Board has ruled, by separate order, that the Agency issued the challenged GRO as a regulatory order and thus has the initial burden of proof under WAC 371-08-485(3). *See AGI Glass, Inc. v. Puget Sound Clean Air Agency*, PCHB No. 15-120, (Order Clarifying Burden of Proof and Order of Presentation at the Hearing, Oct. 3, 2016).

2.

The parties identified the following issues in the prehearing order for this appeal.

1. Under RCW 70.94 and Agency Regulation I, §§ 3.03 and 3.04, did the Agency's General Regulatory Order 10606 lawfully establish Reasonably Available Control Technology ("RACT") emission limits for Ardagh Glass Inc.'s Seattle Furnaces Nos. 2 and 3?[20]

2. Whether the Puget Sound Clean Air Agency ("PSCAA") properly determined, when it issued General Regulatory Order No. 10606 ("RACT Order"), that current controls on AGI's Furnaces 2 and 3 and the emission limits for those furnaces are not reasonably available control technology ("RACT")?
   A. Whether PSCAA based its decision to review and re-establish RACT based on the 2007 Consent Decree?
   B. Whether PSCAA properly amended the emission limits that it established for AGI Furnaces 2 and 3 pursuant to the 2010 Consent Decree?
   C. Whether there were subsequent advances in technologic or economic feasibility to justify a new RACT determination and new emission limits for AGI Furnaces 2 and 3?

[20] This issue is an "umbrella" issue, encompassing the other issues, and therefore it is not addressed separately in this decision.

D. Whether PSCAA lawfully established RACT limits for both PM and SO_2 emissions?

E. Whether PSCAA properly determined that both PM and SO_2 were pollutants of concern?

3. Whether PSCAA based its RACT determination for AGI Furnaces 2 and 3 on control technologies that are not technologically feasible?

A. Whether PSCAA evaluated technologies that are demonstrated in practice at glass furnaces similar to Seattle Furnaces 2 and 3?

B. Whether PSCAA properly determined the emission reductions that could be achieved by the installation of the available emission control technologies taking into consideration the emission limits already in effect for Seattle Furnaces 2 and 3?

C. Whether PSCAA erred in failing to consider "process controls" as RACT for AGI Furnaces 2 and 3?

4. Whether PSCAA based its RACT determination for AGI Furnaces 2 and 3 on control technologies that are not economically feasible?

A. Whether PSCAA's economic analysis was based on incorrect (capital and operating) cost estimates and assumptions?

B. Whether the cost of ancillary and supporting equipment and structures should be considered a cost of a control technology for purposes of a source-specific RACT determination?

C. Whether costs for demolition and site preparation should be considered a cost of a control technology for purposes of a source-specific RACT determination?

D. Whether PSCAA used an appropriate RACT cost-effectiveness threshold?

E. Whether PSCAA properly combined the emission reductions for PM and SO_2 in its calculation of cost-effectiveness?

5. Whether PSCAA properly considered other relevant environmental criteria in determining RACT for Seattle Furnaces 2 and 3?

A. Whether PSCAA failed to consider the cross-media impacts of generating and disposing of wastes generated by control equipment it identified as RACT?

B. Whether PSCAA failed to consider the increase of other pollutants of concern (e.g. greenhouse gases) generated by the control equipment it identified as RACT?

6. Whether the limits imposed by PSCAA in General Regulatory Order NO. 10606 exceed RACT because they impose costs and/or emission reductions that meet or exceed best available control technology ("BACT") or lowest achievable emission rates ("LAER")?

7. Whether PSCAA properly considered and responded to the information that AGI provided regarding PSCAA's RACT Analysis and RACT Order?

8. Whether the September 24, 2017 compliance date set by General Regulatory Order No. 10606 is unreasonable given the time needed to design and implement the emission control equipment installation?

3.

In Washington State, RACT is required for existing sources. RCW 70.94.154(1). "Where current controls are determined to be less than RACT, the permitting authority shall, as provided in RCW 70.94.154, define RACT for each source or source category and issue a rule or regulatory order requiring the installation of RACT." WAC 173-400-040(1); Agency Reg. 1, Sec. 3.04(f). RACT for each source category containing three or more sources shall be determined by rule. RCW 70.94.154(2). Source-specific RACT determinations may be performed for sources in source categories containing fewer than three sources or when an air quality problem, for which the source is a contributor, justifies a source-specific RACT determination prior to development of a categorical RACT rule. RCW 70.94.154(3)(c), (d).[21]

4.

RACT, in Washington, is defined as:

> [T]he lowest emission limit that a particular source or source category is capable of meeting by the application of control technology that is

[21]Other reasons justifying source-specific RACT determinations which are not applicable here, are listed in RCW 70.94.154(3)(a), (d), and (e).

> reasonably available considering technological and economic feasibility. RACT is determined on a case-by-case basis for an individual source or source category taking into account the impact of the source upon air quality, the availability of additional controls, the emission reduction to be achieved by additional controls, the impact of additional controls on air quality, and the capital and operating costs of the additional controls.

RCW 70.94.030(20).[22] In determining RACT, agencies are required to utilize the factors set forth in RCW 70.94.030, as well as RACT determinations and guidance made by the EPA, other states and local authorities for similar sources, and other relevant factors. RCW 70.94.154(5). An agency must "consider" and "take into account" each of the enumerated RACT factors and "use its best professional judgment" to "balance the need for cleaner air (including minimizing adverse health impacts) against the capital and operating costs of additional technologies for controlling emissions." *Bowers v. Southwest Air Pollution Control Authority*, PCHB Nos 98-3 & 31 at CL VII (March 30, 1999), *aff'd* 103 Wn. App. 587, 13 P.3d 1076 (2002).

A. <u>Agency's authority to issue RACT (Issue 2)</u>

5.

Issue 2 reflects Ardagh's various arguments asserting that the Agency inappropriately required it to meet RACT at this point in time. First, Ardagh contends that the Agency incorrectly required RACT review based on Ardagh's past history of noncompliance with its

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[22] The Federal Clean Air Act requires "RACT" when an area fails to meet NAAQs. 42 U.S.C. § 7502(c)(1). In the absence of a statutory definition, EPA has defined RACT as:

> the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility. Therefore, depending on site specific considerations, such as geographic constraints, RACT can differ for similar sources.

David R. Wooley & Elizabeth M. Morss, Clean Air Act Handbook § 2:3 (26th Sept. 2016 update), citing 45 Fed. Reg. 59329, 59331 (Sept. 9, 1980). The first sentence of this definition is identical to the first sentence of Washington's definition.

emissions limits. During the hearing, Ardagh presented evidence it asserts demonstrates that the recent history at the Seattle plant demonstrates there are no significant compliance issues. The Agency responded with its own evidence and its position that past and recent history demonstrates that relying solely on process controls leads to compliance issues. It is clear that the Agency's concerns regarding Ardagh's compliance record was a driving force in the Agency's determination to reject Ardagh's initial RACT analysis and complete its own. However, this does not mean that the Agency was required to prove past emissions violations to require RACT. Noncompliance with emissions limitations is not a legal prerequisite to requiring RACT. RACT is required for all existing sources. RCW 70.94.154(1). Therefore, the Board rejects Ardagh's argument that the Agency could not require RACT without establishing a record of current emissions violations.

6.

Ardagh makes a similar argument that the Agency inappropriately required RACT for SO2, because Ardagh has been in compliance with its SO2 standard since 2007. Here again, the Agency does not need to prove violations of emissions limits for a particular pollutant prior to requiring RACT. RACT is required for all existing sources. RCW 70.94.154. The Legislature has directed that when an agency establishes RACT, it should do so for "all air contaminants deemed to be of concern for that source or source category." RCW 70.94.154(5). SO2 is a "criteria pollutant" which means a pollutant for which there is an established NAAQS. WAC 173-400-030(21). Ardagh is a major source for the air operating permit program, which means that Ardagh has the potential to emit more than 100 tons of criteria pollutants. Ardagh is currently the largest source of PM and S02 emissions as reported by all stationary sources in the Agency's four county area. S02 causes respiratory illnesses. Clearly, SO2 is an air contaminant deemed to be of concern for Ardagh, and therefore it was reasonable for the Agency to include SO2 limits and control technology in its RACT analysis.[23]

7.

Ardagh also argues that because the Agency didn't prove recent violations by Ardagh, it didn't prove that process controls were less than RACT, and therefore it couldn't require a RACT analysis. In support of this argument, Ardagh cites to WAC 173-400-040(1) and PSCAA Regulation 1, Section 3.04(f) which provide that, "before making a new RACT determination for a source or source category, an agency must determine that the controls currently in use are less than RACT".

8.

There are at least two problems with this argument. First, RACT is defined as an "emission limitation" that can be met by reasonably available control technology. RCW 70.94.030(20). If a lower emission limit than the applicable limit can be met through technology that is reasonably available and technologically and economically feasible, the lower emission limit is RACT. A RACT analysis is used to determine whether a lower emissions limit can be reached through reasonably available control technology, and the Agency's authority to perform a RACT analysis is not limited to situations in which the Agency proves violations of emission limits.

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[23] The Board notes that the initial RACT analysis submitted by Trinity on behalf of Ardagh and in anticipation of the rebuild of Furnace 3 included an analysis of technologies to control SO2. Ex. R-83, p. R031299.

9.

The second problem with Ardagh's argument is that it ignores the factual situation in this case. Here, the RACT process started when Ardagh provided a RACT analysis in connection with its planned major rebuild of Furnace 3. The agency reviewed Ardagh's proposed RACT analysis and decided to perform its own RACT analysis to further evaluate Ardagh's conclusion that process controls were RACT. The Agency concluded in its initial RACT analysis that lower emission limits could be met through technologies other than process controls and that those technologies were reasonably available and technologically and economically feasible. Based on those findings, the Agency determined that the current limits were not RACT. The Agency concluded in its initial RACT analysis that the current controls were "less than RACT", and, consistent with WAC 173-400-040(1) and Regulation 1, § 3.04(f), it proceeded with the process of issuing an order to require the Seattle plant to meet new emissions limits it determined to be RACT. Ardagh has failed to establish any restrictions on the Agency's authority to perform its own RACT analysis once the RACT process has been started by a regulated entity that is planning a major rebuild of a furnace,[24] and it was not unreasonable for the Agency to perform its own analysis in light of its determination that Ardagh's RACT analysis was incomplete.

[24] The original RACT analysis submitted by Ardagh was intended to meet a provision in the 2007 Consent Decree requiring Ardagh to submit a RACT analysis 18 months prior to its anticipated major rebuilds of Furnaces 2 and 3. Ex. R-83, p. R031293. Ardagh has extended its schedule for the rebuilds, but is still planning on doing the rebuild for Furnace 2 in June of 2018 and for Furnace 3 in 2019. Heller Testimony, Vol. 4, p. 713. Ardagh's primary reason for delaying the rebuilds is that it is waiting for a determination on whether it will have to employ add-on control technology for Furnaces 2 and 3. *Id.*

10.

Ardagh also argues that the Agency could not require new RACT limits because Ardagh's existing limits established in the 2010 Consent Decree were RACT. According to Ardagh, any new RACT standard would have to be based on new technology developed since the entry of the Consent Decree. The Board rejects this argument. As discussed above, Ardagh began the RACT review process by submitting a RACT analysis in preparation for a furnace rebuild. Regardless of whether the limits established in 2010 were RACT at that time, a RACT standard is by its nature an evolving standard. The purpose of requiring RACT is to consider new technologies as they are developed, or consider already existing technologies that have become technologically feasible or affordable. Even if process controls were RACT in 2010, it does not mean that they are RACT now. The permit limits in the 2010 Consent Decree do not limit the Agency's ability to perform a RACT analysis at this time.[25]

11.

The Board rules in favor of the Agency on Issue 2, and concludes that the Agency acted within its authority to perform a RACT analysis for Ardagh's Furnaces 2 and 3 and to issue a RACT order requiring new emissions limits.

[25] To the extent that Ardagh argues that the parties intended the 2010 Consent Decree to limit the Agency's ability to perform a new RACT analysis, this argument has already been rejected by the Federal District Court in its enforcement of the Consent Decree. *See* Ex. 58.

B. Technological feasibility (Issue 3)

12.

RACT, by definition, is "[T]he lowest emission limit that a particular source or source category is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility." RCW 70.94.030(20). The Washington Court of Appeals has held that "[u]nder this limitation a [RACT] control system must be both economically and technologically feasible." *Bowers*, 103 Wn. App. At 613. To be valid, the emissions limits contained within the GRO must be attainable through the use of a control technology that is technologically feasible. "Control technology" includes "control devices or equipment, work practices and design characteristics." *Brooks Manufacturing Co. v. Northwest Clean Air Agency*, PCHB No. 15-011, CL 17 (March 4, 2016).

13.

The Washington Court has considered very similar language to the RACT standard in another air pollution case, *Weyerhaeuser Co. v. Southwest Air Pollution Control Auth.*, 91 Wn. 2d 77, 81, 586 P.2d 1163, 1165–66 (1978). In *Weyerhaeuser*, the Court interpreted the words "known", "available", and "reasonable" in the context of permitting a new air source. The Court stated:

> The regulation and the statute are clearly meant to foster the use of new emission control technology in the construction of a contaminant source. They do not, however, necessarily mandate the Best control technology. The requirement is clarified and limited by three important words, "known", "available", and "reasonable". As the PCHB concluded, these standards impose limitations of practicality and reasonableness on the agency's discretion.

Weyerhaeuser, 91 Wn. 2d at 81.

The Court went on to state that:

> "[K]nown" and "available" indicate that [an Agency] may not require an applicant to develop new technology to advance the art of emission control. The "advance" must be "known" in the sense that it has been tested and found to control emissions effectively and efficiently. Under this test [an Agency] may not insist that an emission source be utilized as a proving ground for as yet untried control technology. An applicant must, however, incorporate into its proposal those control systems previously developed and presently available.
>
> The agency's discretionary enforcement power is further circumscribed by the requirement of "reasonableness". . . For example, a system moderately more efficient in controlling emissions might be "unreasonable" if it substantially impeded plant production. Similarly, a system efficient in controlling emissions that could remain operative only with frequent, extensive and expensive maintenance work might be beyond the scope of this standard. Many other factors might be relevant in determining the reasonableness of available systems.

Weyerhaeuser, at 81.

14.

Here, the Agency contends that the following emissions control technologies are technologically feasible and would meet the emissions limits in the GRO: wet ESP, Cloud Scrubber, Ceramic Filter, semi-dry scrubber with ESP, and dry scrubber with a baghouse. Agency's Closing Argument, p. 18.

15.

Ardagh agrees that a dry ESP and scrubber combination, which is the most common end-of-stack technology for control of PM and SO2 in the glass container industry is technologically feasible for the Seattle plant. Ardagh's Closing Brief, p. 18. Ardagh also agrees that a ceramic filter system is technologically feasible. *Id*. The Board concludes, based on the parties agreement and the evidence presented at hearing, that a dry ESP and scrubber combination and a ceramic filter system are technologically feasible for the control of PM and SO2 emissions from Furnaces 2 and 3.

16.

The parties disagree on whether wet ESP, a Cloud Scrubber, or a fabric baghouse followed by a dry scrubber are technologically feasible.

17.

The Board concludes that the Agency has not met its burden of proving that wet technologies, including the Cloud scrubber, are technologically feasible for Furnaces 2 and 3. The evidence at hearing established that the wet ESP technology is not in use on glass container furnaces; the generation of waste water is a problem for an industry which is otherwise primarily a dry industry; the Cloud scrubber, which was installed by Ardagh on an experimental basis, has proven to be extremely difficult to maintain and limits the furnace production to non-colored glass only; and the manufacturer of the Cloud scrubber no longer offers that technology for use in the glass container industry and instead recommends the ceramic filter.

18.

The Board concludes that the Agency has met its burden of proving that a fabric baghouse and scrubber is technologically feasible for Furnaces 2 and 3. The Bennu facility may be the only glass container furnace using this technology in the United States, but the Bennu baghouse system was recently constructed, has met its emission limits using this technology, and its manufacturer is still providing estimates for construction of baghouse control technology for the glass container industry. Although the capacity of the Bennu furnace is smaller than the combined capacity of Furnaces 2 and 3, the evidence did not establish that a single baghouse could not work for Furnaces 2 and 3 or that two baghouses will not fit at the Seattle plant.

19.

Moreover, Ardagh did not take a consistent position on whether the baghouse technology is technologically feasible. Ardagh has experienced problems with fabric baghouses on its furnaces in the past, and two of its engineers do not consider fabric baghouses to be technologically feasible for use on glass furnaces. Dirlam Testimony, Vol. 4, pp. 774-775; Grega Testimony, Vol. 3, p. 599. However, ENVIRON determined that baghouse technology is technologically feasible in its 2012 RACT analysis, and Ardagh's vice president of engineering stated that Ardagh had not yet made a decision as to whether it considers a baghouse to be technologically feasible for the Seattle plant. Ex. R-83, p. R031216; Heller Testimony, Vol. 4, p. 721.

20.

The Board concludes that the agency has met its burden of proof that a scrubber with a fabric baghouse, a Ceramic Filter, and dry ESP with scrubber are technologically feasible for control of emissions of PM and S02 from Furnaces 2 and 3. Although the Board has determined that baghouse technology is technologically feasible, the Board acknowledges that Ardagh asserts that the ceramic filter technology is its preferred technology for installation at the Seattle plant. The GRO does not specify a preferred technology. The GRO merely requires installation of control technology that will meet the new emission limits. Ardagh asserts that the Ceramic Filter technology has similar costs to the fabric baghouse technology. Heller Testimony, Vol. 4, pp. 717-718. If the two technologies have similar costs, and Ardagh prefers the ceramic filter technology, the GRO would not prohibit the installation of that control technology.

C. Economic feasibility (Issue 4 and Issue 3C)[26]

21.

In addition to being technologically feasible, a proposed control technology must be economically feasible. RCW 70.94.030(20). While the Agency is correct that it must consider factors in addition to cost-effectiveness in its RACT analysis, the consideration of the other factors is still part of determining whether technology that is available and technologically feasible is also economically feasible. The Washington Supreme Court has interpreted the reasonableness requirement in the context of economic feasibility to mean that an agency "may not require a system which would impose an unreasonable financial burden on the applicant because of excessive initial outlay or annual operating costs." *Weyerhaeuser*, 91 Wn. 2d at 82.

22.

A standard component in the determination of economic feasibility is the cost-effectiveness calculation which determines the costs per ton to remove pollutants associated with the installation of a particular technology. All of Ardagh's consultants and the Agency staff performed this type of calculation as a part of evaluating economic feasibility. Furthermore, it is

[26] The Agency initially questioned whether the cost of "ancillary and supporting equipment and structures", and "demolition and site preparation" should be included in cost calculations. *See* Issue 4 (B) and (C). The Board concludes that the Agency is no longer arguing that these categories of costs, if estimated reasonably, should not be included in the cost of control technology. *See* Agency's Closing Brief, pp. 31-32.

a common practice for other regulators and agencies nationally to perform this calculation as evidenced by the numerous cost-effectiveness numbers expressed in terms of "dollars per ton of pollutants removed" that are contained in the various RACT, BART, and BACT analyses used for comparisons by all of the parties. Ecology has also utilized a "dollars per ton cost-effectiveness calculation" in arriving at BART limitations. In *Bowers*, the Board considered the cost of the proposed technology in terms of dollars per ton of pollutants removed while also recognizing that cost-effectiveness is only one factor and that dollar values do not have to be assigned to each element of the RACT determination. *Bowers*, PCHB No's 98-3 and 31, *compare* CL 17, 18, 19, 30 and 33 *with* CL 5, 7, 16 and 20.

23.

The Board concludes that a cost-effectiveness calculation of dollars per ton of pollutants removed is a necessary element in a RACT analysis for making a determination of economic feasibility. This does not mean that an Agency is required to set a cost effectiveness threshold of a certain amount of dollars per ton that precludes the consideration of other factors in the determination of economic feasibility.

24.

Here, the Agency did calculate the dollars per ton cost of pollutants removed for the wet ESP and the Cloud Scrubber. However, the Board has found that the Agency did not meet its burden of proving that either the wet ESP or the Cloud Scrubber technologies are technologically feasible. Therefore, the cost-effectiveness and economic feasibility of the wet ESP and the

Cloud Scrubber technologies do not need to be reviewed. These technologies cannot form the basis for a RACT emissions limit.

25.

In its final RACT analysis, the Agency did not calculate the cost-effectiveness for a dry ESP and scrubber or a ceramic filter system. The Agency explained in its final RACT report that it did not "re-evaluate" a dry scrubber and ESP because a preliminary evaluation estimated that its cost-effectiveness would be about $10,800.00 per ton of PM and SO2 controlled, which was higher than the wet ESP and dry scrubber and baghouse. Ex. R-4, Tab 3, p. R054956. The Agency did not evaluate the cost-effectiveness of a ceramic filter because it did not have specific information concerning that technology until after the Agency had concluded its RACT analysis.

26.

Ardagh's consultants performed cost-effectiveness calculations for a dry ESP and scrubber, a ceramic filter system, and a scrubber with baghouse, and all of Ardagh's consultants concluded that these systems were not cost effective. Although the Agency did not perform a cost-effectiveness calculation on a dry ESP and scrubber or a ceramic filter system, the Agency did perform a cost-effectiveness calculation on a scrubber with a baghouse. The Agency concluded that the baghouse technology is economically feasible.

27.

The analysis and evidence in the record does not support the Agency's conclusion that the baghouse technology is economically feasible. As discussed above, the Agency's cost-effectiveness calculations underestimated costs. The Agency's analysis also does not identify which specific calculations and scenarios justify its conclusion,[27] or clarify how the consideration of other factors such as the impact of additional controls on air quality and anticipated health impacts effected its determination of economic feasibility.

28.

Furthermore, while the Board has already concluded that it was reasonable to combine PM and SO2 emissions to calculate emissions reductions in the cost-effectiveness calculation, and to use an interest rate based on OMB Circular A-94, the Board is not persuaded that the Agency's calculations for emissions reductions in this situation were reasonable. The Board has found that the Agency's predicted emissions reductions were overestimated. The time frame that the Agency used to calculate current actual emissions did not reflect current conditions and the current permit limits were not used in the Agency's potential to potential emissions calculations.[28] In light of these omissions and errors, the Board cannot affirm the Agency's conclusion of economic feasibility for the baghouse technology.

29.

Although the Board is not affirming the Agency's conclusion regarding the economic feasibility of the baghouse technology, the Board rejects Ardagh's argument that the Agency erred by not establishing a threshold amount against which all control technologies are measured. The Agency is not required to set a threshold amount that is applied in all cost-effectiveness

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[27] The cost-effectiveness numbers calculated for the baghouse technology ranged from $6,157.00 to $25,106.00 dollars per ton of combined pollutants removed.

[28] The Board's decision is not based on an acceptance of Ardagh's arguments that the actual to future potential method is the preferred method for determining the potential emissions capture of control technology. There are multiple methods for calculating emissions reductions, and, based on the evidence presented, it is unclear which method is most commonly applied or which method is preferred by Ecology or EPA.

calculations. A cost-effectiveness calculation should be done for each RACT analysis on a case by case basis. However, the cost-effectiveness calculation does not itself determine economic feasibility. RACT determinations involve consideration of multiple factors in the evaluation of technical and economic feasibility. The dollars per ton figure that results from the cost-effectiveness calculation is reviewed by the Agency decision makers in light of all the other applicable factors to determine whether a particular technology is economically feasible. The Board agrees that costs above $10,000.00 per ton may be reasonable in specific cases. In addition to considering the statutory factors, the Agency acted within its discretion in considering such factors as adverse health impacts caused by the emissions that will be controlled, the agency's own goal of cleaner air, and the status of the surrounding community.

30.

Agency witnesses testified that the evaluated control technologies could be economically feasible even at higher costs per ton than was calculated by the Agency. However, the Agency's Board of Directors have not fully reviewed and analyzed the potentially higher cost per ton figures for baghouse technology, and have not been presented with an analysis of the economic feasibility of a dry ESP or a ceramic filter. The Agency's decision makers are tasked with balancing the need for cleaner air against the capital and operating costs of additional technologies. To do so they must be presented with accurate cost-effectiveness calculations and information about other applicable factors that accurately reflect the current emissions situation. It would be inappropriate for the Board to attempt to recalculate the cost-effectiveness of the control technologies or to guess at how the Agency's decision makers would evaluate all of the applicable factors in light of the potential changes in the cost-effectiveness calculations and the other applicable factors.

31.

There is insufficient evidence in the record to determine whether the baghouse technology is economically feasible, and the Agency's decision makers have not evaluated the economic feasibility of a dry ESP or a ceramic filter. The Board concludes that the Agency has not met its burden of demonstrating that the emission limits in GRO 10606 can be met with a technologically feasible device that is economically feasible.

D. Other environmental criteria – Issue 5

32.

Issue 5 questions whether the Agency failed to consider the generation of and disposal of wastes from control technology it identified as RACT. While this issue may have been intended to question the impact of the disposal of hazardous waste captured when emissions control technology is used, Ardagh does not argue this point in its briefing, and therefore the Board concludes that this argument has been abandoned. *Washington State Dep't of Nat. Res. v. Browning*, 148 Wn. App. 8, 21, 199 P.3d 430, 436 (2008), *citing* State v. Dennison, 115 Wn.2d 609, 629, 801 P.2d 193 (1990)(Court need not consider arguments for which a party provides no briefing or citation to authority.)

33.

Issue 5, as briefed by Ardagh, questions whether the Agency adequately considered as part of its SEPA analysis, adverse impacts from its action in issuing the GRO. See Ardagh's

Closing Brief, pp. 30, 31, and footnotes 195 and 196. The issue, as stated in the Prehearing Order, is not identified as a challenge to the SEPA determination. To the extent that Ardagh is attempting to challenge the Agency's SEPA determination, such a challenge was not identified as an issue and will not be considered by the Board.

E. <u>RACT, BACT, and LAER (Issue 6)</u>

34.

Issue 6 questions whether the Final RACT limits are too restrictive because they are equivalent to what would be imposed under a BACT or LAER analysis. RACT, BACT, and LAER are all separately defined emissions limitations for use in different situations. RACT requires the use of "Reasonably Available" control technology, while BACT requires "Best Available" control technology, and LAER requires the "most stringent emissions limitation that is achievable in practice". RCW 70.94.030(6); (14) and (20). In Washington, RACT is required for all existing sources (RCW 70.94.154(1)). BACT is required for new and modified sources in areas that are attaining ambient air quality standards (WAC 173-400-113(2)). LAER is required for certain new and modified sources in nonattainment areas (WAC 173-400-112(2)).

35.

The different standards generally apply different levels of stringency with RACT being at the lower level. *See Bowers*, 103 Wn. App. at 592, ftn. 2. Even though BACT and LAER standards are more stringent, consideration of emissions limits and technology chosen for these standards can be helpful to provide context for a RACT determination. This is especially true where, as here, there are a limited number of RACT determinations for glass container furnaces available for comparison purposes.

36.

The Board agrees with the Agency that there can be situations where RACT, BACT, and even LAER may converge on the same technology, if there is a single technology that an industry is commonly using that performs well. Van Slyke Testimony, Vol. 1, p. 71; Ex. R-5, p. R014112. The fact that a limit established as a RACT limit is the same as a BACT limit is not determinative of whether the RACT limit is valid. The Board concludes that the limits in the GRO do not exceed RACT merely because the limits may also be BACT or even LAER limits.

F. <u>Consideration and response to comments (Issue 7)</u>

37.

RACT requirements for a source "shall be adopted only after notice and opportunity for comment are afforded." RCW 70.94.030(20). Agency Regulation 1, Section 3.03 sets out the process the Agency follows to ensure compliance with the statutory directive. It requires the Agency to provide notice and a comment period, and instructs that the Agency shall not issue a regulatory order until it has "considered" all information and data related to the proposed regulatory order. *Id.*, §3.03(c).

38.

Ardagh does not contend that the Agency failed to provide notice and opportunity for comment. It argues, however, that the Agency did not appropriately consider or respond to the additional information and comments Ardagh provided. It bases this argument primarily on the fact that the Agency did not make changes to the Final RACT in response to the additional information it received, and instead merely responded to the additional information through its response to comments.

39.

The Agency provided a written response to Ardagh's 293 comments. *See* Ex. R-4, Tab 2. While the Agency did not agree with Ardagh's conclusions, and did not revise its proposal except with regard to the effective date of the GRO, as a procedural matter it appropriately considered information Ardagh provided. The Board concludes that the Agency appropriately considered comments in compliance with RCW 70.94.030(20) and Agency Regulation 1, Section 3.03.

G. <u>Compliance date (Issue 8)</u>

40.

The GRO requires compliance within two years of the date of its approval. Ardagh objects to this effective date primarily because it believes that RACT cannot be required until Ardagh decides to undertake a major rebuild of Furnaces 2 and 3. The Board has already ruled against Ardagh on this issue. The Agency has the authority to require compliance with RACT emissions limits without waiting for Ardagh to undertake its rebuild.

41.

Ardagh asserts that installation of control technology at the Seattle plant could take at least two years depending on the technology selected. Based on the Board's decision that the Agency did not meet its burden of demonstrating that RACT requires installation of emissions control technology, and because the Board is reversing the GRO, the Board concludes that the issue of time required for compliance with GRO 10606 is moot.

H. Deference

42.

The Agency argues that its RACT decision is entitled to deference. The Agency cites to the Court of Appeals language in *Bowers* that the Court accords "substantial weight to [the Agency] and the PCHB's interpretation of the law." *Bowers*, 103 Wn. App at 614. It also cites to the Board's decision in *Bowers,* in which the Board states that a RACT determination requires the Agency to "use its best professional judgment, considering all the information available to it." *Bowers,* PCHB Nos. 98-3 & 31, CL 7. As discussed above, the Board has afforded deference to the determinations of the Agency where appropriate. However, the Agency has not met its burden of demonstrating that its new RACT emission limits could be met through the use of control technology that was both technologically and economically feasible.

43.

Any Finding of Fact deemed to be a Conclusion of Law is hereby adopted as such. From the foregoing, the Board issues this:

ORDER

The Board REVERSES General Regulatory Order No. 10606 (GRO), imposing new emission limits on Ardagh Glass, Inc.'s Furnaces 2 and 3, and remands this matter to the Puget Sound Clean Air Agency for additional review, consistent with the analysis in this Order.

SO ORDERED this 21st day of February, 2017.

POLLUTION CONTROL HEARINGS BOARD

KAY M. BROWN, Presiding

THOMAS C. MORRILL, Board Chair