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November 23, 2021

Linda Kildahl  
Department of Ecology  
Air Quality Program  
P.O. Box 47600  
Submitted via [Electronic Upload](#)

Re: bp Comments on the Regional Haze State Implementation Plan Revision – 2<sup>nd</sup> 10-Year Plan

Dear Ms. Kildahl:

On behalf of bp America Inc. (“bp”), thank you for the opportunity to provide comments on the Washington State Department of Ecology (“Ecology”) Regional Haze Rule (“RHR”) draft State Implementation Plan for 2018 through 2028 (“draft RHR SIP”). This letter provides comments regarding Ecology’s Emission Inventory (Chapter 4 of the draft RHR SIP) and the Four-Factor Analysis (Chapter 11 of the draft RHR SIP) that was issued for public comment on October 19, 2021.

**1. The Statewide Emission Inventory Fails to Include Certain Emission Reductions from the Cherry Point Refinery (186 tpy NO<sub>x</sub> and 270 tpy SO<sub>2</sub>):**

The Regional Haze Rule requires an accurate statewide emission inventory of pollutants that are reasonably anticipated to cause or contribute to visibility impairment in any mandatory Class I Federal area. The emission inventory must include emissions for the most recent year for which data are available.<sup>1</sup>

For the bp Cherry Point Refinery, Ecology selected 2014 emissions for both the baseline year emissions and the 2028 “On-the-Books” (“OTB”) emissions for visibility modeling scenarios. The 2028 OTB emission inventory should include emissions associated with applicable controls, regulations, and facility changes. Ecology incorporated emission reductions at both Cardinal FG Winlock facility and TransAlta Centralia Generation. Ecology did not incorporate emission reductions from the bp

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<sup>1</sup> Requirements for revisions of RHR implementation plans are set forth at 40 CFR 51.308(f)(6)(v).

Cherry Point Refinery (186 tons per year (tpy) NO<sub>x</sub> and 270 tpy SO<sub>2</sub>) that have occurred since the 2014 baseline year.

Emission reductions include low NO<sub>x</sub> burner retrofits, process heat replacement projects, federal New Source Performance Standard (“NSPS”) Subpart Ja compliance projects to reduce flaring, and a 90 percent reduction in marine diesel fuel sulfur content (used to pump feedstock from marine vessels to refinery storage). All of these emission reductions are enforceable either by regulation (i.e., NSPS Subpart Ja and fuel standards) or by enforcement of permit conditions in permits issued by Ecology and Northwest Clean Air Agency (“NWCAA”). These emission reductions at Cherry Point should be incorporated into the 2028 OTB emission inventory used to develop the draft RHR SIP.

## **2. NO<sub>x</sub> Emission Benchmarking in Table 7-6 is Incorrect**

Ecology presents an unrefined, incomplete petroleum refinery NO<sub>x</sub> emissions benchmarking analysis in Table 7-6 of the draft RHR SIP. As Ecology indicated in its 2013 Refinery GHG RACT analysis, benchmarking refineries is more complex than comparing emissions to refinery crude capacity.<sup>2</sup> The Nelson Complexity Index (NCI) is an example of accounting for a refinery’s capability to upgrade crude oil and provides a more accurate comparison between refineries with different processing capabilities. Ecology calculated NCI values for each Washington refinery as part of the GHG RACT analysis, and Ecology stated “two facilities with equal crude throughput ratings that have NCIs that are significantly different will likely have significantly different levels of GHG emissions.” The same situation applies in the draft RHR SIP with NO<sub>x</sub> emissions from refineries that have different NCI values. Instead of incorporating the complexity index (similar to the GHG RACT analysis), Ecology has excluded complexity index information for their NO<sub>x</sub> benchmarking analysis and simply compared NO<sub>x</sub> emission rates to reported crude capacity. As a result, this approach has likely overstated bp Cherry Point’s relative NO<sub>x</sub> emissions compared to refineries of similar size and complexity. bp requests that Ecology either remove the incomplete NO<sub>x</sub> benchmarking analysis from the draft RHR SIP or incorporate refinery-specific complexity index information with NO<sub>x</sub> emission information before comparing the Cherry Point Refinery NO<sub>x</sub> emissions to other refineries in Washington and across the United States.

## **3. Ecology Should Not Use bp’s PSD Permitting Discussion from the Four Factor Analysis (“FFA”) Reasonableness Analysis**

Page 187 of the draft RHR SIP (Ecology’s FFA reasonableness analysis) includes a summary of a recent Ecology PSD permit issued to bp and comments received during the PSD permit public comment period. bp requests the PSD permit discussion be removed from Ecology’s FFA because it is completely unrelated to the process Ecology

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<sup>2</sup> Section 6.10 (Refinery Complexity) from Washington Oil Refinery RACT Accessed at <https://apps.ecology.wa.gov/publications/documents/1302031.pdf> in November 2021.

used to determine which sources were required to complete a FFA (see the Source Screening Analysis on page 159 of the draft RHR SIP), and the PSD permit discussion is not relevant to any of the four factors evaluated in the analysis (cost of compliance, time necessary for compliance, energy and non-air quality environmental impacts of compliance, and remaining useful life of any potentially affected sources.) Ecology did not request bp include the recently permitted equipment in the FFA; therefore, Ecology should remove the PSD permit discussion from the FFA.

#### **4. Ecology Should Use bp's Detailed Project-Specific Retrofit Cost Estimates for the Selective Catalytic Converter ("SCR") Systems**

Guidance provided by the U.S. Environmental Protection Agency ("EPA") for the Second Implementation Period Regional Haze SIPs recommends that caution be exercised before accepting or rejecting controls based on generic cost estimates if adequately documented source-specific cost estimates are available.<sup>3</sup> Here, adequately documented source-specific cost estimates are available, but Ecology has declined to use them.

In April 2020, bp provided Ecology with detailed project-specific retrofit cost estimates based on engineering information for selective catalytic reduction ("SCR") systems specific to the Crude Heater, #1 Reformer Heaters, and #1 Hydrogen Plant Heaters. The cost estimates bp provided to Ecology represent the most accurate estimates of the cost of compliance available. Furthermore, we believe that use of the generic Control Cost Manual methods does not provide accurate cost estimates for application of SCR systems to the heaters evaluated, as we detailed in our February 16, 2021 comment letter. In response to comments on the most recent updates to the SCR Control Cost Manual, EPA stated the cost manual provides study-level estimates and recommends detailed design specifications and cost quotes for more accurate cost estimates.<sup>4</sup>

Ecology has instead relied upon generic SCR estimates from an EPA cost model without exercising the caution recommended by EPA and conducting a complete review of bp's source-specific cost estimate.<sup>5</sup>

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<sup>3</sup> EPA Four Factor Analysis Guidance. Accessed at [https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019\\_-\\_regional\\_haze\\_guidance\\_final\\_guidance.pdf](https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf) in January 2021.

<sup>4</sup> Public Comments on the Proposed Revisions to Section 4.2 (Chapter 2, SCR, of the Control Cost Manual), Accessed at [https://www.epa.gov/sites/default/files/2020-07/documents/scr\\_costmanual\\_7thed\\_rtc.pdf](https://www.epa.gov/sites/default/files/2020-07/documents/scr_costmanual_7thed_rtc.pdf) in November 2021.

<sup>5</sup> Ecology's disregard of bp's detailed cost estimates is inconsistent with prior positions adopted by the agency. For example, Ecology accepted and defended bp's detailed cost estimates in a challenge to the Final PSD for bp West Coast Products, LLC's Coker Heater Project. *See, e.g., National Parks Conservation Ass'n v. Dept. of Ecology and bp West Coast Products*, PCBH No. 17-055, Ecology Motion for Summary Judgment at 18 (Jan. 19, 2018).

Ecology previously has accepted bp's detailed SCR retrofit cost estimates in making other decisions, such as the SCR retrofit cost-effectiveness calculations and the original Best Available Retrofit Technology ("BART") Orders for refineries.<sup>6, 7</sup> Ecology should rely upon bp's refreshed, detailed cost estimates again here.

Finally, in the draft FFA, Ecology indicates that bp did not provide any information on how the SCR retrofit cost estimates were developed, which is inaccurate. Ecology staff and the bp cost estimating team met on February 19, 2021 to discuss the process and information used to develop bp's detailed SCR retrofit cost estimates to be used in the FFA. bp requests Ecology correct the draft FFA to state that bp has provided documentation on how the SCR cost estimates were developed, has discussed that cost estimate methodology with Ecology and answered Ecology's questions.

#### **5. Ecology Should Revise the SCR Cost Model to Include Source-Specific Cost Information, as EPA recommends**

The cost estimation methodology EPA presented in the SCR chapter of the Control Cost Manual is based on a Sargent and Lundy study of coal-fired electric utility boilers. Putting an SCR on a coal-fired electric utility boilers differs significantly from retrofitting process heaters found at a petroleum refinery with an SCR.

In the Control Cost Manual, EPA notes the limitations of the simplistic study-level cost equation methodology provided, and states that the cost-effectiveness of SCR control should be based on a detailed engineering study and cost quotes from system vendors.<sup>8</sup> In response to comments on the SCR cost chapter, EPA again notes the limitations of their SCR cost estimate equations as a simplified approach to obtain a study-level cost estimate, and EPA notes that the cost equations are not intended to reflect site-specific project details.<sup>9</sup>

The South Coast Air Quality Management District ("SCAQMD") also has noted the limitations of EPA's SCR cost equations as part of current NO<sub>x</sub> emission rulemaking activities for petroleum refineries, where SCAQMD adjusted the study-level capital cost estimate equations with actual refinery SCR retrofit cost estimate data after review by a third-party engineering firm.<sup>10</sup> However, it must be emphasized that detailed

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<sup>6</sup> 2012 Revised Washington Regional Haze SIP including Appendix L (BART Determinations) Accessed at <https://apps.ecology.wa.gov/publications/SummaryPages/1002041.html> in November 2021.

<sup>7</sup> BART Determination Support Document for bp Cherry Point Refinery. Washington Ecology, September 2009.

<sup>8</sup> EPA Control Cost Manual, Section 4, Chapter 2 (Selective Catalytic Reduction), June 2019. Accessed at [https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition\\_2016revisions2017.pdf](https://www.epa.gov/sites/production/files/2017-12/documents/scrcostmanualchapter7thedition_2016revisions2017.pdf) in January 2021.

<sup>9</sup> EPA Response to Comments on Chapter 2 (SCR), of the Control Cost Manual. Accessed at [https://www.epa.gov/sites/production/files/2020-07/documents/scr\\_costmanual\\_7thed\\_rtc.pdf](https://www.epa.gov/sites/production/files/2020-07/documents/scr_costmanual_7thed_rtc.pdf) in January 2021.

<sup>10</sup> SCAQMD adjustments to SCR installation total capital investment presented and discussed in December 12, 2019 and June 30, 2021 working group meetings for Rule 1109.1 (Slides 14 – 19 on presentation accessible here: <http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1109.1/pr1109->

engineering cost estimates, like the ones bp provided to Ecology, provide the source-specific cost information that EPA recommends be used to evaluate the cost of compliance.

#### **6. Ecology Should Revise the FFA Analysis to Include the Detailed Engineering Cost Estimates bp Provided to Ecology in April 2020**

As discussed with Ecology on February 19, 2021 the EPA Control Cost Manual summarizes examples of source-specific conditions that affect SCR retrofit costs, including space constraints, existing fan limitations, limitations of existing electrical distribution system, etc. These retrofit costs are not included in EPA's SCR cost calculation because they are project-specific.

In late 2019 Ecology requested cost-effectiveness calculations for several units at Cherry Point Refinery. bp responded in April of 2020 with detailed engineering cost estimates to retrofit the Crude Heater, #1 Reformer Heaters, and #1 Hydrogen Plant Heaters with SCR systems. The detailed engineering cost estimates developed by bp for these potential SCR systems were based on process flow diagrams, piping and instrumentation diagrams, vendor-supplied estimates, and process knowledge. bp used Jacobs Engineering to provide the estimated requirements for the equipment, demolition, site work, pilings, buildings, concrete, structural steel, ducting, piping, insulation, instrumentation, electrical, painting, scaffolding and fire protection requirements. The detailed engineering cost estimates submitted by bp in April of 2020 are similar to the actual costs of historic SCR retrofit projects completed by bp and should be used in Ecology's FFA analysis. bp requests Ecology revise the draft FFA analysis to include the detailed engineering cost estimates bp provided in April 2020.

#### **7. Ammonia Reagent Costs**

The cost of the ammonia reagent is a substantial portion of the cost to operate an SCR system. Ecology selected an ammonia reagent cost of \$0.04/pound for bp heaters instead of using bp's actual ammonia reagent cost of \$0.33/pound. bp purchases 29 percent aqueous ammonia reagent for existing SCR control equipment at the Cherry Point Refinery, and bp requests that Ecology revise the ammonia reagent costs to incorporate actual ammonia reagent costs.

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[1 wgm22 presentation.pdf?sfvrsn=18](#)), and 3<sup>rd</sup> Party Engineering Review of Cost Estimates accessible here: <http://www.aqmd.gov/docs/default-source/rule-book/Proposed-Rules/1109.1/norton-report-rev-2-barct-cost-review.pdf?sfvrsn=6>

## 8. Space Limitations

Ecology concluded that no additional control equipment is required for cement manufacturing. Ecology's basis for this determination was that the cement manufacturing sites have limited space, and the installation of additional control equipment would require the site to be reconfigured. The same space constraint issues exist at refineries, and bp provided Ecology with engineering cost estimates addressing the space limitations near the Crude Heater, #1 Reformer Heaters, and the #1 Hydrogen Plant Heaters; however, Ecology has disregarded these additional retrofit costs for bp. Ecology should take these additional retrofit costs into consideration.

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bp appreciates the opportunity to provide comments on the draft RHR SIP Revision for the 2<sup>nd</sup> 10-Year Plan. Please feel free to contact me at [james.verburg@bp.com](mailto:james.verburg@bp.com) or 360-526-3901 if you would like to discuss further.

Sincerely,

A handwritten signature in blue ink, appearing to read "James Verburg". The signature is fluid and cursive, with a long horizontal stroke at the end.

James Verburg  
Senior Environmental Engineer