



Alpine Lakes Protection Society



Olympic Park Advocates



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November 23, 2021

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Submitted via email to: linda.kildahl@ecy.wa.gov and to Ecology's Public Comment Form at <https://aq.ecology.commentinput.com/?id=taEN9>

Re: Conservation Organizations' Comments Submitted on Washington's Proposed Regional Haze State Implementation Plan for 2018 to 2028

Dear Ms. Kildahl:

The National Parks Conservation Association, Sierra Club, Alpine Lakes Protection Society, North Cascades Conservation Council, Olympic Park Advocates, Puget Soundkeeper Alliance (PSK), Stand.earth, and Waste Action Project ("Conservation Organizations") submit the

following and attached comments regarding the Washington Department of Ecology's ("Ecology, DOE") Proposed Regional Haze State Implementation Plan ("SIP") for 2018 to 2028.¹

National Parks Conservation Association ("NPCA") is a national organization whose mission is to protect and enhance America's National Parks for present and future generations. NPCA performs its work through advocacy and education. NPCA has over 1.64 million members and supporters nationwide, with more than 42,000 in WA state, with its main office in Washington, D.C. and 24 regional and field offices. NPCA is active nation-wide in advocating for strong air quality requirements to protect our parks, including submission of petitions and comments relating to visibility issues, regional haze State Implementation Plans, climate change and mercury impacts on parks, and emissions from individual power plants and other sources of pollution affecting National Parks and communities. NPCA's members live near, work at, and recreate in all the national parks, including those directly affected by emissions from Washington's sources.

Sierra Club is a national nonprofit organization with 67 chapters and about 830,000 members dedicated to exploring, enjoying, and protecting the wild places of the earth; to practicing and promoting the responsible use of the earth's ecosystems and resources; to educating and enlisting humanity to protect and restore the quality of the natural and human environment; and to using all lawful means to carry out these objectives. The Sierra Club has long participated in Regional Haze rulemaking and litigation across the country in order to advocate for public health and our nation's national parks. The Washington Chapter of the Sierra Club has approximately 32,000 members.

The Alpine Lakes Protection Society (ALPS) promotes environmental protection and conservation of the Alpine Lakes Wilderness (ALW) and surrounding area of the Central Cascades. Since the creation of this federal Wilderness in 1968, ALPS has fought to protect it against exploitation. ALPS is an all-volunteer organization sustained by its members. ALPS members have many decades of experience working to keep the ALW wild and is not beholden to big corporate donors or foundations, meaning that ALPS can, and do, take the tough stands against harmful projects that threaten our protected wilderness.

The North Cascades Conservation Council (N3C) was founded in 1957, and our mission is to protect and preserve the scenic, scientific, recreational, educational, and wilderness values in

¹ Victoria R. Stamper, "Review and Comments on Washington Department of Ecology's Draft Regional Haze Plan for the Second Implementation Period: Long Term Strategy and Four-Factor Analysis of Controls" (Nov. 19, 2021) ("Stamper Report") (Enclosure 1). Ms. Stamper is an independent air quality consultant and engineer with extensive experience in the regional haze program. Steven Klafka, P.E. BCEE, Environmental Engineer, Wingra Engineering, S.C., "The Four-Factor Reasonable Progress Analysis for Ardagh Glass" (Jan. 27, 2021) ("Klafka Report") (Enclosure 2). Also enclosed are NPCA's comments submitted on the Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County), which included proposed source-specific amendments for Ecology's Regional Haze SIP Revision, (Dec. 3, 2020) (Enclosure 3), and comments submitted by the Conservation Organizations on February 16, 2021 (submitted with corrections on February 19, 2021) (Enclosure 4).

Washington State. N3C is an independent, all-volunteer organization whose work is carried out by our board and 200 members.

Waste Action Project (WAP) has been around since 1994. WAP focuses on advocacy and education, and the Clean Water Act and has also provided technical and other support for communities for issues around the Clean Water Act, Superfund, Resource Conservation Recovery Act, and Model Toxics Control Act. WAP are a co-founder of Duwamish River Cleanup Coalition, and for the first few years oversaw DRCC's EPA Technical Assistance Grant for the Lower Duwamish Waterway Superfund Site. WAP has worked with impacted communities around the state to better understand their rights to clean water, and implementation of restoration and water quality improvement projects.

Olympic Park Advocates (OPA) is a 501(c)(3) nonprofit citizens conservation organization working to protect the beauty, integrity and biological diversity of Olympic National Park and the Olympic ecosystem. OPA was founded in 1948 to defend the Park against attacks on its spectacular old-growth rain forest valleys. Seventy-three years later, OPA's more than 240 Washington members recognize that having pristine air in Olympic National Park is necessary for the protection of this special place.

Puget Soundkeeper Alliance (PSK) is a regional organization whose mission is to protect and enhance the waters of Puget Sound for the health and restoration of our aquatic ecosystems and the communities that depend on them. PSK conducts outreach via stewardship, advocacy, monitoring and enforcement in order to achieve behavior change and systems change. PSK currently has 1,898 members who live, work, play, and worship all round Puget Sound and its tributaries, and have strong interests in protecting the waters from pollution and associated harms to community health. PSK is currently prosecuting Clean Water Act lawsuits against both Ardagh Glass and Ash Grove Cement for violations of National Pollution Discharge Elimination System (NPDES) permits. Though PSK is a water quality focused organization, it acknowledges and appreciates the undeniable intersectionality of water and air pollution with human health, and with racial and environmental justice.

Stand was created to challenge corporations and governments to treat people and the environment with respect, because our lives depend on it. Born as Forest Ethics, Stand's work and its approach has evolved from a dedicated focus on forest protection to taking on some of the root causes of climate change and environmental injustice. Stand pursues audacious solutions, campaigns for as long as it takes to see them through, punches way above our weight, and treats everyone with respect. From keeping communities safe from dozens of proposed oil-by-rail terminals to protecting more than 65 million acres of forest from logging, Stand's work has resulted in sweeping industry-wide changes and environmental protection on a massive scale.

As discussed in these comments, we have serious concerns regarding Ecology's proposed Regional Haze SIP for the Second Implementation Period. Ecology must correct the following flaws:

- EPA cannot approve Ecology's proposed reliance on Reasonably Available Control Technology ("State-RACT") to meet the RP regional haze requirements. Washington's

RACT requirements are less than stringent and not equivalent to the CAA's regional haze Four-Factor Analysis reasonable progress requirements. Indeed, Ecology describes its State-RACT as a "C-grade" control or emission limit;²

- Although Ecology's proposed SIP identifies the five refineries as *the priority source sector* for controls, it fails to include emission controls, instead proposes delay until the next ten-year implementation period.³
- Ecology's only proposed reductions come from alleged "on-the-books" emission reductions from the following sources:
 - TransAlta Centralia Generation (BART order revision, which ceased coal-fired operation of one boiler in December 2020 and will cease coal-fired operation of the other boiler by the end of 2025);
 - Cardinal FG Winlock Glass Plant (which voluntarily requested a permit to install selective catalytic reduction (SCR) on its glass furnace in conjunction with an increase in glass production capacity. A permit was issued authorizing these actions on February 11, 2001, and Ecology states that the SCR should be installed and operating by 2022);
 - Ash Grove Cement Company (which entered into a Consent Decree in 2013 with EPA, Ecology, and other state agencies that required optimization of the Seattle Kiln to reduce NOx emissions and is currently subject to a NOx limit of 5.1 lb/ton of clinker); and
 - Alcoa Wenatchee and Intalco Aluminum (which are both currently in "curtailment due to market conditions," for which ECOLOGY has proposed Agreed Orders to require the plants to conduct and submit a four-factor analysis of controls if they decide to restart operations).
- Despite applying EPA methodology and identifying cost-effective controls three pulp and paper mills and the sulfite mill, Ecology proposes no controls at these facilities.⁴
- Ecology improperly defers making any four-factor determinations based on purported emission reductions from existing Clean Air Act programs (*i.e.*, permits and state rules).⁵
- As explained in the attached Report prepared by Steven Klafka, Ecology must evaluate cost-effective and achievable emission reductions for *all* Washington's largest sources, including Ardagh Glass.
- The draft SIP fails to include Four-Factor Analyses for the Alcoa Wenatchee and Intalco facilities, and there are numerous approvability issues with the Agreed Orders for Alcoa Wenatchee and Intalco.

² Draft SIP, Appendix A at A-10, Ecology's response to the Nov. 19, 2020 email from the National Park Service.

³ Draft SIP at 187. ("All controls identified as reasonable in the reasonability analysis will be installed and operated as an enforceable requirement consistent with the RHR. The results of the analysis and determinations from the analysis will be included in a RHR SIP supplement.")

⁴ Nippon Dynawave Packaging Company Longview, Georgia-Pacific Consumer Operations, LLC, WestRock Longview, LLC, WestRock PC, LLC Tacoma, Port Townsend Paper Corporation, Packaging Corporation of America Wallula, and Cosmo Specialty Fibers Mill.

⁵ Draft SIP at 23 ("The long-term strategy in this regional haze SIP revision includes emission reductions from permits and state rules.")

- The draft SIP fails to *first* evaluate whether additional emission reductions from sources are necessary via the Four-Factor Analysis reasonable progress determinations to ensure reasonable progress toward the Clean Air Act’s visibility goal.⁶
- Ecology’s consultation with the Federal Land Managers is flawed and incomplete.
- The draft SIP fails to *evaluate* environmental justice impacts, resulting in a proposed SIP that does not consider equity or reduce emissions and minimize harms to disproportionately impacted communities.⁷

The Clean Air Act requirements for Washington’s regional haze plan present a significant opportunity to not only improve the skies at Mount Rainier, North Cascades and Olympic National Parks as well as across the region’s treasured public lands but also the air quality in communities across the state, including some of the most disproportionately affected by health harming pollution that can and must be abated. Despite the legal requirements necessary to ensure reasonable progress, Ecology’s draft SIP contains fundamental flaws and fails to propose any new emission reductions for its sources.

Our comments present these issues and offer detailed suggestions to ensure that the SIP Ecology submits to EPA will be in line with the legal requirements of the Clean Air Act and federal regulations, and address visibility impairing emissions.

⁶ Draft SIP at 219. (“Ecology’s calculation of RPGs relies on technical data and analysis developed by the Western Regional Air Partnership (WRAP),” which was developed before identification of sources and the Four-Factor Analyses.)

⁷ Draft SIP at 22-24.

Conservation Organizations' Comments
Washington's Proposed Regional Haze State Implementation Plan for 2018 to 2028
November 23, 2021

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I. Introduction and Background

Washington is home to three national parks, Mount Rainier, Olympic, and North Cascades National Parks, and five wilderness areas, Alpine Lakes, Glacier Peak, Goat Rocks, Mount Adams, and Pasayten Wilderness Areas. Our national parks and wilderness areas are iconic, treasured landscapes and Washington is rich in national parks and natural areas.

Congress set aside these national parks and wilderness areas to protect our natural heritage for generations. Washington's protected areas also generate millions of dollars in tourism revenue, provide habitat for a range of species, and provide year-round recreational opportunities for residents. These special places are designated "Class I areas" under the Clean Air Act ("CAA") and as such, their air quality is entitled to the highest level of protection.

To improve air quality in our most treasured landscapes, Congress passed the visibility protection provisions of the Clean Air Act in 1977, establishing "as a national goal the prevention of any future, and the remedying of any existing, impairment of visibility in the mandatory class I Federal areas which impairment results from manmade air pollution."⁸ "Manmade air pollution" is defined as "air pollution which results directly or indirectly from human activities."⁹ In order to protect Class I areas' "intrinsic beauty and historical and archeological treasures," the regional haze program establishes a national regulatory floor and requires states to design and implement programs to curb haze-causing emissions within their jurisdictions. Each state must submit for EPA review a SIP designed to make reasonable progress toward achieving natural visibility conditions.¹⁰

A regional haze SIP must provide "emissions limits, schedules of compliance and other measures as may be necessary to make reasonable progress towards meeting the national goal."¹¹ Two of the most critical features of a regional haze SIP are the requirements for installation of Best Available Retrofit Technology ("BART") limits on pollutant emissions *and a long-term strategy for making reasonable progress toward the national visibility goal*.¹² Although many states addressed the Clean Air Act's BART requirements in their initial regional haze plans, EPA's 2017 revisions to the Regional Haze Rule (RHR) make clear that BART was not a once-and-done requirement. Indeed, states "will need" to reassess "BART-eligible sources that installed only moderately effective controls (or no controls at all)" for any additional technically-achievable controls in the second planning period.¹³ The haze requirements in the Clean Air Act present an unparalleled opportunity to protect and restore regional air quality by curbing visibility-impairing emissions from a variety of polluting sources.

Implementing the regional haze requirements promises benefits beyond improving views. Pollutants that cause visibility impairment also harm public health. For example, oxides of nitrogen ("NOx") are a precursor to ground-level ozone which is associated with respiratory

⁸ 42 U.S.C. § 7491(a)(1).

⁹ *Id.* § 7491(g)(3).

¹⁰ *Id.* § 7491(b)(2).

¹¹ 42 U.S.C. § 7491(b)(2).

¹² *Id.* § 7491(b)(2)(B); 40 C.F.R. § 51.308(d)(1)(i)(B).

¹³ 82 Fed. Reg. 3078, 3,083 (Jan. 10, 2017); see also *id.* at 3,096 ("states must evaluate and reassess all elements required by 40 CFR 51.308(d)").

disease and asthma attacks. NO_x also reacts with ammonia, moisture and other compounds to form particulates that can cause and/or worsen respiratory diseases, aggravate heart disease, and lead to premature death. Similarly, sulfur dioxide (“SO₂”) increases asthma symptoms, leads to increased hospital visits, and can also form particulates. NO_x and SO₂ emissions also harm terrestrial and aquatic plants and animals through acid rain as well as through deposition of nitrates (which in turn cause ecosystem changes including eutrophication of mountain lakes). Unfortunately, the promise of natural visibility is unfulfilled because the air in most Class I areas, including in Washington’s most treasured natural areas, remains polluted by industrial sources, including the sources covered in our comments:

- TransAlta Centralia Generation,
- Ash Grove Cement Plant,
- Cardinal FG Winlock Glass Plant,
- Oil refineries (BP Cherry Point, Phillips 66 Ferndale, Shell Puget Sound, Marathon Petroleum Company Anacortes Refinery, U.S. Oil & Refining Company – Tacoma Refinery),
- Pulp and Paper Mills (Nippon Dynawave Packaging Company Longview, Georgia-Pacific Consumer Operations, LLC, WestRock Longview, LLC, WestRock PC, LLC Tacoma, Port Townsend Paper Corporation, Packaging Corporation of America Wallula),
- Cosmo Specialty Fibers Mill, and
- Ardagh Glass Plant.

II. The Regional Haze Reasonable Progress Legal Requirements

A. Requirements for Periodic Comprehensive Revisions for Regional Haze SIPs

In developing its long-term strategy, a state must consider its anthropogenic sources of visibility impairment and evaluate different emission reduction strategies including and beyond those prescribed by the BART provisions.¹⁴ A state should consider “major and minor stationary sources, mobile sources and area sources.”¹⁵ At a minimum, a state must consider the following factors in developing its long-term strategy:

- (A) Emission reductions due to ongoing air pollution control programs, including measures to address reasonably attributable visibility impairment;
- (B) Measures to mitigate the impacts of construction activities;
- (C) Emissions limitations and schedules for compliance to achieve the reasonable progress goal;
- (D) Source retirement and replacement schedules;
- (E) Smoke management techniques for agriculture and forestry management purposes including plans as currently exist within the State for these purposes;
- (F) Enforceability of emission limitations and control measures; and
- (G) The anticipated net effect on visibility due to projected changes in point, area, and

¹⁴ 40 C.F.R. § 51.308(f).

¹⁵ *Id.* § 51.308(f)(2)(i).

mobile emissions over the period addressed by the long-term strategy.¹⁶

Additionally, a state

Must include in its implementation plan a description of the criteria it used to determine which sources or groups of sources it evaluated and how the four factors were taken into consideration in selecting the measures for inclusion in its long-term strategy.¹⁷

In developing its plan, the state must document the technical basis for the SIP, including monitoring data, modeling, and emission information, including the baseline emission inventory upon which its strategies are based.¹⁸ All of this information is part of a state's revised SIP and subject to public notice and comment. A state's reasonable progress analysis must consider the four-factors identified in the Clean Air Act and regulations. *See* CAA 169A(g)(1); 40 C.F.R. 51.308(f)(2)(i) (“the costs of compliance, the time necessary for compliance, the energy and non-air quality environmental impacts of compliance, and the remaining useful life of any potentially affected anthropogenic source of visibility impairment.”)

EPA's 2017, Regional Haze Rule Amendments made clear that states are to first conduct the required four-factor analysis for its sources, and then use the results from its four-factor analyses and determinations to develop the reasonable progress goals.¹⁹ Specifically, EPA explained in its final notice that it proposed, took and responded to comments and amended 40 C.F.R. § 51.308(f) to eliminate the cross-reference to 40 C.F.R. § 51.308(d) to “codify ...[its] long-standing interpretation of the way in which the existing regulations were intended to operate” to track “the actual [SIP] planning sequence” as follows, thus, states are required to:

- (1) [C]alculate baseline, current and natural visibility conditions, progress to date and the URP;
- (2) [D]evelop a long-term strategy for addressing regional haze by evaluating the four factors to determine what emission limits and other measures are necessary to make reasonable progress;
- (3) [C]onduct regional-scale modeling of projected future emissions under the long-term strategies to establish RPGs and then compare those goals to the URP line; [FN73] and
- (4) [A]dopt a monitoring strategy and other measures to track future progress and ensure compliance.²⁰

Moreover, in promulgating the RHR EPA stated that:

The CAA requires states to determine what emission limitations, compliance schedules and other measures are necessary to make reasonable progress by considering the four factors. The CAA does not provide that states may then reject some control measures

¹⁶ *Id.* § 51.308(f)(2)(iv).

¹⁷ 40 C.F.R. § 51.308(f)(2)(i).

¹⁸ 40 C.F.R. § 51.308(f)(2)(i).

¹⁹ 82 Fed. Reg. at 3090-91.

²⁰ *Id.* at 3091.

already determined to be reasonable if, in the aggregate, the controls are projected to result in too much or too little progress. Rather, the rate of progress that will be achieved by the emission reductions resulting from all reasonable control measures is, by definition, a reasonable rate of progress. ... [I]f a state has reasonably selected a set of sources for analysis and has reasonably considered the four factors in determining what additional control measures are necessary to make reasonable progress, then the state's analytical obligations are complete if the resulting RPG for the most impaired days is below the URP line. *The URP is not a safe harbor*, however, and states may not subsequently reject control measures that they have already determined are reasonable.²¹

Thus, the key determinant in whether a state's "robust determination" obligation has been satisfied under Section 51.308(f)(3)(ii)(B) is not whether the Reasonable Progress Goal ("RPG") of a Class I Area is below that Class I Area's URP, but rather whether a state has considered and determined requirements to make reasonable progress based on the four-factors. A state must consider the four-factors *regardless* of the status of any Class I Area's RPG.

The state's SIP revisions must meet certain procedural and consultation requirements.²² The state must consult with the Federal Land Manager(s) and look to the Federal Land Managers' expertise of the lands and knowledge of the way pollution harms them to guide the state to ensure SIPs do what they must to help restore natural skies.²³ The RHR also requires that in "developing any implementation plan (or plan revision) or progress report, the State must include a description of how it addressed any comments provided by the Federal Land Managers."²⁴

The duty to ensure reasonable progress requirements are met for purposes of the SIP rests with the state. While the WRAP plays an important role in providing support in regional haze planning, the state is ultimately accountable for preparing, adopting, and submitting a compliant SIP to EPA. Further, as discussed more fully below, Ecology has an obligation to cite to the technical support documentation it proposes to rely on and use as part of its SIP revision.²⁵

B. EPA's 2019 Guidance

Additionally, as you may know, in May 2020, NPCA shared the petition it submitted to the previous EPA Administrator - which sought reconsideration of the 2019 RH guidance - alongside a cover letter to Washington.²⁶ In addition to NPCA, Sierra Club, Natural Resources Defense Council, Western Environmental Law Center, Appalachian Mountain Club, Coalition to Protect America's National Parks, and Earthjustice, signed the petition for reconsideration. As of

²¹ See, 82 Fed. Reg. 3093 (emphasis added).

²² For example, in addition to the RHR requirements, states must also follow the SIP processing requirements in 40 C.F.R. §§ 51.104, 51.102.

²³ 40 C.F.R. § 51.308(i).

²⁴ *Id.* § 51.308(i)(3).

²⁵ See, e.g., 40 C.F.R. §§ 51.100, 51.102, 51.103, 51.104, 51.105 and Appendix V to Part 51.

²⁶ "Petition for Reconsideration of Guidance on Regional Haze State Implementation Plans for the Second Implementation Period," submitted by National Parks Conservation Association, Sierra Club, Natural Resources Defense Council, Coalition to Protect America's National Parks, Appalachian Mountain Club, Western Environmental Law Center and Earthjustice, to former EPA Administrator Andrew Wheeler (May 8, 2020). ("Conservation Organizations Petition"). (Enclosure 5)

the date of this comment letter, EPA has not responded to the Petition. Until the current EPA Administration withdraws the illegal approaches in the 2019 guidance, we trust states will not follow it, instead adhering closely to the regulation itself and working to achieve the Clean Air Act goal of Class I visibility restored to natural conditions. The Petition explained that, as issued, the Final Guidance conflicts with this statutory objective, previous rulemaking and guidance; misdirects states as to how they can go about complying with their legal obligations to make reasonable progress towards restoring natural visibility to protected public lands; and otherwise fails to set expectations that comport with legal requirements for the second planning period.²⁷ The Petition includes a detailed analysis of the issues. As of the date of this comment letter, EPA has not responded to our Petition. Until the current EPA withdraws the illegal approaches in the 2019 guidance, we trust states will not follow it instead adhering closely to the regulation itself and work to achieve the Clean Air Act goal of Class I visibility restored to natural conditions.

C. EPA's 2021 Clarification Memorandum

On July 9, 2021, EPA issued a memorandum titled, “Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period.”²⁸ EPA’s July 2021 Memo provides important information regarding development of SIPs for all states for the regional haze second planning period in response to questions and information EPA is receiving from states and stakeholders and clarifies and provides information on existing statutory and regulatory requirements.²⁹ Because EPA’s Memo is directly relevant to—and in some cases, confirms—numerous flaws in the Ecology’s proposed SIP, as explained below and in the attached technical report, we urge Ecology to reevaluate its proposed SIP. We strongly encourage Ecology to take the time necessary to carefully review and consider all the information in EPA’s July 2021 Memo and develop supporting information and make necessary adjustments to its proposed SIP.

Particularly relevant here, EPA made clear that States must secure additional emission reductions that build on progress already achieved, there is an expectation that reductions are additive to ongoing and upcoming reductions under other CAA programs.³⁰ In evaluating sources for emission reductions, EPA emphasized that:

Source selection is a critical step in states’ analytical processes. All subsequent determinations of what constitutes reasonable progress flow from states’ initial decisions regarding the universe of pollutants and sources they will consider for the second planning period. States cannot reasonably determine that they are making reasonable progress if they have not adequately considered the contributors to visibility impairment. Thus, while states

²⁷ Further, we petitioned the prior Administrator to replace it with guidance that comports with the Clean Air Act (“CAA”) and the Regional Haze Rule, 42 U.S.C. §§ 7491, 7492; 82 Fed. Reg. 3078 (Jan. 10, 2017); 71 Fed. Reg. 60,612 (Oct. 13, 2006); 70 Fed. Reg. 39,104 (July 6, 2005); 64 Fed. Reg. 35,714 (July 1, 1999), and aids states in making progress towards achieving the national goal of natural visibility conditions at all Class I areas. Conservation Organizations Petition at 1-2.

²⁸ EPA Memorandum from Peter Tsigiotis, Director, Office of Air Quality Planning and Standards, to Regional Air Division Directors, “Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period,” (July 9, 2021) (“EPA July 2021 Memo”), <https://www.epa.gov/visibility/clarifications-regarding-regional-haze-state-implementation-plans-second-implementation>.

²⁹ *Id.*

³⁰ *Id.* at 2.

have discretion to reasonably select sources, this analysis should be designed and conducted to ensure that source selection results in a set of pollutants and sources the evaluation of which has the potential to meaningfully reduce their contributions to visibility impairment.³¹

Thus, it is generally not reasonable to exclude from further evaluation larger sources of visibility-impairing pollution. Moreover, a state's obligation to consider the statutory reasonable progress factors for a particular source is not discharged simply because another source or another state has greater contributions to visibility impairment.³² Ecology's sole focus on refineries is an example of such myopic decision making.

In sum, EPA's July 2021 Memo unequivocally states that meaningful reductions are expected to make reasonable progress towards the national goal of restoring visibility – reductions in SO₂ and NO_x, reductions in the biggest sources of impairment as well as relatively smaller contributors – reductions that are achievable looking across a full spectrum of options of emission reducing measures. That the Ardagh Glass facility is absent from Ecology's analysis and reduction requirements is notable, for example, and on its face at odds with the state's haze obligations. EPA's memo is responsive to observations of state process and should result in redirecting Washington towards compliance with the CAA. State efforts to avoid reductions - to assert that because visibility has improved, because reductions are anticipated at some later date when the state works on the next SIP or due to implementation of another program, or because a source has some level of control are not acceptable excuses and neither is ignoring requests of FLMs and other states to assess sources for reductions. Actual requirements for emission reductions are expected for a haze SIP to be approvable in the absence of rare circumstances and this recent regional haze memo makes this abundantly clear.

D. Requirements for Sources with Permits

We provide the following comments regarding RP requirements pertaining to facilities with permits. While a facility requested a permit to install emission controls, the permit does not exempt it from a four-factor analysis and establishment of emission limits to provide reasonable progress towards the national visibility goal. For example, Ecology must conduct a proper four-factor analysis for the Cardinal FG Winlock Glass Plant and ensure that emission limits are imposed via SIP measures to address the facility's visibility impairing pollution.

For a source that is found subject to the required reasonable progress Four-Factor Analysis as a result of a state's reasonable progress screening process, the state must ensure the Analysis is conducted. Neither the Act nor EPA's rules provide an "off-ramp" for a source in this situation.

A RACT analysis that Ecology may have gone through (or will go through in the future) for an individual source or source category is separate and distinct from the four-factor reasonable progress analysis requirement. The regional haze program includes identifying and issuing requirements to remedy *existing* impairment and also requirements necessary to prevent *future* impairment. As discussed below, the four-factor RP and RACT analysis apply different factors and consider different information because they are different programs with different objectives.

³¹ *Id.* at 3.

³² *Id.* at 7.

A RACT analysis and controls must not be used in place of the requirement to conduct the four-factor RP analysis and determine RP for the source. The regional haze four-factor RP analysis and determination applies *in conjunction with* other CAA programs. Therefore, as individual sources and source categories are modified and subject to emission controls (*e.g.*, RACT), Ecology must take into consideration *all* requirements of the CAA (*e.g.*, RP four-factor analysis and determination) and not set aside distinct requirements or delay their implementation. Moreover, a state's issuance of a permit does not replace its responsibility under the CAA to conduct the required RP four-factor analysis.

E. If a Source is Unwilling to Conduct the Required RP Analysis, the Responsibility Must be Met by the State

The duty to ensure reasonable progress requirements are met for purposes of the SIP rests with the state, not the source. Therefore, if a source is unwilling to prepare the analysis, Ecology must conduct the analyses to inform its reasonable progress determination. Ecology fails to provide any authority or analysis for this “do nothing” approach.

For sources where the Q/d value shows a Four-Factor Analysis is required, Ecology must conduct the required four-factor analysis for the source, including requirements for emission limitations and other measures based on the source's current operations.

F. Ecology Cannot Rely on Permit Provisions, Emission Reductions Must be Included in Practically Enforceable SIP Measures

Ecology cannot merely rely on permit provisions for emission reductions. The Clean Air Act requires states to submit implementation plans that “contain such emission limits, schedules of compliance and other measures as may be necessary to make reasonable progress toward meeting the national goal” of achieving natural visibility conditions at all Class I Areas.³³ The RHR requires that states must revise and update its regional haze SIP, and the “periodic comprehensive revisions must include the “enforceable emissions limitations, compliance schedules, and other measures that are necessary to make reasonable progress as determined pursuant to [51.308](f)(2)(i) through (iv).”³⁴ Furthermore, EPA's Guidance further explains these requirements:

This provision requires SIPs to include enforceable emission limitations and/or other measures to address regional haze, deadlines for their implementation, and provisions to make the measures practicably enforceable including averaging times, monitoring requirements, and record keeping and reporting requirements.³⁵

³³ 42 U.S.C. §§ 7491(a)(1), (b)(2).

³⁴ 40 C.F.R. § 51.308(f)(2); 40 C.F.R. § 51.308(d)(3)(v)(F) (Enforceability of emission limitations and control measures).

³⁵ “EPA Guidance on Regional Haze State Implementation Plans for the Second Implementation Period,” at 42-43 (Aug. 20, 2019), https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf. (While NPCA filed a Petition for Reconsideration regarding EPA's issuance of the 2019 Guidance, it does not dispute the information in the Guidance referenced here regarding enforceable limitations, which cite to the “General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, 74 Fed. Reg. 13498 (April 16, 1992).

Thus, EPA's Guidance recognizes EPA's long-standing position that while the SIP is the basis for demonstrating and ensuring state plans meet the regional haze requirements, state-issued permits must complement the SIP and SIP requirements.³⁶ State-issued permits must not frustrate SIP requirements.³⁷ For example, sources with PSD permits under Title I must not hold permits that allow emissions that conflict with SIP requirements.³⁸ Additionally, the Act's Title V operating permits collect and implement all the Act's requirements – including the requirements in the SIP – as applicable to the particular permittee. And sources with Title V permits must not hold such permits if they contain permit terms and conditions that conflict with the SIP and Clean Air Act SIP requirements.

G. It is Inconsistent with the CAA's Requirements to Use Air Quality Modeling to Decide Reasonable Process Controls

As explained above the reasonable progress four-factor analysis includes consideration of the following:

- Consider the costs of compliance,
- The time necessary for compliance,
- The energy and non-air quality environmental impacts of compliance, and
- The remaining useful life of any potentially affected sources.³⁹

The four-factor analysis is clearly bounded by the information collected under each of the factors. Air quality impacts, modeling results, and emission inventories are not information collected pursuant to any of the four-factors. Therefore, to the extent a state adds an additional factor or factors to its four-factor analysis the state's analysis is inconsistent with the four-factor analysis requirement. As discussed in these comments, as part of its reasonable progress analysis Ecology uses visibility impacts to reject emission controls at several of the sources, and because visibility is not one of the four statutory factors, and EPA has expressly stated that consideration of visibility is not to be used as an off-ramp for reduction requirements, the State cannot rely on it to exclude emission reducing measures from a source that otherwise satisfies the four statutory factors.

H. EPA Cannot Approve Ecology's Reliance on State-RACT to Meet the CAA's RP Requirements

Regional Haze Rule 40 C.F.R. 51.308(f) requires the state's long-term strategy to include all measures that are "necessary to make reasonable progress, as determined pursuant to [40 CFR 51.308](f)(2)(i) through (iv)." In turn, 40 CFR 51.308(f)(2)(i) requires the state to consider the

³⁶ 74 Fed. Reg. 13498, 13568 (April 16, 1992).

³⁷ Furthermore, to the extent stationary source are granted permits by rule or other mechanisms, these other categories that allow construction and operation must also complement SIP requirements.

³⁸ Additionally, the proposed SIP revisions fail to contain source-specific "measures to mitigate the impacts of construction activities." 40 C.F.R. § 51.308(d)(3)(v)(B).

³⁹ 42 U.S.C. § 7491(g)(1); 40 C.F.R. 51.308(f)(2)(i).

following four statutory factors in determining which emission reductions measures are necessary to make reasonable progress:

- the costs of compliance,
- the time necessary for compliance,
- the energy and non-air quality environmental impacts of compliance, and
- the remaining useful life of any potentially affected anthropogenic source of visibility impairment.

I. State-RACT is Not Equivalent to the CAA’s RP Four-Factor Requirements

Ecology’s suggestion that Washington State RACT “is equivalent to the” Regional Haze Rule’s four-factor analysis is incorrect. Based on the plain language in Washington’s statute for RACT – the five-factor State-RACT is neither equivalent to nor more stringent than the Clean Air Act’s RP four-factor analysis. Thus, despite Ecology’s meager assertions, it cannot use its State-RACT process to comply with the Act’s reasonable progress requirements.

Ecology’s draft SIP lists the four-factors applied for RP and the five-factors it applies for State-RACT.⁴⁰ The draft SIP includes a brief discussion of each of the four RP factors and shoe-horns State-RACT into each of the RP factors as follows, concluding that “...Ecology will use the RACT process to (1) evaluate and determine the emissions reduction measures that are necessary to make reasonable progress and (2) incorporate these measures into its long-term strategy and Regional Haze SIP in a manner that is enforceable as a legal and practical matter.”

Figure 1. Issues with Ecology’s Draft SIP Analysis of State-RACT

Reasonable Progress Factor	Ecology Draft SIP Analysis	Issues with Ecology’s Analysis
<p>The costs of compliance</p>	<p>Under the RACT analysis, Ecology characterizes and considers the cost of compliance consistent with 40 CFR 51.308(f)(2)(i) and EPA guidance. The cost of compliance factor in 40 CFR 51.308(f)(2)(i) directly correlates to the RACT analysis consideration of capital and operating costs of the additional controls. The capital and operating costs in RACT are for purchase, installation, and operation of all equipment. These costs include the actual emission control equipment, any non-air quality equipment, and the energy costs to operate the equipment.⁴¹</p>	<p>State-RACT requires consideration of “capital and operating costs of the additional controls.” While Ecology asserts that it has authority to consider “any non-air quality equipment, and the energy costs to operate the equipment” it does not cite language in its enabling statute or rules. Moreover, “any non-air quality equipment, and the energy costs to operate the equipment” is clearly not the same as the RP factor that</p>

⁴⁰ Draft SIP at 163-164.

⁴¹ *Id.* at 164.

Reasonable Progress Factor	Ecology Draft SIP Analysis	Issues with Ecology's Analysis
		requires consideration of "energy and non-air quality environmental impacts of compliance."
The time necessary for compliance	Under the RACT analysis, Ecology characterizes and considers the time necessary for compliance consistent with 40 CFR 51.308(f)(2)(i) and EPA guidance. Under the RACT analysis requirements, Ecology determines the time necessary for compliance as part of considering the capital and operating costs of the additional controls and impact of the source upon air quality. Specifically, a shorter amount of time for compliance would involve costs distributed over a shorter time and thus have a larger annualized cost. The impact of the source on air quality is also a consideration in the time for compliance. The longer it takes to install and operate the control equipment the greater the negative impact on air quality. ⁴²	The State-RACT factors do not contain a time component. While Ecology suggests that it has authority to consider this RP factor as part of the costs analysis, it does not provide a cite to and an interpretation of the language it relies on to support its assertion. Moreover, Ecology's suggestion that the time for compliance addresses air quality is not part of the Act's four-factor requirements.
The energy and non-air quality environmental impacts of compliance	Under the RACT analysis, Ecology characterizes and considers the energy and non-air quality environmental impacts of compliance consistent with 40 CFR 51.308(f)(2)(i) and EPA guidance. Ecology considers the energy and non-air quality environmental impacts of compliance factor as part of analyzing the capital and operating costs of the additional controls in the RACT analysis. The RACT analysis includes costs for equipment directly related to the emissions and all indirectly required equipment needed to install and operate the new controls. The operating cost requirement in the RACT analysis also covers the energy impacts of the controls and supporting equipment. ⁴³	The State-RACT factors do not contain consideration of energy and non-air quality environmental impacts. While Ecology suggests that it has authority to consider this RP factor as part of the costs analysis, it does not provide a cite to and an interpretation of the language it relies on to support its assertion. Contrary to Ecology's assertions, the costs for "indirectly required equipment needed to install and operate the new controls" is not what is contemplated in the "energy and non-air quality environmental impacts of compliance." Indirectly required equipment

⁴² *Id.*

⁴³ *Id.*

Reasonable Progress Factor	Ecology Draft SIP Analysis	Issues with Ecology's Analysis
		is not the same as energy and non-air quality requirements, it does not have an equivalent reach.
The remaining useful life	Under the RACT analysis, Ecology characterizes and considers the remaining useful life of any potentially affected anthropogenic source of visibility impairment consistent with 40 CFR 51.308(f)(2)(i) and EPA guidance. Ecology considers the remaining useful life of an emissions control system as part of calculating the capital and operating costs of the system. Specifically, the annualized costs of the emissions control system are affected by the remaining useful life. The shorter the useful life, the larger the annual costs associated with control equipment. ⁴⁴	The State-RACT factors do not contain consideration of the remaining useful life. While Ecology suggests that it has authority to consider this RP factor as part of the costs analysis, it does not provide a cite to and an interpretation of the language it relies on to support its assertion.

Ecology admits that State-RACT “requires consideration of the impact of the source upon air quality⁴⁵ and then conflates consideration of visibility impacts as its equivalent asserting that this consideration is an element within the four-factor analysis requirements.⁴⁶ This it cannot do. Ecology’s draft SIP analysis fails to show how the five State-RACT factors are equivalent or more stringent than the CAA’s four-factor analysis, which as shown below, it cannot do. The

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.* at 164-165 (“Additionally, RACT requires consideration of the impact of the source upon air quality.’ This is consistent with the CAA, RHR, and EPA guidance. While the four statutory factors must be considered in determining what is necessary to make reasonable progress, they are not the only factors that states may consider in this evaluation. As explained by EPA in its 2019 guidance, states have the flexibility to consider other factors, including visibility benefits, when determining the emission reduction measures that are necessary to make reasonable progress:

‘Section 51.308(f)(2)(i) of the Regional Haze Rule requires consideration of the four factors listed in CAA section 169A(g)(1) and does not mention visibility benefits. However, neither the CAA nor the Rule suggest that only the listed factors may be considered. Because the goal of the regional haze program is to improve visibility, it is reasonable for a state to consider whether and by how much an emission control measure would help achieve that goal. Likewise, it is reasonable that such information on visibility benefits be considered in light of other factors that may weigh for or against the control at issue. Such a balancing of outcomes is consistent with CAA section 169A(b)(2), which states that SIPs must contain elements as may be necessary to make reasonable progress toward meeting the national visibility goal. Thus, EPA interprets the CAA and the Regional Haze Rule to allow a state reasonable discretion to consider the anticipated visibility benefits of an emission control measure along with the other factors when determining whether a measure is necessary to make reasonable progress.’” Citing, EPA-457/B-10-003, *Guidance on Regional Haze State Implementation Plans for the Second Implementation Period*, Section II.B.5.)

State’s RACT factors and applicability differ significantly from the CAA, thus Ecology’s draft SIP and attempt to rely on State-RACT now – and for future SIPs – is not approvable by EPA.

Figure 2. Analysis Showing State-RACT is Noe Equivalent to the Required Four-Factor Analysis

	CAA Reasonable Progress	Washington State-RACT	Are they Equivalent?
Applicability & Purpose	<p>The State should consider evaluating major and minor stationary sources or groups of sources, mobile sources, and area sources.⁴⁷</p> <p>Purpose. The primary purposes of this subpart are to require States to develop programs to assure reasonable progress toward meeting the national goal of preventing any future, and remedying any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution; and to establish necessary additional procedures for new source permit applicants, States and Federal Land Managers to use in conducting the visibility impact analysis required for new sources under § 51.166. This subpart sets forth requirements addressing visibility impairment in its two principal forms: “reasonably attributable” impairment (<i>i.e.</i>, impairment attributable to a single source/small group of sources) and regional haze (<i>i.e.</i>, widespread haze from a multitude of sources which impairs visibility in every direction over a large area)⁴⁸</p>	<p>RACT requirements.</p> <p>(1) RACT as defined in RCW 70A.15.1030 is required for existing sources except as otherwise provided in RCW 70A.15.3000(9).</p> <p>(2) RACT for each source category containing three or more sources shall be determined by rule except as provided in subsection (3) of this section.</p> <p>(3) Source-specific RACT determinations may be performed under any of the following circumstances:</p> <p>(a) As authorized by RCW 70A.15.2220;</p> <p>(b) When required by the federal clean air act;</p> <p>(c) For sources in source categories containing fewer than three sources;</p> <p>(d) 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; or</p> <p>(e) When a source-specific RACT determination is needed to address either specific air quality problems for which the source is a significant contributor or source-specific economic concerns.</p>	No
Definition		Reasonably available control technology" (RACT) means the 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	

⁴⁷ 40 C.F.R. § 308(f)(2)(i).

⁴⁸ 40 C.F.R. § 51.300(a).

	CAA Reasonable Progress	Washington State-RACT	Are they Equivalent?
		economic feasibility. RACT is determined on a case-by-case basis for an individual source or source category taking into account... ⁴⁹	
Factors	Costs of compliance ⁵⁰	Capital and operating costs of the additional controls	Yes
	Time necessary for compliance		No
	Energy and non-air quality environmental impacts of compliance		No
	Remaining useful life of any potentially affected anthropogenic source of visibility impairment.		No
		Emission reduction to be achieved by additional controls	No. This is inherent in the RP analysis but not a specific factor that is considered and applied.
		the availability of additional controls	Yes. Inherent in the RP analysis.
		the impact of additional controls on air quality ⁵¹	No. Not one of the four RP factors. This consideration can be integrated as part of the “non-air quality and environmental impacts of compliance” factor in a

⁴⁹ RWC 70A.15.1030(20) (definition of RACT) (“Reasonably available control technology (RACT) means the 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. RACT requirements for a source or source category shall be adopted only after notice and opportunity for comment are afforded.”)

⁵⁰ 40 C.F.R. § 308(f)(2)(i).

⁵¹ RWC 70A.15.1030(20).

	CAA Reasonable Progress	Washington State-RACT	Are they Equivalent?
			Four-Factor Analysis.
		the impact of the source upon air quality ⁵²	No. Not one of the four RP factors

While Ecology’s RACT provisions and the Clean Air Act’s reasonable progress requirements have similarities, one is not a replacement for the other. Moreover and as discussed in detail below, application of the RACT requirements does not produce the results necessary to satisfy regional haze obligations. RACT introduces considerations that are not part of the reasonable progress Four-Factor Analysis and omits considerations that are. Consequently, and setting aside the lack of parity between the state and federal regulatory provisions, the outcome is a SIP that is deficient in meeting the programmatic objective: requirements for emission reduction measures that contribute to making reasonable progress towards the restoration of natural visibility at Class I areas progressively in each planning period.

J. Ecology Can Use Its Existing Authority to Implement the Four-Factor Analysis Requirements

The Washington State legislature granted Ecology various legal tools to require controls on its sources,⁵³ several of which it could rely on to implement the Clean Air Act’s Four-Factor Analysis requirements. For example, the Department of Ecology has broad authority under state law to propose and adopt emission limitations that apply to individual sources. The State Legislature outlined the powers and duties of the Department of Ecology in RCW 70A.15.3000, which includes the authority to

⁵² RWC 70A.15.1030(20).

⁵³ Ecology has had many years to develop this SIP and select appropriate existing authority to meet the RP four-factor analysis requirements. Options of viable State authority include: (1) Adopt source-specific RP emission limitations via rulemaking using its authority under State law; (2) Have the local air pollution authorities (or Ecology) adopt new enforceable orders. This was done for the State’s PM₁₀ nonattainment SIP, where the local agency established emission limitations and other requirements based on the modeling assumptions in Orders. Notably, the emission limitations were not LAER-based. *See* EPA’s actions on the following three SIPs, Kaiser Aluminum (62 Fed. Reg. 3800 (Jan. 27, 1997) (final action), 61 Fed. Reg. 35998 (July 9, 1996) (proposal)); Saint Gobain (69 Fed. Reg. 53007 (Aug. 31, 2004) (final action), 69 Fed. Reg. 17368 (April 2, 2004) (proposal)); and Lafarge (69 Fed. Reg. 53007 (Aug. 31, 2004) (final action), 69 Fed. Reg. 17368 (April 2, 2004) (proposal)); (3) Adopt a RP regulation under State law using either its emergency or expedited rulemaking authority, and then adopt source-specific RP emission limitations via rulemaking under the newly adopted RP regulation; (4) Adopt a state-wide guideline, and have the sources submit plans to either Ecology or local air pollution authority to meet the guideline, which are reviewed and approved and included in the SIP submitted to EPA. *See* Simplot example (70 Fed. Reg. 22597 (May 2, 2005) (final), 70 Fed. Reg. 5086 (Feb. 1, 2005) (proposal)); (5) Include the required emission limitations and other requirements via a Title V permit, and then incorporate those provisions in the SIP for submittal to EPA for inclusion as source-specific requirements. *See* Boise Cascade example (70 Fed. Reg. 22597 (May 2, 2005) (final), 70 Fed. Reg. 5086 (Feb. 1, 2005) (proposal)); (6) Revise existing BART and other Orders issued in the State. This option is based on Ecology’s modification of the BART Order issued for TransAlta, which it proposes to modify for the second planning period; (7) Seek delegation from EPA for whatever legal authority it thinks it lacks to implement the RP requirements; (8) Notify EPA it lacks authority and defer to EPA’s promulgation of a FIP.

- *Adopt rules establishing air quality objectives and air quality standards.*⁵⁴
- *Adopt by rule air quality standards and emission standards for the control or prohibition of emissions to the outdoor atmosphere of radionuclides, dust, fumes, mist, smoke, other particulate matter, vapor, gas, odorous substances, or any combination thereof.*⁵⁵

In adopting these standards, the Legislature made clear that “[t]he air quality standards and emission standards may be for the state as a whole *or may vary from* area to area *or source to source...*”⁵⁶ The definition of emission standard includes requirements under both State and Federal law.⁵⁷

The State Legislature also granted the Department authority to establish rules for a particular source that are more stringent than the statewide rules that apply to that source.⁵⁸ The Department must find that the regulation is “in the public interest” and “for the protection of the welfare of the citizens of the state,” and “after public hearing and due notice” it may “may adopt and enforce rules to control and/or prevent the emission of air contaminants from such source.”⁵⁹

Ecology also has authority to issue a source-specific “regulatory order to an air contaminant source which applies to that source, any applicable provision of chapter 70.94 RCW [Washington’s Clean Air Act], or the rules adopted thereunder.”⁶⁰ If Ecology were to promulgate source-specific RP emission limitations, as it should, it could then issue regulatory orders to those sources, because there would be a specific rule that applied to each source. Furthermore, it would be inconsistent with the Washington State Legislature’s declaration for Ecology to apply State-RACT, which is inconsistent and less stringent than the federal Clean Air Act’s RP requirements. Notably, the Legislature declared that it is:

[T]he policy of the state of Washington through the department of ecology to cooperate with the federal government in order to insure the coordination of the provisions of the federal and state clean air acts, and the department is authorized and directed to implement and enforce the provisions of this chapter in carrying out this policy [t]o take all action necessary to secure to the state the benefits of the federal clean air act.⁶¹

⁵⁴ RCW 70A.15.3000(2)(a) (emphasis added).

⁵⁵ RCW 70A.15.3000(2)(c) (emphasis added).

⁵⁶ RCW 70A.15.3000(3).

⁵⁷ RWC 70A.15.1030 (12) “‘Emission standard’ and ‘emission limitation’ mean a requirement established under the federal clean air act or this chapter that limits the quantity, rate, or concentration of emissions of air contaminants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction, and any design, equipment, work practice, or operational standard adopted under the federal clean air act or this chapter.”

⁵⁸ RCW 70A.15.3080.

⁵⁹ *Id.*

⁶⁰ Chapter 70.94 RCW.

⁶¹ RCW 70A.15.1090(2).

Finally, the State Legislature gave Ecology overarching authority to establish emission limitations for sources subject to the Federal Clean Air Act's four-factor requirements. Specifically, Washington's Legislature:

...[D]eclared to be the public policy to preserve, protect, and enhance the air quality for current and future generations. Air is an essential resource that must be protected from harmful levels of pollution. Improving air quality is a matter of statewide concern and is in the public interest. It is the intent of this chapter to secure and maintain levels of air quality that ... comply with the requirements of the federal clean air act ... foster the comfort and convenience of Washington's inhabitants, to promote the economic and social development of the state, and to facilitate the enjoyment of the natural attractions of the state.

It is further the intent of this chapter to protect the public welfare, to preserve visibility, to protect scenic, aesthetic, historic, and cultural values, and to prevent air pollution problems that interfere with the enjoyment of life, property, or natural attractions. To these ends it is the purpose of this chapter to safeguard the public interest through an intensive, progressive, and coordinated statewide program of air pollution prevention and control, to provide for an appropriate distribution of responsibilities, and to encourage coordination and cooperation between the state, regional, and local units of government, to improve cooperation between state and federal government, public and private organizations, and the concerned individual, as well as to provide for the use of all known, available, and reasonable methods to reduce, prevent, and control air pollution.⁶²

This enabling language is broader than State-RACT that is just based on "known, available, and reasonable methods" because reasonable progress does not limit emission reduction measures to consideration of "reasonable" but also includes consideration of the best and most stringent controls. Thus, the Department has authority under State law to establish air quality standards and emission limitations for a source category and individual sources using the rulemaking process, including the reasonable progress four-factor analysis requirements. Indeed, Ecology discussed several of these options in its December 2020 public presentation on regional haze:^{63, 64} taking no action; Agreed Orders; Compliance Orders;⁶⁵ permit modifications;

⁶² Declaration of public policies and purpose of Washington's Clean Air Act, RWC 70A.15.1005.

⁶³ Philip Gent & Colleen Stinson, Washington Department of Ecology, Regional Haze State Implementation Plan (SIP) Public Information Session, at 41 (Dec. 3, 2020), <https://ecology.wa.gov/DOE/files/87/8754c215-7a67-4e6f-bc9f-54632357913e.pdf>. ("Ecology PPT"); *see also*, 2010 RH SIP, revised in 2012, <https://apps.ecology.wa.gov/publications/SummaryPages/1002041.html>.

⁶⁴ Ecology PPT at 40.

⁶⁵ It appears that historically the State may have used this authority to issue orders for sources in nonattainment areas that required emission limitations. *Note*, these orders did not establish LAER emission limitations..

and State-RACT.^{66, 67} Thus, despite numerous options for State authority to implement the required RP four-factor analysis and emission control requirements, Ecology’s proposed SIP impermissibly sets aside this Clean Air Act requirement with an alternative standard that fails to satisfy it.

IV. Source-Specific Control Measures

A. TransAlta Centralia Generation

The TransAlta Centralia Generating Station is a coal-fired power plant located near Centralia, Washington. In its 2010 Regional Haze SIP, Ecology indicated that the Centralia plant significantly impacts regional haze in twelve Class I areas in Washington and Oregon.⁶⁸ The Centralia power plant was subject to BART in Washington’s regional haze plan. In 2003, EPA approved requirements applicable to the Centralia units’ SO₂ and PM emissions as meeting BART.⁶⁹ In 2012, EPA approved a NO_x BART determination in First Revised BART Order 6426 for the Centralia power plant, which included the following control requirements: an initial NO_x emission limitation of 0.21 lb/MMBtu for each unit based on the installation of SNCR on both coal-fired units plus Flex Fuel followed by an optimization study and lowering of the emission limits based on the study results.⁷⁰ In addition, the BART order required each of the two Centralia units to cease burning coal and be “decommissioned” by December 31, 2020 for one unit and by December 31, 2025 for the other unit, unless Ecology determined that state or federal law requires selective catalytic reduction (SCR) to be installed on either unit.⁷¹

In 2021, EPA approved a revision to the BART requirements for the Centralia power plant.⁷² Specifically, TransAlta had installed a Combustion Optimization System with Neural Network

⁶⁶ “This state law usually allows the sources a specific amount of time to upgrade the controls to meet the new or revised emission standards. It includes an economic hardship provision. A company that demonstrates it meets the criteria for economic hardship is allowed either an extended time to achieve compliance or an alternate, source-specific emission limitation.” Regional Haze SIP Revision – Second 10-Year Plan Table of Contents Chapter 9: Reasonable Progress Goals at 4 (Sept. 2020) (“Sept. 2020 SIP Revision, Chapter 9”), <https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/docs/RhSIPCh09202009.pdf>.

⁶⁷ In addition to applying RACT to existing sources, Ecology explains that it applies to new sources and modifications, “[s]tate law (RCW 70A.15.2220) requires that when a company decides to modify or replace an existing emission control system, Ecology or the local air pollution control authority must assure that the modified or replacement control system meets a reasonably available control technology (RACT) level of emissions control. This results in an emission reduction from the stationary source, though not so dramatic a reduction as might be achieved through the NSR program. Processing modifications and replacements of control equipment is an ongoing workload and, from year-to-year, the emission reductions are unpredictable.” Regional Haze SIP Revision – Second 10-Year Plan Table of Contents Chapter 10: Long-Term Strategy For Visibility Improvement, at 10 (Sept. 2020) (“Sept. 2020 SIP Revision, Chapter 10”), <https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/docs/RhSIPCh10202009.pdf>.

⁶⁸ Stamper Report at 9.

⁶⁹ WDOE, Regional Haze Plan, (Dec. 2010), at 11-13 (Table 11-11), <https://apps.ecology.wa.gov/publications/documents/1002041.pdf>.

⁷⁰ See 68 Fed. Reg. 34821 (June 11, 2003).

⁷¹ See 77 Fed. Reg. 72742 (Dec. 6, 2012); see also, First Revised BART Order 6426, attached as Ex. 1 to Stamper Report.

⁷² *Id.*

program (Neural Net) to decrease ammonia slip from the SNCR, and such Neural Net controls also help to reduce NOx emissions among other things. Ecology reduced the NOx limit applicable to one unit from to 0.18 lb/MMBtu and changed other requirements pertaining to use and monitoring of ammonia and analyzing coal sulfur and nitrogen content.⁷³ Ecology also eliminated the requirement in the BART Order 6426 that required that the units be “decommissioned” once they stopped burning coal, based on 2017 changes to a Memorandum of Agreement between TransAlta and the state of Washington.⁷⁴

The Stamper Report explains that “[i]t appears that TransAlta has been pursuing a coal-to-gas conversion program at some of its other units in Canada.”⁷⁵ Thus, in the event TransAlta elects to re-power with natural gas, Ecology’s reliance on the retirements for its 2028 emission projections would be misplaced and need a revision to the SIP. Furthermore, a re-powering scenario would be subject to regional haze BART requirements, including SIP public notice and comment, amongst other Clean Air Act requirements. Notably, one of the other Clean Air Act requirements such a proposed SIP amendment where TransAlta proposed to transition to gas would be subject to is the anti-backsliding provisions, which are discussed in detail below in Section VII.B.

B. Alcoa Primary Metals Intalco Works and Alcoa Wenatchee

While Ecology correctly identified Alcoa’s two aluminum smelters as sources that “have a very large potential to emit SO₂, and would contribute to regional haze if Alcoa re-started aluminum production operations,”⁷⁶ its proposed SIP lacks the required four-factor analysis and enforceable emission limits.

The Alcoa Primary Metals Intalco Works Plant (Intalco Plant) is an aluminum smelter located in Ferndale, Washington. NPCA found that the Alcoa Intalco plant potentially impacts 38 Class I areas and that it is the most significant industrial contributor to regional haze at North Cascades National Park.⁷⁷ Ecology states that the Intalco Plant has been in curtailment since 2020.⁷⁸ The Alcoa Wenatchee Plant is an aluminum smelter located in Wenatchee, Washington. ...[T]he Wenatchee plant has a Q/d value of 80.9 based on 2014 emissions. According to NPCA’s analysis, emissions from the Wenatchee plant potentially impact 34 Class I areas, including the Alpine Lakes Wilderness area,⁷⁹ located approximately 28 miles west of the facility, and also

⁷³ 86 Fed. Reg. 24502 (May 7, 2021).

⁷⁴ Ecology, Technical Support Document for Second BART (Best Available Retrofit Technology) Order Revision, July 2020, at i (attached as Ex. 2 to Stamper Report).

⁷⁵ Stamper Report at 13, citing <https://www.nsenergybusiness.com/features/coal-gas-conversion-us-canada/>.

⁷⁶ Draft SIP at 82.

⁷⁷ NPCA, Comments on Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County), at 3.

⁷⁸ WDOE Public Review Draft, Second Regional Haze Plan, (Oct. 2021), at 82.

⁷⁹ 78 Fed. Reg. 79344, 79348-79349. (Dec. 30, 2013).

North Cascades National Park to the northwest and Mount Rainier National Park to the southwest.⁸⁰ Ecology states that the Wenatchee plant has been in curtailment since 2015.^{81,82}

If Ecology is going to claim that controls at these two aluminum plants are necessary as part of its Long Term Strategy for the second implementation period - which is must - then the state's plan must include the requirements that would be imposed if either of the plants resume operation.⁸³ Such evaluations of the emission reduction measures necessary to make reasonable progress is required to be included in the long term strategy pursuant to 40 C.F.R. § 51.308(f)(2)(i).⁸⁴ Further, it would also give Alcoa notice as to the control requirements it must meet before it decides whether to restart either plant which would ensure expeditious limitations emissions should either plant restart.⁸⁵

Furthermore, as discussed in NPCA's earlier comments to Ecology on the Agreed Orders for the two smelter sources, there are numerous approvability issues with the Orders.⁸⁶

C. Ash Grove Cement Plant

Ecology selected the Ash Grove Cement Plant as a facility to be included in its Long Term Strategy in its regional haze plan for the second implementation period because it is one of the largest NOx point sources in Washington, emitting over 1,000 tons of NOx per year.⁸⁷ And yet, the draft SIP lacks the required four-factor analysis and emission limits to control emissions. The source is a dry process cement kiln in the Duwamish Industrial area of Seattle and the primary regional haze pollution from the plant comes from the cement kiln and its associated clinker cooler baghouses.⁸⁸ It is located only 53.8 kilometers from Alpine Lakes Wilderness Area⁸⁹ and, according to NPCA, potentially impacts nine Class I areas.⁹⁰ The source has a Q/d value based on 2014 emissions of 23.1. According to Ecology, the source is capable of burning coal, natural gas, and tire-derived fuels.⁹¹

There are numerous issues with Ecology's approach in the proposed SIP.⁹² First, although Ecology requested the required four-factor analysis for the Ash Grove Cement Plant,⁹³ The primary issue is that Ecology proposes to rely on a consent decree that lacks an emission limit

⁸⁰ NPCA, Comments on Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County), at 3.

⁸¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 82.

⁸² Stamper Report at 13-14.

⁸³ *Id.* at 17.

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ Stamper Report at 14; NPCA, Comments on Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County).

⁸⁷ Draft SIP at 82.

⁸⁸ *Id.* at 167.

⁸⁹ *Id.* at 162.

⁹⁰ Based on NPCA's Regional Haze Fact Sheet for Washington, Sources of Visibility Impairing Pollution in Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOlPyFmp/view>.

⁹¹ WDOE Public Review Draft, Second Regional Haze Plan, (Oct. 2021), at 167.

⁹² 40 C.F.R. § 51.308(f)(2)(i).

⁹³ Draft SIP at 163.

and the limit proposed (5.1lb/ton) is too high for SNCR capabilities. Moreover, “Ecology has failed to provide an adequate [and complete] four-factor analysis of controls.”⁹⁴ As discussed in detail in the Stamper Report, Ecology’s abbreviated analysis is incomplete and fails to evaluate the control option of installing catalytic ceramic filters in the existing main baghouse at the cement kiln, which several vendors offer and claim can achieve 90% or greater control of NOx.⁹⁵ The Stamper Report further explains that:

Recently, a cost assessment for the use of a ceramic catalytic filtration system was done for the GCC Pueblo Cement Plant in Colorado.⁹⁶ That information can be used to estimate costs of using a catalytic ceramic filtration system at the Ash Grove plant. The GCC plant is somewhat similar to the Ash Grove Seattle plant in that both cement kilns use the dry kiln process and use a preheater and precalciner.^{97, 98}

The use of catalytic ceramic filters would allow for a NOx emission limit of approximately 0.5 lb/ton of clinker,⁹⁹ which is significantly lower than the 5.1 lb/ton clinker NOx limit that Ecology is proposing to be part of the state’s Long Term Strategy.¹⁰⁰ Therefore, Ecology must fully evaluate use of catalytic ceramic filter bags at the Ash Grove cement plant as a top regional haze control.

Moreover, Ecology’s attempted reliance on the 2013 Consent Decree is misplaced. The Consent Decree was not negotiated to meet the requirements of the regional haze program, nor can Ecology make such a demonstration. Ecology’s attempt to rely on an approval letter from EPA in a completely different context to create enforceable SIP limits fails.

Additionally, Ecology must evaluate all control technologies, including SNCR, because as discussed in the Stamper Report, SNCR can most assuredly reduce NOx to lower emission rates than the 5.1 lb/ton of clinker emission rate that Ash Grove is apparently negotiating with PSCAA for its SNCR system.¹⁰¹

The proposed SIP also fails to impose appropriate emission limits and control requirements. Indeed, the draft SIP does not recommend installation of control equipment for particulate matter

⁹⁴ Stamper Report at 19.

⁹⁵ *Id.* at 20; *see e.g.*, Klafka, Steve, Wingra Engineering, GCC Rio Grande – Pueblo Cement Plant, Four-Factor Reasonable Progress Analysis, September 23, 2021, hereinafter GCC Pueblo Four-Factor Analysis, attached as Ex. 5 to Stamper Report.

⁹⁶ Klafka, Steve, Wingra Engineering, GCC Rio Grande – Pueblo Cement Plant, Four-Factor Reasonable Progress Analysis, (Sept. 23, 2021) (“GCC Pueblo Four-Factor Analysis”) attached as Ex. 5 to Stamper Report.

⁹⁷ *See* GCC Pueblo Four-Factor Analysis, Appendix B at 2 (Ex. 6 to Stamper Report); *see also* PSCAA Statement of Basis for Ash Grove Cement Company, Air Operating Permit Administrative Amendment 4 issued 6/13/18 at 3 (Ex. 7 to Stamper Report).

⁹⁸ Stamper Report at 20.

⁹⁹ *See* PSCAA Statement of Basis for Ash Grove Cement Company, Air Operating Permit Administrative Amendment 4 issued 6/13/18, at 1 (Ex. 7 to Stamper Report); and Air Operating Permit No. 11339, issued to Ash Grove Cement Company by PSCAA, last amended June 13, 2018, at 10 (Ex. 8 to Stamper Report). Assuming 90% NOx control from the 1,846 tons NOx per 12-month period limit equates to 0.5 lb/ton of clinker at maximum production capacity of 750,000 tons of clinker per year.

¹⁰⁰ Stamper Report at 21-22.

¹⁰¹ Draft SIP at 168.

because of what it claims are recent upgrades; and asserts the costs for SCR for NOx and wet scrubbing for SO₂ are unreasonable because of confined space at the site.¹⁰² Ecology admits that the 5.1 lb/ton of clinker emission rate from the recent upgrade is not reflective of even full-time operation of an SNCR system, and yet proposes a 5.1 lb/ton NOx limit that purportedly requires SNCR for the facility in its Long Term Strategy with a plan to revise the regional haze plan once a permit for the SNCR system is issued by PSCAA. Ecology has not even provided evidence that the 5.1 lb/ton clinker NOx limit has been adopted in final enforceable form such that it can be incorporated into the federally enforceable SIP.

Ecology's apparent reliance on the fuel change to no longer burn coal as the method to reduce and control SO₂ emissions must be imposed as a federally enforceable SIP provision. Moreover, Ecology did not evaluate any controls for SO₂ and must evaluate use of catalytic ceramic filter with sorbent injection should also be evaluated as an available SO₂ control for the cement plant.¹⁰³

Ecology must conduct a complete four-factor analysis now as part of its regional haze plan for the Ash Grove cement plant to fully evaluate all cost-effective controls and impose practically enforceable emission limits that apply at all times - not intermittently - for the pollutants that are reflective of the efficacy of the controls required.

D. Cardinal FG Winlock Glass Plant

The Cardinal FG Winlock plant is a flat glass manufacturing plant in Winlock, WA. According to Ecology, its 2014 NOx emissions were 791 tons per year based on 2014 emissions.¹⁰⁴ Thus, the facility is a large source of NOx. Despite the large source of emissions, Ecology did not request a four-factor analysis of pollution controls for the Cardinal Glass Plant.¹⁰⁵ Instead, Ecology proposes to rely on the fact that the company recently submitted a permit application to install SCR controls, which it proposed concurrently with an increase in glass production capacity from 650 tons per day to 750 tons per day.¹⁰⁶ Ecology's proposed reliance on a permit that is in process to meet the regional haze reasonable progress requirements is misplaced.

As discussed in Section VIII.E, the regional haze four-factor analysis requirement applies to sources *in conjunction with* any other Clean Air Act requirements. The fact that the Cardinal Glass Plant may receive a permit that requires installation and use of SCR does not obviate the need for the state to comply with reasonable progress requirements.¹⁰⁷ Moreover, "[t]he emission limits of the permit, as described in the draft regional haze SIP, do not reflect the maximum capabilities of SCR, including the ability to use low temperature catalyst to avoid or eliminate the SO₂ and particulate matter increases that were projected to occur with SCR."¹⁰⁸

¹⁰² *Id.* at 171.

¹⁰³ Stamper Report at 22.

¹⁰⁴ Draft SIP at 84.

¹⁰⁵ Stamper Report at 23.

¹⁰⁶ Draft SIP at 171.

¹⁰⁷ Stamper Report at 25.

¹⁰⁸ *Id.*

Furthermore, in preparing the required four-factor analysis, Ecology must evaluate the engineering concerns and considerations presented in the Stamper Report. For example, the proposed NOx reductions only reflect a reduction with SCR of 68%, which is much lower than the 90%+ control SCR is capable of achieving.¹⁰⁹ Ecology has not explained why it is not requiring the more stringent controls, which can be achieved using the options described in the Stamper Report (*i.e.*, use of the 3R process, low temperature catalysts, and use of ceramic catalyst filters).¹¹⁰

Ecology must conduct its own four-factor analysis of reasonable progress controls. “The fact that the Cardinal Glass Plant has received a permit requiring installation of use of SCR does not obviate the need for the state to comply with reasonable progress requirements. The emission limits of the permit, as described in the draft regional haze SIP, do not reflect the maximum capabilities of SCR, including the ability to use low temperature catalyst to avoid or eliminate the SO₂ and particulate matter increases that were projected to occur with SCR.”¹¹¹ Ecology must impose emission limits in its SIP.

V. Unjustifiable Deferral of Reasonable Progress Requirements for Refineries and Pulp and Paper Facilities in Ecology’s Proposed Long Term Strategy

A. Oil Refineries

Ecology identified the refineries as the prior source sector in its proposed SIP. Despite requesting four-factor analyses from the sources, Ecology found the analyses were fraught with errors and conducted its own cost effectiveness analysis. Ecology identified cost effective controls and yet its proposed SIP fails to include enforceable emission limitations. Contrary to the Act and regional haze regulations, Ecology proposes to defer to address this source sector in the next planning period.

Ecology states in its draft regional haze plan that the refineries in Washington “are over 40 years old and the facilities have maintained the majority of the equipment in a manner that has not required updating emission controls to current standards.”¹¹² Ecology did a nationwide comparison of 2014 facility-wide NOx emissions per barrel of production capacity for the five Washington refineries to 83 other refineries located in the U.S. and found that “Washington refineries represent four of the top five facilities in the nine states in terms of NOx emissions per 1,000 barrels produced per day.”¹¹³ Ecology requested four-factor analyses from the five Washington refineries to address each fluid catalytic cracking unit (FCCU), each boiler with heat input greater than 40 MMBtu/hr, and each heater with heat input greater than 40 MMBtu/hr that has not been retrofitted with NOx controls since 2005.¹¹⁴ None of the five refineries for which Ecology requested four-factor analyses found that low NOx burners or ultra-low NOx burners

¹⁰⁹ Stamper Report at 24.

¹¹⁰ *Id.* at 24.

¹¹¹ Stamper Report at 25.

¹¹² Draft SIP at 184.

¹¹³ *Id.* at 185-186 (Table 7-6).

¹¹⁴ *See, e.g.*, BP Cherry Point Refinery Regional Haze Four Factor Analysis, (April 2020) (“BP Cherry Point Analysis”) at 2, available at <https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/RegionalHaze.htm>.

(LNB/ULNB) or SCR were appropriate for regional haze reasonable progress controls. Therefore, Ecology correctly conducted its own cost effectiveness analyses for application of SCR to the refinery heaters and boilers. Ecology states that two refineries did not submit analyses for their FCCUs, and Ecology subsequently decided to evaluate SCR for those FCCUs “since they are a large source of NOx emissions.”¹¹⁵

1. Ecology is Entirely Justified in Its Use of EPA’s Control Cost Manual to Determine Cost Effective Controls for the Petroleum Refineries

Ecology is entirely justified to use and rely on the EPA’s SCR cost spreadsheet to determine cost effectiveness of SCR at the heaters, boilers and FCCUs for the five refineries it evaluated for controls for its regional haze plan.¹¹⁶ Ecology determined that SCR is cost effective for the refineries as seen in the below figure.

Figure 3. Ecology’s Identification of Cost Effective SCR Determinations at the Petroleum Refineries¹¹⁷

Plant	Emission Unit	Cost Effectiveness, \$/ton	NOx Reduced, tons per year
BP Cherry Point	#1 Reformer Heaters	\$3,101/ton	304 tpy
	Crude Heater	\$2,051/ton	393 tpy
	Reforming furnace #1 (N H2 Plant)	\$6,161/ton	262 tpy
	Reforming furnace #2 (S H2 Plant)		
Phillips 66 Ferndale	Crude Heater 1F-1	\$2,640/ton	166 tpy
	FCCU/CO Boiler/Wet Gas Scrubber 4F-101	\$3,954/ton	247 tpy

¹¹⁵ Draft SIP at 187.

¹¹⁶ Stamper Report at 30, 27-30, 33.

¹¹⁷ Draft SIP at 188 (finding SCR at BP Cherry Point units was cost effective), at 192 (finding SCR at Phillips 66 units was cost effective), at 194 (finding SCR at Shell units was cost effective), and at 198 (finding SCR at Marathon Petroleum Company (Tesoro) units was cost effective); *see also* Appendix J at J-1.

Plant	Emission Unit	Cost Effectiveness, \$/ton	NOx Reduced, tons per year
Shell Puget Sound	Boiler #1 Erie City – 31G-F1	\$2,441/ton	179 tpy
	FCCU Regenerator Unit	\$1,948/ton	521 tpy
	CRU #2 HTR, INTERHTR—10H-101, 102, 103	\$6,346/ton	69 tpy
Marathon Petroleum Company (Tesoro) Anacortes Refinery	FCCU	\$1,159/ton	843.3 tpy
	F 102 Crude Heater	\$2,962/ton	147.6 tpy
	F 201 Vacuum Flasher Heater	\$7,589/ton	57.6 tpy
	F 6650 CAT Reformer Heater	\$3,736/ton	117 tpy
	F 6651 CAT Reformer Heater	\$3,520/ton	124.2 tpy
	F 751 Main Boiler	\$2,159/ton	202.5 tpy
	F 752 Main Boiler	\$2,570/ton	170.1 tpy

However, instead of adopting SCR control requirements for the refinery emission units, Ecology’s draft SIP suggests it will conduct a more extensive cost evaluation of SCR. The Stamper Report explains that additional analysis is not necessary because Ecology:

- Provided the refineries an opportunity to submit four-factor analyses;

- Determined that that the company analyses were not well documented or justified;¹¹⁸
- Used the proper EPA Control Cost Manual, which demonstrated that SCR is cost effective for the units;
- Correctly applied the other three factors and determined they do not provide a reason to exclude any of the emission units from requirement to install SCR to achieve reasonable progress towards the national visibility goal.¹¹⁹

As highlighted below and presented in the Stamper Report, there are numerous issues with the company's analyses. Therefore, Ecology is justified in correcting the identified deficiencies and in its final SIP submission requiring SCR as reasonable progress controls for all of the refineries. Indeed, because Ecology identified refineries as its priority sector for this planning period, it must require SCR and the associated emission limitations.

2. BP Cherry Point Refinery

The BP Cherry Point Refinery's four-factor analysis had numerous errors, which are inconsistent with the legal requirements. As discussed in the Stamper Report, Ecology rightly corrected the errors and in so doing determined that SCR is cost effective.

Ecology calculated a Q/d value for the BP Cherry Point facility of 36.4, and it is ranked 5th highest Q/d on Ecology's list of sources it evaluated.¹²⁰ NPCA data shows that the facility likely contributes to regional haze at 14 Class I areas.¹²¹

There are numerous issues with the company's four-factor analysis because it does not comport with EPA's regulations, guidance and is based on unsupported assumptions. The Stamper Report presents details on seven issues with the company's four-factor analysis:¹²²

- Used an inflated interest rate in amortizing capital costs, which not consistent with EPA's Control Cost Manual;¹²³
- Scaled 2010 cost estimates, which EPA's Control Cost Manual cautions against;¹²⁴
- Unjustifiably rejected emission control options as not technical feasible;¹²⁵
- Failed to include citations and support for statements regarding emission rates, retrofit factors, cost for ammonia reagent;¹²⁶

¹¹⁸ *Id.* at 190, 192, 195, 196, 199, and 202 (Ecology stating that the various refinery companies provided limited supporting data for their cost analyses).

¹¹⁹ Stamper Report at 33.

¹²⁰ Draft SIP at 161.

¹²¹ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOIPyFmp/view>.

¹²² Stamper Report at 34-36.

¹²³ *Id.* at 34.

¹²⁴ *Id.*

¹²⁵ *Id.* at 34-35.

¹²⁶ *Id.* at 35-36.

- Erroneously inflated the number of hours per year number based on the number of hours in a leap year;¹²⁷
- Failed to assume the most cost-effective options for catalyst replacement;¹²⁸ and
- Unreasonably assumed a lengthy schedule to implement emission controls.¹²⁹

Ecology’s cost-effective analysis was based on EPA’s SCR cost spreadsheet.¹³⁰ The differences between Ecology’s cost estimates based on EPA’s Control Cost Manual Spreadsheet and the company’s are very significant, as discussed in the Stamper Report and shown in the below figure.

Figure 4. Summary from Draft Washington Regional Haze SIP: Comparison of BP’s Cost Analysis to Ecology’s Cost Analysis for SCR at Certain BP Cherry Point Emission Units¹³¹

BP’s Capital Cost	BP’s Annual Maintenance Cost	BP’s Cost Effectiveness, \$/ton	WDOE’s Capital Cost	WDOE’s Maintenance Cost	WDOE’s Cost Effectiveness	NOx Reduced, tpy
Reformer Heaters						
\$94,809,582	\$420,048	\$24,378/ton	\$9,929,730	\$49,649	\$3,101/ton	304 tpy
Crude Heater						
\$94,809,582	\$420,048	\$24,378/ton	\$9,325,358	\$46,627	\$2,051/ton	425 tpy
Hydrogen Plant Reforming Furnaces						
\$143,325,183	\$479,126	\$78,065/ton	\$9,325,358	\$46,627	\$6,161/ton	141 tpy

As the Stamper Report explains:

BP’s cost estimates are almost ten times as high as the SCR cost estimates for the same units calculated by Ecology with EPA’s SCR cost spreadsheet. Ecology’s analysis clearly shows that SCR at these BP Cherry Point units would be cost effective and would reduce NOx emissions by a total of 870 tons per year. Ecology states that BP did not

¹²⁷ *Id.* at 36.

¹²⁸ *Id.*

¹²⁹ *Id.*

¹³⁰ *Id.*

¹³¹ *Id.* at 37, data from Draft SIP at 189-190 (Tables 7-8, 7-9, and 7-10).

provide the data it used to scale the cost data. Thus, Ecology has found BP did not adequately support its SCR cost calculations.¹³²

Furthermore, in 2018, attorneys representing Ecology told the State of Washington Pollution Control Board that Ecology would address emissions from BP Cherry Point in the Regional Haze Program. Explaining that the “National Park Service’s finding of adverse impacts from the BP project” in that permit appeal case “will be included as a component of the next analysis of state’s progress toward better visibility required by the Regional Haze Program.”¹³³ During the Hearing before the Pollution Control Hearings Board, Ecology’s Alan Newman testified and confirmed the statements in the Prehearing Brief. Mr. Newman testified that the Department would evaluate BP Cherry Point for “a SIP update and potential emission reduction requirements” as part of the 2021 regional haze plan.¹³⁴ Mr. Newman further testified that:

BP will be evaluated, as other sources will, for whether there are available and appropriate controls that can be installed, and, if so, they will be required as part of the regional haze for reasonable progress goal for 2028.¹³⁵

In its draft SIP Ecology found that controls are available and cost effective, yet, contrary to the Department’s 2018 sworn testimony, Ecology proposes no controls in the draft SIP for the BP Cherry Point Refinery. Ecology cannot dodge its legal obligations to consider and control emissions impacting the Class I Areas in both the permitting *and* regional haze programs.¹³⁶ This, Ecology must include enforceable emission limitations for the BP Cherry Point refinery in this draft SIP to meet its earlier commitment and statements to its Board.

Moreover, to meet the requirements of EPA’s regional haze regulations, Ecology must include final determinations to require SCR in this regional haze plan for the second implementation period for the BP Cherry Point Refinery.

¹³² Stamper Report at 37.

¹³³ *National Parks Conservation Association v. State of Washington, Department of Ecology; and BP West Coast Products, LLC*, PCHB No. 10-162, Department of Ecology’s Prehearing Brief (April 12, 2018), at 5 (Enclosure 6);

¹³⁴ *National Parks Conservation Association v. State of Washington, Department of Ecology; and BP West Coast Products, LLC*, PCHB No. 10-162, Hearing Transcript, Volume IV (April 26, 2018), at 757 (testimony of Alan Newman at 757, (“Q So what does that mean in the regional haze program when you get an adverse determination, adverse impact determination? A If I considered it the same as an adverse impact determination under 51.302, that means the Washington State Department of Ecology has to evaluate that facility for a SIP update and potential emission reduction requirements. By the rule, that SIP update for this timing is allowed to occur as part of the 2021 regional haze plan.) (Enclosure 7).

¹³⁵ *Id.* at 806-807 (“Q Is it your position that if BP is affecting haze after this project, you will require controls to address that, you will require controls from BP to address that? A BP will be evaluated, as other sources will, for whether there are available and appropriate controls that can be installed, and, if so, they will be required as part of the regional haze for reasonable progress goal for 2028. I cannot give you an answer there will be a reduction. Q Based on what information? A Based on the analysis has not been started or completed. Q Does that include pollution controls that are equivalent to BACT as we are discussing here? A Those are the kind of controls that would be evaluated. Q Regional haze provisions don't address deposition, right? A That is correct.)

¹³⁶ As discussed elsewhere in these comments, the Clean Air Act’s permit programs work in conjunction with the regional haze program.

3. Marathon Petroleum Company (MPC) Anacortes Refinery (Formerly Tesoro Refinery)

The MPC's four-factor analysis for the Tesoro Refinery had numerous errors, which are inconsistent with the legal requirements. As discussed in the Stamper Report, Ecology rightly corrected the errors and in so doing determined that SCR is cost effective.

The Anacortes Refinery is currently owned by Marathon Petroleum Company (MPC) and was previously owned by Tesoro Refining & Marketing Company LLC (Tesoro, which Ecology also refers to as "Tesoro Northwest Company"¹³⁷). Ecology calculated a Q/d value for the Tesoro Anacortes Refinery of 30.7, and it is ranked 6th highest Q/d on Ecology's list of sources it evaluated.¹³⁸ NPCA data shows that the facility likely contributes to regional haze at 10 Class I areas.¹³⁹

There are numerous issues with the company's four-factor analysis because it does not comport with EPA's regulations, guidance and is based on unsupported assumptions. Specifically, MPC:

- Did not conduct four-factor analyses for any heaters or boilers that had installed NOx controls since 2005.¹⁴⁰
- Used outdated 2014 emissions for the baseline year contrary to EPA's regulation and guidance – and without justification;¹⁴¹
- Used an inflated interest rate contrary to EPA's Control Cost Manual;¹⁴²
- Used an unjustified and very high cost for ammonia;¹⁴³
- Failed to provide underlying data and assumptions for the FCCU analysis;¹⁴⁴
- Failed to provide documentation and justification for the base case fuel gas volumetric flow rate factors for the SCR reactors;¹⁴⁵
- Unreasonably assumed low NOx removal rate for Boiler 3 of 75%, without providing justification;¹⁴⁶
- Only assumed a 20-year life of controls in determining the amortizing the capital costs of control for ULNB for the heaters and boilers;¹⁴⁷
- Failed to provide justification for the NOx emission rate for the ULNBs;¹⁴⁸ and
- Failed to evaluate the cost effectiveness of the most effective control – ULNB plus SCR.¹⁴⁹

¹³⁷ Draft SIP at 185.

¹³⁸ *Id.* at 161.

¹³⁹ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOlPyFmp/view>.

¹⁴⁰ *Id.*, Appendix P at P-207 (Tesoro Four-Factor Analysis).

¹⁴¹ Stamper Report at 39.

¹⁴² *Id.*

¹⁴³ *Id.* at 39-40.

¹⁴⁴ *Id.* at 40.

¹⁴⁵ *Id.*

¹⁴⁶ *Id.* at 40-41.

¹⁴⁷ *Id.* at 41.

¹⁴⁸ *Id.* at 41-42

¹⁴⁹ *Id.* at 42.

Figure 5. Comparison of SCR Cost Effectiveness as Calculated by Tesoro to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Anacortes Refinery¹⁵⁰

Anacortes Refinery Emission Unit	Tesoro's Cost Effectiveness, \$/ton	WDOE's Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
FCCU	\$14,381/ton	\$1,159/ton	843.3 tpy
F102 Crude Heater	\$16,086/ton	\$2,962/ton	147.6 tpy
F201 Vacuum Heater	\$35,276/ton	\$7,589/ton	57.6 tpy
F6650 CAT Reformer Heater	\$21,196/ton	\$3,736/ton	117 tpy
F6651 CAT Reformer Heater	\$21,196/ton	\$3,520/ton	124.2 tpy
F751 Main Boiler	\$10,060/ton	\$2,159/ton	202.5 tpy
F752 Main Boiler	\$10,513/ton	\$2,570/ton	170.1 tpy

As discussed in the Stamper Report and seen in the above figure, “differences in calculated SCR costs/ton of NOx removed make clear that Tesoro’s costs are significantly higher than the costs calculated by Ecology using the EPA SCR cost spreadsheet provided with EPA’s Control Cost Manual.”¹⁵¹ Given that SCR is such a highly effective NOx control and otherwise satisfies the Four-Factor Analysis, the state should require SCR installation as reasonable progress for these units.

To meet the requirements of EPA’s regional haze regulations, Ecology must include final determinations to require SCR in this regional haze plan for the second implementation period for the Marathon Petroleum Company Anacortes Refinery.

¹⁵⁰ Draft SIP at 199.

¹⁵¹ Stamper Report at 42.

4. Shell Puget Sound Refinery

Shell Puget Sound Refinery's four-factor analysis had numerous errors, which are inconsistent with the legal requirements. As discussed in the Stamper Report, Ecology rightly corrected the errors and in so doing determined that SCR is cost effective.

The Shell Puget Sound Refinery is another refinery located near Anacortes, Washington. Ecology calculated a Q/d value for the Shell Puget Sound Refinery facility of 24.5.¹⁵² NPCA data shows that the facility likely contributes to regional haze at eight Class I areas.¹⁵³

There are numerous issues with the company's four-factor analysis because it does not comport with EPA's regulations, guidance and is based on unsupported assumptions. The Stamper Report presents details on seven issues with the company's four-factor analysis.¹⁵⁴ Specifically, Shell's analysis:

- Lacked justification for its baseline emission assumptions;¹⁵⁵
- Used an unreasonably high interest rate of 7%, inconsistent with EPA's Control Cost Manual;¹⁵⁶
- Used truncated useful life assumptions, inconsistent with EPA's Control Cost Manual;¹⁵⁷
- Assumed an eight year remaining useful life for the highest emitting unit (Erie City Boiler 1);¹⁵⁸
- Underestimated without justification the NOx emission rate for LNB;¹⁵⁹
- Applied an inflated and unjustified retrofit factor;¹⁶⁰
- Assumed costs for reheating the gas stream for each of the emission units at the Shell refinery to accommodate SCR, without providing justification.¹⁶¹

Ecology found that the Shell Puget Sound Refinery had the second highest NOx emissions per 1,000 bpd production of all of the eighty-four refineries nationwide that it evaluated.¹⁶² As seen in the below figure and discussed in the Stamper Report, Ecology's draft SIP also found that SCR is cost effective for Erie City Boiler 1, the FCCU, regenerator unit, and the CRU #2 heater and interheaters.

¹⁵² Draft SIP at 161.

¹⁵³ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOlPyFmp/view>.

¹⁵⁴ Stamper Report at 45-48.

¹⁵⁵ *Id.* at 45-46.

¹⁵⁶ *Id.* at 46.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.* at 46-47.

¹⁵⁹ *Id.* at 47.

¹⁶⁰ *Id.*

¹⁶¹ *Id.* at 48

¹⁶² Draft SIP at 185.

Figure 6. Comparison of SCR Cost Effectiveness as Calculated by Shell to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Shell Puget Sound Refinery¹⁶³

Puget Sound Refinery Emission Unit	Shell's Cost Effectiveness, \$/ton	WDOE's Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
Erie City Boiler 1	\$12,511/ton	\$2,441/ton	179 tpy
FCCU Regenerator Unit	Not Evaluated	\$1,948/ton	521 tpy
CRU2 Charge Heater/Interheaters	\$10,813/ton	\$6,346/ton	69 tpy

Thus, to meet the requirements of EPA's regional haze regulations, Ecology must include final determinations to require SCR in this regional haze plan for the second implementation period, these SCR installations must occur during the second implementation period and could be coordinated with maintenance outages at the Shell Puget Sound refinery.¹⁶⁴

5. Phillips 66 Ferndale Refinery

Phillips 66 Ferndale Refinery's four-factor analysis had numerous errors, which are inconsistent with the legal requirements. As discussed in the Stamper Report, Ecology rightly corrected the errors and in so doing determined that SCR is cost effective.

Ecology calculated a Q/d value for the Phillips 66 Ferndale Refinery of 10.9.¹⁶⁵ NPCA data shows that the facility likely contributes to regional haze at 5 Class I areas.¹⁶⁶ Ecology found that the Phillips 66 Refinery had the fifth highest NOx emissions per 1,000 bpd production of all of the eighty-four refineries nationwide that it evaluated.¹⁶⁷

There are numerous issues with the company's four-factor analysis because it does not comport with EPA's regulations, guidance and is based on unsupported assumptions. The Stamper Report presents details on seven issues with the company's four-factor analysis. Specifically, Shell:

¹⁶³ *Id.* at 195.

¹⁶⁴ Stamper Report at 49.

¹⁶⁵ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 161.

¹⁶⁶ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOlPyFmp/view>.

¹⁶⁷ Draft SIP at 185.

- Erroneously used a five-year average of annual emissions for baseline emissions, contrary to EPA’s regulations and guidance;¹⁶⁸
- Applied an inflated interest rate, contrary to EPA’s Control Cost Manual;¹⁶⁹
- Used a truncated number of years for the useful life of controls;¹⁷⁰
- Used high NOx emission rates with LNB, which are not supported;¹⁷¹
- Without justification assumed continual operation every hour of the year (*i.e.*, 8,760 hours per year – 100% capacity factor) in assessing reagent and other operational expenses of SCR;¹⁷² and
- Included numerous costs that are not allowed under EPA’s Control Cost Manual.¹⁷³

As seen in the below figure, once it corrected the company’s errors, Ecology found the SCR controls cost effective for the refinery.

Figure 7. Comparison of SCR Cost Effectiveness as Calculated by Phillips 66 to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Phillips 66 Refinery¹⁷⁴

Phillips 66 Refinery Emission Unit	Phillips 66’s Cost Effectiveness, \$/ton	WDOE’s Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
Crude Heater 1F-1	\$12,225/ton	\$2,640/ton	166 tpy
FCCU/CO Boiler	Not Evaluated	\$3,954/ton	247 tpy

To meet the requirements of EPA’s regional haze regulations, Ecology must include final determinations to require SCR in this regional haze plan for the second implementation period for the Phillips 66 Ferndale Refinery.

6. U.S. Oil & Refining Company – Tacoma Refinery

U.S. Oil & Refining Company’s four-factor analysis had numerous errors, which are inconsistent with the legal requirements. As discussed in the Stamper Report, Ecology must require that the

¹⁶⁸ Stamper Report at 50-51..

¹⁶⁹ *Id.* at 51.

¹⁷⁰ *Id.* at 51.

¹⁷¹ *Id.*

¹⁷² *Id.* at 52.

¹⁷³ *Id.* at 52, citing P-78 to P-84.

¹⁷⁴ *Id.* at 52, citing Draft SIP at 192-193.

company identify and verify its assumptions. Based on additional information received from the company, Ecology must also determine whether it is necessary to include emission limitations in the SIP.

U.S. Oil & Refining (U.S. Oil) owns a refinery in Tacoma. According to Ecology, the facility has a Q/d value of 3.2.¹⁷⁵

There are issues with the company's four-factor analysis. In particular, the company:

- Failed to provide baseline emissions and failed to propose enforceable SIP requirements for upcoming changes;¹⁷⁶
- Applied an inflated interest rate of 7%, contrary to EPA's Control Cost Manual;¹⁷⁷
- Applied a truncated useful life of controls for all units, contrary to EPA's Control Cost Manual;¹⁷⁸
- Assumed NOx emission limits that are not reflective of typical limits;¹⁷⁹
- Assumed an inflated retrofit factor that is not justified;¹⁸⁰ and
- Assumed SCR will require flue gas reheating without justification.¹⁸¹

As presented in the Stamper Report:

As it did with the other refineries, Ecology evaluated SCR cost effectiveness using EPA's SCR cost calculation spreadsheet made available with its Control Cost Manual for the Heater H-11. Ecology found that cost effectiveness of SCR would be \$15,612/ton, which was lower than U.S. Oil's calculated cost effectiveness of \$18,649/ton, but Ecology still found that SCR was not cost effective for this heater.¹⁸² However, as discussed ... above, U.S. Oil assumed a lower baseline for its cost analysis because it is "implementing changes during the refinery's upcoming turnaround in early 2021 that will add significantly to heat recovery, thereby reducing the fired duties of these sources."¹⁸³

Ecology must require that U.S. Oil identify and verify the details of its cost effectiveness analysis, and Ecology must determine if it is necessary to make such changes in emissions into enforceable requirements.

¹⁷⁵ Draft SIP at 162 (Table 7-1).

¹⁷⁶ Stamper Report at 54-55.

¹⁷⁷ *Id.* at 55.

¹⁷⁸ *Id.*

¹⁷⁹ *Id.* at 55-56.

¹⁸⁰ *Id.* at 56.

¹⁸¹ *Id.*

¹⁸² Draft SIP at 202.

¹⁸³ *Id.* at P-303.

B. Pulp and Paper Mills

1. Ecology is Entirely Justified in Its Use of EPA’s Control Cost Manual to Determine Cost Effective Controls for the Pulp and Paper Mills

The pulp and paper mill four-factor analyses submitted by NWPPA and by Cosmo Specialty Fibers were flawed and inconsistent with EPA’s regulations and guidance. Ecology evaluated and partially adjusted the companies’ cost information and provided a summary of its revised costs/ton in Appendix J of the draft regional haze SIP. Ecology’s adjustments primarily included using a 3.25% interest rate for amortizing capital costs, adjusting the useful life of controls for some sources, and adjusting SNCR NOx control efficiency to 35% for some sources.¹⁸⁴ As discussed below, while Ecology should have made further adjustments to the control cost assessments, even with the limited changes it did make, Ecology found that controls as seen in the below figure, would be cost effective based on Ecology’s reasonableness cost thresholds.¹⁸⁵ For the same reasons presented in the above discussion on refineries, Ecology was entirely justified in using EPA’s Control Cost Manual and making the necessary corrections. And yet, Ecology’s draft SIP fails to propose emission limitations based on these cost effective controls.

The SO₂ control cost estimates that the pulp mills submitted to Ecology are greater than the potential cost threshold range of the other RH pollutant costs of \$6,250 - \$7,800.¹⁸⁶

Figure 8. Ecology’s Identification of Cost Effective Regional Haze Controls at Pulp and Paper Mills.¹⁸⁷

Plant	Emission Unit	Control	Cost Effectiveness, \$/ton	RH Pollution Reduced, tons per year
Nippon Dynawave	Hog Fuel Boiler #11	SCR	\$5,466/ton	NOx -1,025 tpy
Nippon Dynawave	Hog Fuel Boiler #11	SNCR	\$5,413/ton	NOx - 500 tpy
Nippon Dynawave	Boiler #9	SCR	\$6,041/ton	NOx - 175 tpy

¹⁸⁴ Draft SIP, Appendix J at J-1 to J-3.

¹⁸⁵ Stamper Report at 58.

¹⁸⁶ Draft SIP at 183 and Appendix J at J-1.

¹⁸⁷ Stamper Report at 59, citing Draft SIP at 183 and Appendix J at J-1.

Plant	Emission Unit	Control	Cost Effectiveness, \$/ton	RH Pollution Reduced, tons per year
Nippon Dynawave	Boiler #9	LNB	\$2,754/ton	NOx - 97 tpy
Packaging Corp. of America (PCA)	Boiler #1	LNB	\$5,893/ton	NOx - 26 tpy
PCA	Boiler #2	LNB	\$4,834/ton	NOx - 30 tpy
West Rock Longview	Hog Fuel Boiler 20	SNCR	\$6,245/ton	NOx - 115 tpy
WestRock Tacoma	Lime Kiln #1	Wet ESP	\$6,964/ton	PM ₁₀ - 33 tpy

2. Ecology’s Proposal to Defer Controls on Pulp and Paper Mills is Inconsistent with its Cost Effectiveness Determinations and the Legal Requirements

Based on its Q/d screening analysis, Ecology identified six pulp and paper mills and one sulfite chemical processing mill and requested that they perform four-factor analysis. Ecology correctly found the analyses from the companies fraught with errors and conducted its own cost effectiveness analyses. Ecology analyses identified cost effective controls.¹⁸⁸ However, based on the erroneous assumptions discussed below, Ecology assigned the pulp and paper mill source category collectively a lower priority for emission controls and its proposed SIP fails to include enforceable emission limitations.

Ecology inappropriately discounts emission controls from the pulp and paper source category assigning a lower priority. For example, Ecology suggests they “are not located as close to each other as the refineries so they do not have as great of a cumulative effect.”¹⁸⁹ As discussed in the Stamper Report:

While these facilities may not all be located nearby each other, these four facilities along with Cosmo Specialty Fibers, WestRock Longview, and Georgia Pacific Consumer Operations all have Q/d values that are greater than or equal to the Q/d threshold of 10 that Ecology set for selecting sources for review. Thus, the decision to defer controls on

¹⁸⁸ Stamper Report at 57.

¹⁸⁹ Draft SIP at 166.

any of these pulp and paper mills must be based on a four-factor analysis of controls, not a determination that the facilities might not have as great of a cumulative effect on regional haze as the refineries.¹⁹⁰

Furthermore, Ecology's suggestion that the potential reduction in regional haze emissions from pulp and paper mills is "vastly less than the potential refinery emission reductions"¹⁹¹ provides a justification to discount control is also misplaced. Ecology's proposed reliance on visibility to reject emission controls is outside of the four-factor analysis.¹⁹² As explained in the Stamper Report:

[T]he McKinley Paper Company (for which Ecology inexplicably did not conduct a four-factor analysis of controls) has the second highest Q/d value (83.1) of any facility for which Ecology requested four-factor analyses.¹⁹³ Three other pulp and paper mills are in the top ten highest Q/d values as calculated by Ecology – the WestRock Tacoma facility, the Nippon Dynawave Packaging Company in Longview, and the Pt Townshend Paper Corporation.^{194, 195}

Contrary to the Act and regional haze regulations, Ecology proposes to defer and address this source sector in the next planning period. Ecology must propose and establish enforceable emission limits in its SIP for the pulp and paper sources.

3. Ecology Must Conduct the Required Four-Factor Analysis for the McKinley Paper Plant

As explained in the Stamper Report: it appears that Ecology neither requested nor conducted a four-factor analysis for the McKinley Paper Plant, which is a pulp and paper plant with a Q/d value of 83.1, and has the second highest Q/d value of all facilities evaluated by Ecology.¹⁹⁶ It's important to note that the Technical Support Document for the current operating permit for the McKinley Plant states that the McKinley facility was purchased from Nippon Paper Industries USA Co. in 2017.¹⁹⁷ Therefore is a *different* source than Nippon Dynawave, which is located in Longview, Washington.

Ecology must conduct a four-factor analysis of controls for the McKinley Paper Plant, as it greatly exceeded Ecology's Q/d threshold of 10 and as indicated by the analysis, require emission controls.

¹⁹⁰ Stamper Report at 57-58.

¹⁹¹ Draft SIP at 167.

¹⁹² Stamper Report at 58.

¹⁹³ *Id.* at 7, 57.

¹⁹⁴ Stamper Report at 57, citing Draft SIP at 160-161.

¹⁹⁵ *Id.*

¹⁹⁶ Stamper Report at 57.

¹⁹⁷ Stamper Report at 7, citing,

https://www.orcaa.org/wpcontent/uploads/TSD_McKinley_Final_17August2021.pdf.

4. Deficiencies that Appear in All of the NWPPA Pulp and Paper Mill Four-Factor Analyses

The Stamper Report discusses deficiencies in the control evaluations and cost-effectiveness analyses that apply to all of the NWPPA four-factor analyses, which include:

- Use of an inflated interest rate, inconsistent with EPA’s Control Cost Manual;¹⁹⁸
- Assumed too short of a life of pollution controls in amortizing capital costs of controls, inconsistent with EPA’s Control Cost Manual;¹⁹⁹
- Apparent use of a cost per ton threshold (\$3,400/ton) that is neither justified nor supported by the facts in its analysis;²⁰⁰
- Use of an outdated report from 2013 to derive costs for certain controls to scale costs, which is discouraged by EPA’s Control Cost Manual;²⁰¹
- Inappropriately, included costs for sales taxes, property taxes and insurance in its capital costs of controls for several controls evaluated;²⁰² and
- Suggested fuel switching was too costly without providing sufficient details for its assumptions.²⁰³

Ecology must correct all these errors in the NWPPA four-factor analyses and redo the cost-effectiveness calculations. Once Ecology makes corrections, eliminates the errors, and makes the other necessary corrections, the various would likely be even more cost effective for the emitting units at the pulp and paper sources.

5. SO₂ Controls for the WestRock Lime Kiln

Ecology must fully evaluate NWPPA’s unsupported assertions regarding SO₂ controls for the lime kilns. For example, NWPPA asserts that SO₂ emissions from all the lime kilns are low, suggesting that installing additional SO₂ controls would not be cost effective.²⁰⁴ EPA stated in a 2014 document that nearly 70% of lime kilns in the pulp and paper industry are equipped with wet scrubbers.²⁰⁵ NWPPA evaluated one of the lime kilns in Washington that is not equipped with a wet scrubber - the WestRock Longview Mill Lime Kiln 5, but NWPPA states that “additional [SO₂] control technology is not evaluated due to the low emissions achieved with the current control technology.”²⁰⁶ The WestRock Longview Kiln 5 is the only lime kiln evaluated by NWPPA that does not have a scrubber for SO₂ control out of the seven lime kilns using

¹⁹⁸ *Id.* at 63.

¹⁹⁹ *Id.* at 63-64.

²⁰⁰ *Id.* at 64-65.

²⁰¹ *Id.* at 65.

²⁰² *Id.* at 66.

²⁰³ *Id.*

²⁰⁴ Draft SIP, Appendix O at O-23.

²⁰⁵ U.S. EPA, Universal Industrial Sectors Integrated Solutions Model for Pulp and Paper Manufacturing Industry – Universal ISIS-PNP, November 2014, at 2-40, https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=311359.

²⁰⁶ Draft SIP, Appendix O at 2-5.

similar fuels (fuel oil and natural gas) that were evaluated by NWPPA.²⁰⁷ Given that most lime kilns are equipped with wet scrubbers (both nationally and in Washington state), Ecology should evaluate adding a wet scrubber to this lime kiln for SO₂ control and also PM control.²⁰⁸

6. NWPPA's NO_x Controls Evaluations for Power Boilers

NWPPA's cost effective analysis for several of the power boilers at the six pulp and paper mills was unreasonable and inconsistent with EPA's regulations and guidance. The Stamper Report presents details on five issues with the NWPPA's cost effective analysis. In particular, the NWPPA:

- Failed to justify assuming one level of NO_x control for all the power boilers evaluated, regardless of the NO_x inlet rate to the SNCR system.²⁰⁹
- Greatly underestimated the NO_x reduction capabilities and cost effectiveness of SNCR by only assuming 35% NO_x control.²¹⁰ In contrast to EPA's Control Cost Manual that indicates "NO_x removal efficiencies for SNCR used at boilers in the pulp and paper industry as achieving a median NO_x removal efficiency of 50% with urea used as the reagent with a range of 20-62%."²¹¹ And EPA's statement "that median NO_x reductions with ammonia-based SNCR systems are 61-65% and that most boilers with ammonia-based SNCR systems that are solid fuel-fired are fired with wood or municipal solid waste."²¹²
- Failed to justify inflating the retrofit factor provided in EPA's SCR cost calculation spreadsheet. NWPPA applied a retrofit factor of 1.5 to all boilers, rather than using EPA's 20% retrofit factor.²¹³
- Failed to provide supporting data necessary on various assumptions, including the following: "baseline NO_x emissions and emission rates of each boiler in tons per year and lb/MMBtu;"²¹⁴ "operating hours and/or operating capacity factor of each power boiler used in estimating the operational expenses of these controls;"²¹⁵ "specific costs assumed for the SNCR and SCR reagent (including what type of reagent was assumed) or the electricity costs;"²¹⁶ and "what unit characteristics and fuel characteristics were assumed in the cost spreadsheets for each boiler."²¹⁷
- Applied a high interest rate of 7%, which is inconsistent with EPA's Control Cost Manual.²¹⁸

²⁰⁷ *Id.* at 1-3.

²⁰⁸ Stamper Report at 67.

²⁰⁹ *Id.* at 67-68.

²¹⁰ *Id.* at 68.

²¹¹ *Id.* at 68, citing EPA, Control Cost Manual, Section 4, Chapter 1 Selective Non-Catalytic Reduction, 4/25/2019, at 1-2, <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

²¹² *Id.*, citing EPA, Control Cost Manual, Section 4, Chapter 1 Selective Non-Catalytic Reduction, 4/25/2019, at 1-1, <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

²¹³ *Id.* at 68-69.

²¹⁴ *Id.* at 69.

²¹⁵ *Id.* at 69.

²¹⁶ *Id.* at 69.

²¹⁷ *Id.* at 69.

²¹⁸ *Id.* at 69-70.

- Applied a truncated life for LNBs of only 10 years, which is inconsistent with EPA’s evaluations that assume lifetimes of 30 years.²¹⁹
- Assumed an unreasonably low NOx reduction rate for LNB of 50% and failed to evaluate flue gas recirculation (FGR) in combination with LNB. In contrast, EPA states that these controls are normally used together to reduce NOx, and emission reductions of 60 to 90% are achievable.²²⁰

Additionally, based on the back-calculations for NOx emission reductions for SNCR and SCR, the Stamper Report explains that NWPPA’s cost effectiveness calculations seem inconsistent with the baseline emissions assumed for the boilers evaluated for LNB control.²²¹ However, because NWPPA failed to provide the entire spreadsheets for its cost calculations, neither the public nor Ecology can review to ensure consistency and accuracy.²²²

Merely “revising the annualized capital costs of LNBs using NWPPA’s cost numbers but using a capital recovery factor reflective of a 3.25% interest rate and a 25-year life makes a significant difference in the cost effectiveness of LNBs at the power boilers,” as was done in the Stamper Report and shown in the below figure.²²³

Figure 9. Revisions to NWPPA’s Cost Effectiveness of LNBs at Power Boilers to Use a Lower Interest Rate and a More Realistic Life of LNB Controls (3.25% Interest Rate, 25-Year Life of LNB)

Plant-Unit	Total Annualized Costs (at 3.25% Interest and 25 Year Life)	NOx reductions (per NWPPA), tpy	Revised Cost Effectiveness (at 3.25% Interest Rate and 25-Year Life)	NWPPA’s Cost Effectiveness (at 7% Interest Rate and 10-Year Life)
Nippon Dynawave Boiler 6	\$141,708	18.55	\$7,639	\$12,093

²¹⁹ *Id.* at 70, citing EPA’s proposed action on Arkansas’ Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944 at 18953, 18960 (Apr. 8, 2015).

²²⁰ *Id.* at 70, citing EPA, AP-42 Emission Factor Documentations, Section 1.4 Natural Gas Combustion, at Section 1.4.4, <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-fifth-edition-volume-i-chapter-1-external-0>.

²²¹ *Id.* at 70.

²²² *Id.*

²²³ *Id.*

Plant-Unit	Total Annualized Costs (at 3.25% Interest and 25 Year Life)	NOx reductions (per NWPPA), tpy	Revised Cost Effectiveness (at 3.25% Interest Rate and 25-Year Life)	NWPPA's Cost Effectiveness (at 7% Interest Rate and 10-Year Life)
Nippon Dynawave Boiler 7	\$168,795	28	\$6,028	\$9,543
Nippon Dynawave Boiler 9	\$250,813	97.3	\$2,578	\$4,081
PCA Wallula Boiler 1	\$142,579	25.85	\$5,516	\$8,732
PCA Wallula Boiler 2	\$136,856	30.3	\$4,517	\$7,162

In light of the above deficiencies, Ecology must make the following corrections to NWPPA's analysis and its draft SIP:

- Consider SNCR to achieve at least 50% NOx control at power boilers used in the pulp and paper industry if urea is the reagent;²²⁴
- Not allow use of any retrofit factor greater than 1 for SNCR costs at any of the power boilers without sufficient documentation from NWPPA or the facility owners to justify the use of a retrofit factor;²²⁵
- Not allow use of retrofit factors greater than 1 in the SCR cost analyses unless justified based on the specific situation for a particular power boiler;²²⁶
- Ask NWPPA to make all of the pages of the SNCR and SCR spreadsheets available for review for the power boilers so that this information can be evaluated by Ecology and the public;²²⁷
- Ensure that NWPPA evaluates the most effective combustion controls for the power boilers, and perform the evaluation if NWPPA fails to do so;²²⁸

²²⁴ *Id.* at 68.

²²⁵ *Id.* at 68.

²²⁶ *Id.* at 68-69

²²⁷ *Id.* 69.

²²⁸ *Id.* at 70.

- Correct the unjustified high interest rate and truncated useful life assumptions;²²⁹ and
- Review the cost inputs used in the SCR cost analyses - it is imperative to ensure that costs for items such as reagent, electricity, or catalysts to ensure they are supported and were not overstated in those analyses.²³⁰

Once Ecology makes the NO_x reduction corrections, eliminates the improper retrofit factor, and the other necessary corrections are made, the SNCR and SCR controls would likely be even more cost effective for the power boilers at the pulp and paper mills.

7. Four-Factor Analyses for the Cosmo Specialty Fibers Mill

Cosmo Specialty Fibers (Cosmo) operates a sulfite pulp mill located in Cosmopolis, Washington. A four-factor analysis was submitted for controls at only one emissions unit at the plant: the hog fuel boiler at the facility.²³¹ Notably, Cosmo neither provided four-factor analyses for the recovery boilers at the facility (Recovery Boiler 1, 2, and 3), nor provided four-factor analyses for the hogged fuel dryer at the facility. Instead, Cosmo erroneously relied on Ecology’s 2016 analysis entitled “Washington Regional Haze Reasonably Available Control Technology Analysis for Pulp and Paper Mills” dated November 2016 to justify no additional regional haze controls for its recovery boilers.²³² As explained in the Stamper Report, there are numerous issues with reliance on that report, including: the November 2016 Ecology State-RACT analyses were focused on whether the visibility benefits of pollution controls evaluated justified the costs of the pollution controls.²³³

The visibility benefits of controls - which are part of State-RACT - are not part of the Clean Air Act’s four-factor analysis. Ecology’s 2016 analysis fails to comply with the Act’s requirements and Cosmo’s reliance on Ecology’s analysis in attempts to avoid the four-factor analysis is misplaced.²³⁴ Furthermore, contrary to EPA’s guidance and rules to use the most recent emission inventories, Ecology’s State-RACT analysis relied on emission inventories between 2003 to 2011, and during three of those years the source was not operating.²³⁵ Furthermore, when the mill restarted in 2011, it had eliminated two processes and the production at the mill varies upon market demand.²³⁶ Thus, Ecology’s use of outdated data in its 2016 State-RACT report was not reflective of new and current operations at the source.

Cosmo evaluated SCR and SNCR for NO_x controls at the hog fuel boiler and evaluated use of an ESP to reduce PM emissions from the hog fuel boiler. Based on unsupported and erroneous assumptions, Cosmo determined that no additional controls are required at the hog fuel boiler to address regional haze requirements.²³⁷ The Stamper Report identifies seven issues with the company’s cost effectiveness analyses for the hog fuel boiler:

²²⁹ *Id.*

²³⁰ *Id.* at 71.

²³¹ Draft SIP, Appendix O at O-278 to O-312 (December 2019 Four-Factor Analysis for Cosmo Specialty Fibers).

²³² *Id.* at O-288.

²³³ Stamper Report at 72.

²³⁴ *Id.*

²³⁵ *Id.*

²³⁶ *Id.* .

²³⁷ *Id.* at 72, citing Draft SIP, Appendix O at O-285.

- Used an inflated interest rate of 4.75% that is inconsistent with EPA’s Control Cost Manual and current prime rate of 3.25%;²³⁸
- Assumed of too short of a life of pollution controls of 20 years in amortizing capital costs of controls, when a 25-30 year life is likely a more appropriate life of controls to use in amortizing capital costs of a pollution control for the hog fuel boiler;²³⁹
- Assumed, without justification 25% NOx control for the hog fuel boiler;²⁴⁰
- Assumed, without justification and detailed calculations, that the flue gas would need reheating for SCR, which reflects 85 to 88% of Cosmo’s total annual cost of SCR;²⁴¹
- Erroneously eliminated evaluation of the cost effectiveness of a high dust SCR system, which would eliminate any need for flue gas reheating, thus reducing Cosmo’s annual cost estimates of SCR significantly;²⁴²
- Failed to evaluate the cost effectiveness of a high dust SCR system, which would eliminate any need for flue gas reheating, thus reducing Cosmo’s annual cost estimates of SCR significantly;²⁴³ and
- Erroneously included costs for taxes and insurance for the ESP for the hog fuel boiler.²⁴⁴

In correcting and finalizing its SIP, Ecology must look to examples of similar emission units in the pulp and paper industry in Washington that have installed NOx and PM controls, which provide relevant examples of a source determining it was cost-effective to install the pollution controls. As discussed in the Stamper Report, these examples include controls at the PCA Wallula Mill and WestRock Longview Power Boiler.²⁴⁵

Ecology must: make the corrections presented above that are necessary for the SCR/SNCR cost effectiveness calculations to control NOx and PM emission from the hog fuel boiler; and ensure that the required four-factor analyses are prepared and emission controls evaluated and SIP emission limitations adopted for the recovery boilers at the facility (Recovery Boiler 1, 2, and 3), and the hogged fuel dryer at the source.

²³⁸ *Id.* at 72-73.

²³⁹ *Id.* at 73.

²⁴⁰ *Id.* at 73.

²⁴¹ *Id.* at 74, citing Draft SIP, Appendix O at O-295.

²⁴² As explained in the Stamper Report, Cosmo’s justification for not evaluating a high dust SCR was alleged and unsupported concerns about particulate emissions poisoning the SCR catalyst. Draft SIP, Appendix O at O-295. As the Stamper Report explains, there are several options to reduce or slow down catalyst deactivation that should have been considered. *Id.* at 74.

²⁴³ *Id.* at 74.

²⁴⁴ *Id.* at 74.

²⁴⁵ *Id.* at 74-75.

VI. Ecology Should Evaluate and Require Controls at the Ardagh Glass Plant

One additional facility that Ecology should evaluate for regional haze controls is the Ardagh Glass plant in Seattle, Washington. According to NPCA analysis, the facility likely affects regional haze in 2 Class I areas.²⁴⁶ NPCA previously submitted to Ecology a four-factor analysis of reasonable progress controls for the Ardagh Glass Plant with its February 16, 2021 comment letter to Ecology for the informal comment period,²⁴⁷ but Ecology has not responded to those comments in the public review draft regional haze plan for the second implementation period.

The largest sources of emissions at a glass plant are the fossil fuel-fired furnaces which melt glass. At the Ardagh plant, there are five furnaces. No. 1 is an all-electric furnace; No. 2, No. 3 and No. 5 furnaces are oxy-fuel fired; and No. 4 is an end-port regenerative furnace.

At the request of NPCA, Steve Klafka of Wingra Engineering, evaluated reasonable progress control options where he focused on the use of ceramic catalytic filtration systems at Furnaces 2, 3, 4, and 5 of the Ardagh Glass Plant.²⁴⁸ The Klafka Report discusses how ceramic catalytic filtration systems have been used at existing glass plants as a highly effective multi-pollutant control technology.²⁴⁹ The Klafka Report included a cost analysis for ceramic catalytic filtration systems at the Ardagh Glass Plant furnaces to reduce NO_x and also SO₂ and PM₁₀. As summarized in the Stamper Report, the Klafka Report concluded that it is technically feasible to add a catalytic ceramic filtration system to the glass furnaces at Ardagh Glass and that it would be very cost effective to do so, at a cost per total tons of pollutant removed of \$4,766/ton based on emission reductions from 2014 actual emissions and at a cost of \$2,238/ton based on emission reductions from potential emissions.²⁵⁰

Thus, a ceramic catalytic filtration system is a very cost effective control that can significantly reduce emissions from the Ardagh Glass Plant, and Ecology should strongly consider this control and the emission reductions at Ardagh Glass as part of its regional haze control strategy.

VII. Ecology's Must Provide a Basis for and Apply a Consistent Cost Effectiveness Threshold

EPA's regional haze guidance and regulations require that the State Implementation Plan (SIP) "explain why the selected threshold is appropriate for that purpose and consistent with the requirements to make reasonable progress."²⁵¹ Of significant concern to commenters is that

²⁴⁶ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOIpyFmp/view>.

²⁴⁷ See NPCA, Comments Submitted for Informal comment period: Regional Haze SIP Revision - 2nd 10-Year Plan (Feb. 16, 2021), at 11.

²⁴⁸ Klafka Report.

²⁴⁹ *Id.* at 9.

²⁵⁰ *Id.* at 12. Note that the narrative discussion of the Klafka report indicates lower cost effectiveness numbers of \$3,768/ton for reductions from 2014 emissions and \$1,819/ton from reductions in potential emissions, but Table 5 of the report indicates a higher cost per ton of pollutants removed. The Table 5 data of the Klafka Report is included in Table 12 of the Stamper Report as the data are assumed to be the more accurate numbers.

²⁵¹ EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 39.

Ecology's draft SIP lacks the justification for its cost reasonableness threshold.²⁵² Ecology arbitrarily applied inconsistent cost thresholds, which it must not do.²⁵³ For example in its four-factor review for the pulp and paper sources, Ecology indicates that:

- For NO_x control using a low-NO_x burner, the following units have estimated cost/ton value less than the potential reasonableness threshold of \$6,300/ton.²⁵⁴
- For NO_x control using an SCR or SNCR, the following units have a cost/ton value less than the potential reasonableness threshold of \$6,250/ton.²⁵⁵
- For PM₁₀ control, the following units have a cost/ton value less than the potential reasonableness threshold of \$7,800/ton.²⁵⁶
- The SO₂ control cost estimates that the pulp mills submitted to Ecology are greater than the potential cost threshold range of the other RH pollutant costs of \$6,250 - \$7,800.²⁵⁷

Additionally, while not stated so explicitly in its proposed SIP, Ecology does collectively find the costs for all its revised cost effectiveness analyses reasonable (Figures 3 through 9 above), which include a wide range of costs per ton.

The Stamper Report contains an extensive cost effectiveness survey and highlights from various states. Additionally, the State of Colorado recently indicated that it “is using \$10,000 per ton of regional haze pollutant as the nominal cost threshold to determine cost effective control strategies for Round 2 RP.”²⁵⁸

As explained in EPA's Guidance, Ecology must provide a basis for and establish the cost effectiveness threshold upon which the State bases its decision, including an explanation of why the cost effectiveness threshold is appropriate and consistent with the requirement to make reasonable progress.²⁵⁹

²⁵² Stamper Report at 59

²⁵³ *Id.* at 59.

²⁵⁴ Draft SIP at 182.

²⁵⁵ *Id.* at 183.

²⁵⁶ *Id.*

²⁵⁷ *Id.*

²⁵⁸ “Prehearing Statement of the Colorado Department of Public Health and Environmental, Air Pollution Control Division,” *In the Matter of Proposed Revisions to Regulation No 23* (Oct. 7, 2021) at 7, (further explaining that “[t]his threshold is applied to the individual pollutants in the control strategy analyses, specifically NO_x, PM, and SO₂. This threshold value is an increase from Round 1 and reflects the fact that with each successive round of planning, less costly and easier to implement strategies have already been adopted. Colorado has maintained this threshold throughout the planning process despite the fact that each of the Class I areas in Colorado is below the URP for 2028.”) (Enclosure 8)

²⁵⁹ *Supra* note 251.

VIII. Comments on Ecology’s Long-Term Strategy for Visibility Impairment

A. Ecology Must First Conduct the Required Four-Factor Analysis and Then Develop the Reasonable Progress Goals

Ecology’s draft long-term strategy uses reasonable progress goals developed by the Western Regional Air Partnership (WRAP) *before* conducting the required four-factor analysis – it has impermissibly reversed the order of the requirements. The RPGs are not to be developed before the four-factor analyses but as a result of the four-factor analyses.²⁶⁰ Ecology’s draft long-term strategy states that it “relied on the Western Regional Air Partnership (WRAP) for air quality modeling and other analytical tools to identify pollutants, the sources of those pollutants, and to predict future levels of visibility impairment.”²⁶¹ Ecology also states “[t]hrough WRAP technical collaborations, the western states agreed upon the [reasonable progress goals (RPGs)] set for 2028 and a regionally consistent approach to addressing visibility impairment in the West.”²⁶² Ecology must first conduct the four-factor analyses, determine measures for reducing visibility impairing emissions based on the Act’s four-factor analysis and then use the results to develop proposed revisions to the reasonable progress goals.

B. Ecology Must Not Revise Its Current SIP and Violate the Clean Air Act’s Anti-Backsliding Provision

Section 110(l) of the Clean Air Act prohibits EPA from approving an implementation plan revision if the revision would “interfere with any applicable requirement concerning attainment and reasonable further progress ... or any other applicable requirement of this chapter.”²⁶³ This provision is designed to ensure that air-quality improvements are not reversed through regulatory actions to weaken pollution limits. This anti-backsliding provision applies to existing BART determinations, including provisions specific to the Centralia plant, as the Act’s “applicable requirement[s]” include the regional haze program’s BART requirements.²⁶⁴ Indeed, Courts have routinely upheld EPA interpretations of Section 110(l) as preventing implementation plan revisions that would increase overall air pollution limits or worsen air quality.²⁶⁵ Should Ecology must either remove or provide an adequate demonstration under Section 110(l) of the Clean Air Act.

²⁶⁰ See, e.g., 82 Fed. Reg. 3090-91 (Jan. 10, 2017).

²⁶¹ Draft SIP at 206.

²⁶² *Id.* at 208.

²⁶³ 42 U.S.C. § 7410(l); see also *El Comite Para El Bienestar de Earlimart v. EPA*, 786 F.3d 688, 692 (9th Cir. 2015).

²⁶⁴ See *Oklahoma v. EPA.*, 723 F.3d 1201, 1204, 1207 (10th Cir. 2013).

²⁶⁵ See *WildEarth Guardians v. EPA*, 759 F.3d 1064, 1074 (9th Cir. 2014) (a haze plan that “weakens or removes any pollution controls” would violate section 110(l)); see also *Indiana v. EPA*, 796 F.3d 803, 812 (7th Cir. 2015) (noting that EPA allows “emissions-increasing SIP revisions” if a state “identif[ies] substitute emissions reductions such that net emissions are not increasing.”); *Ala. Envtl. Council v. EPA*, 711 F.3d 1277, 1293 (11th Cir. 2013) (Section 110(l) “permit[s] approval of [a] SIP revision ‘unless the agency finds it will make air quality worse’” or increase emissions) (quotation and citation omitted); *Kentucky Resources Council v. EPA*, 467 F.3d 986, 995 (6th Cir. 2006) (Section 110(l) allows the agency to approve a plan revision that weakened some existing control measures while strengthening others, but only “[a]s long as actual emissions in the air are not increased” and “air quality [is not] worse[ned]”).

C. The Public was not Provided an Opportunity Review and Comment on the WRAP's Emission Inventories and Modeling

While the Western states may have agreed on the modeling (and presumably the emission inventory development) compiled or completed by the WRAP, the general public has not had the opportunity to review and comment on the assumptions that went into the emission inventories or the modeling. The regional haze regulations require the long term strategy to “document the technical basis, including modeling, monitoring and emissions information, on which the State is relying to determine its apportionment of emission reduction obligations necessary for achieving reasonable progress in each mandatory Class I Federal area it affects.”²⁶⁶ The issue here is that Ecology has not documented and incorporated the underlying RPO information in the draft SIP for the public to review and provide comments. As part of its proposed SIP revisions, Ecology must not only follow the requirements in the RHR, but also the requirements for preparation, adoption and submittal of SIPs (*i.e.*, 40 C.F.R. §§ 51.100, 51.102, 51.103, 51.104, 51.105 and Appendix V to Part 51. Ecology has an obligation to make transparent and cite to (and provide weblinks to) the technical support documentation it proposes to rely on and use as part of its SIP revision (*e.g.*, such regional planning organization technical analyses) and provide the public with the opportunity to comment on such analyses. Thus, Ecology must cite to and provide weblinks to the WRAP's documentation and analysis for the emissions information, monitoring and modeling.²⁶⁷

The RHR requires that “[t]he State must identify the baseline emissions inventory on which its strategies are based.”²⁶⁸ Except for the facilities for which it conducted four-factor analyses, Ecology has not provided its baseline emission inventory of all visibility-impairing pollution from the various sources within its state. Ecology must provide that information with the long-term strategy for public review and comment. Washington's long-term strategy relies on emission reductions associated with the following: federal, state, and local rules regarding mobile onroad engines, nonroad engines, marine engines, fuel sulfur limitations, petroleum

²⁶⁶ 40 C.F.R. § 51.308(d)(3)(iii).

²⁶⁷ 40 C.F.R. Part 51, Appendix V ¶ 2.2 Technical Support. “(a) Identification of all regulated pollutants affected by the plan. (b) Identification of the locations of affected sources including the EPA attainment/nonattainment designation of the locations and the status of the attainment plan for the affected areas(s). (c) Quantification of the changes in plan allowable emissions from the affected sources; estimates of changes in current actual emissions from affected sources or, where appropriate, quantification of changes in actual emissions from affected sources through calculations of the differences between certain baseline levels and allowable emissions anticipated as a result of the revision. (d) The State's demonstration that the national ambient air quality standards, prevention of significant deterioration increments, reasonable further progress demonstration, and visibility, as applicable, are protected if the plan is approved and implemented. (e) Modeling information required to support the proposed revision, including input data, output data, models used, justification of model selections, ambient monitoring data used, meteorological data used, justification for use of offsite data (where used), modes of models used, assumptions, and other information relevant to the determination of adequacy of the modeling analysis. (f) Evidence, where necessary, that emission limitations are based on continuous emission reduction technology. (g) Evidence that the plan contains emission limitations, work practice standards and recordkeeping/reporting requirements, where necessary, to ensure emission levels. (h) Compliance/enforcement strategies, including how compliance will be determined in practice. (i) Special economic and technological justifications required by any applicable EPA policies, or an explanation of why such justifications are not necessary.”

²⁶⁸ *Id.*

refinery maximum achievable control technology (MACT), boiler MACT, revised utility boiler MACT, various area source MACT, industrial/commercial boiler burning designated solid wastes NSPS, sewage sludge incinerator NSPS, ozone and PM₁₀ SIPs, state oil and gas emission control programs, the 2010 SO₂ and NO₂ NAAQS, the 2013 PM_{2.5} NAAQS, and the 2015 ozone NAAQS.²⁶⁹ To enable the public to evaluate these emission reductions, Ecology must provide a baseline emissions inventory for these various source categories.

D. Ecology Must Document the Technical Basis for Nonroad Engine Reductions

In its discussion of state, federal and local rules and controls that limit visibility-impairing pollutants, Ecology states “[f]ederal fuel and engine rules for on-road and nonroad engines are of special importance. These result in large projected percent decreases in visibility-impairing emissions in Washington by 2028.”²⁷⁰ Ecology must identify the specific assumed reductions in emissions from nonroad engines and must document the technical basis for the assumed emission reductions in nonroad engines, as required by 40 C.F.R. § 51.308(d)(3)(iii). The nonroad engine requirements in 40 C.F.R. Parts 89 and 1039 require manufacturers to only make engines meeting certain specified emission standards with the most stringent Tier 4 emission standards applying in approximately 2014 and beyond. However, the federal rules do not require companies to use these cleaner burning engines. It is not clear whether Washington State or local rules require companies to replace existing engines with these cleaner burning engines.

Similarly, while ultra-low sulfur diesel fuel has been available since about 2006 and has been required by diesel manufacturers since 2014, there are exemptions for older locomotive and marine engines.²⁷¹ Thus, Ecology should provide the technical basis for assumed emission reductions from nonroad engines in Washington state, both due to use of lower-emitting engines and use of lower sulfur fuel. To the extent the assumptions regarding emission reductions from nonroad engines were developed by the WRAP, Ecology should document the WRAP’s assumptions and provide links to the underlying documentation and provide the public the opportunity to review and comment on it. Finally, because Ecology is relying on federal rules for future emission projections, Ecology must also document its assumptions, provide citations to the federal rules it relies on, and include enforceable measures in proposed SIP revision.

E. Permit Actions Are Not an Off-Ramp to the Four-Factor Analysis Requirement

As explained in the Stamper Report, Ecology inappropriately excluded sources from the four-factor analysis in light of pending permit actions:

[T]here were a few sources for which Ecology did not request a four-factor analysis of controls for, because “[s]ome of these facilities had existing legal requirements or pending permit actions to reduce emissions.”²⁷² Those facilities were the TransAlta Centralia power plant, the Cardinal FG Winlock glass plant, and the Ash Grove Cement

²⁶⁹ Draft SIP at 209.

²⁷⁰ *Id.* at 6.

²⁷¹ See <https://www.epa.gov/diesel-fuel-standards/diesel-fuel-standards-and-rulemakings>.

²⁷² Draft SIP at 163.

Plant.²⁷³ Ecology also will only request a four-factor analysis of controls for the Intalco Aluminum Plant and the Alcoa Wenatchee Aluminum Plant if the plants restart operations.^{274, 275}

Moreover, a RACT analysis that Ecology may have gone through (or will go through in the future) for an individual source or source category is separate and distinct from the four-factor reasonable progress analysis requirement. The regional haze program includes identifying and issuing requirements to remedy *existing* impairment and also requirements necessary to prevent *future* impairment. As discussed below in Section III, the four-factor RP and five-factor RACT analyses apply different factors and consider different information because they are different programs with different objectives. A RACT analysis and controls must not be used as an off-ramp – or in place of – the requirement to conduct the four-factor RP analysis and determine RP for the source. The regional haze four-factor RP analysis and determination applies *in conjunction with* other CAA programs. Therefore, as individual sources and source categories are modified and subject to emission controls (*e.g.*, RACT), Ecology must take into consideration *all* requirements of the CAA (*e.g.*, RP four-factor analysis and determination) and not make one decision in isolation, set aside distinct requirements or delay their implementation. A state's issuance of a permit does not replace its responsibility under the CAA to conduct the required RP four-factor analysis.

F. Ecology Must Document the Extent to Which Emission Reductions Have Occurred in Other Programs

Ecology identifies several control strategies that were not in the previous Regional Haze SIP that apply at the Federal and/or State level. Ecology states that the most current emission inventory reflects several of these rules, including the following:²⁷⁶

- MARPOL VI,
- The North American Emission Control Area (ECA) for marine vessels, and
- The marine engine requirements in 40 CFR Part 94.

Ecology should document the extent to which emission reductions have actually occurred as a result of these regulations and requirements. For example, for the sulfur standard for marine vessels, Ecology acknowledges that EPA and the U.S. Coast Guard have allowed some shipping companies delayed compliance dates with these requirements.²⁷⁷ Ecology should document the extent to which shipping companies doing business in Washington state are complying with these standards or whether such companies have been granted a delay in compliance and, if so, how long compliance has been delayed. It appears that the MARPOL Annex VI requirements are applicable to marine engine manufacturers pursuant to 40 C.F.R. Part 90, but the requirements do not require that shipping companies use those engines. Further, the EPA recently issued

²⁷³ *Id.* at 212.

²⁷⁴ *Id.* at 178, 180-181.

²⁷⁵ Stamper Report at 6-7

²⁷⁶ Draft SIP at 211.

²⁷⁷ *Id.*

regulations on marine engines that would weaken emission standards and sulfur in fuel standards.²⁷⁸ Thus, we request that Ecology identify the extent to which the lower-emitting engines are being utilized by shipping companies doing business in Washington state. Ecology states that “[t]he effects of the marine vessel fuel sulfur requirements are reflected in the IMPROVE data, though the effect of the [North American Emissions Control Area (ECA)] are not fully reflected in the data due to the long lead time for the MARPOL requirements and the relatively recent date (2013) for vessels to meet the first stage requirements.”²⁷⁹ We request that Ecology also document the extent to which emission reductions associated with these programs have been reflected in the emissions inventories modeled by the WRAP and the extent to which any such modeled emission reductions were ground-truthed. Finally, if Ecology is relying on federal rules for future emission projections, Ecology must also document its assumptions, provide citations to the federal rules it relies on, and if enforceable measures are necessary, include them in the proposed SIP revision.

With respect to mobile sources, Ecology states that Washington’s vehicle emissions testing program was phased out by the legislature “based on Ecology’s prediction that more fuel efficient and electric vehicles would replace the need for it by 2020....”²⁸⁰ Ecology also discusses the Washington legislature’s adoption of California vehicle emission standards for passenger cars, light duty trucks and medium duty passenger vehicles. Ecology stated that it is currently in the process of adopting rules reflective of the state’s legislative authority.²⁸¹ Ecology should provide a timeline for when that process is projected to be complete and when new vehicle emission standards will be phased in.

G. Ecology Must Include Details and the Practically Enforceable Emission Limitations and Timeframes for the NAAQS Requirements

For the emission reductions due to NAAQS revisions since 2007, the state identified the 2010 NO_x NAAQS, the 2010 SO₂ NAAS, the 2013 PM_{2.5} NAAQS, and the 2015 ozone NAAQS. Ecology should identify rules/emission standards and requirements that it has adopted to require emission reductions to comply with these NAAQS and when compliance was or will be required. Ecology should also make clear whether any area in Washington state has been or will be designated as nonattainment for any of these NAAQS and whether additional NAAQS control requirements will be forthcoming in the state. The long-term strategy is supposed to detail the enforceable emission limitations and compliance timeframes.²⁸² Thus, Ecology’s plan must include more details on the NAAQS requirements that it relies on for future emissions controls.

H. Ecology’s Reliance on Existing Programs is Misplaced

Ecology exclusive reliance on the continued implementation of various air quality rules and programs to ensure reasonable progress is misplaced.²⁸³ While the RHR allows for

²⁷⁸ See 85 Fed. Reg. 62,218 (Oct. 2, 2020); 84 Fed. Reg. 69,335 (Dec. 18, 2019).

²⁷⁹ Draft SIP at 211.

²⁸⁰ *Id.* at 214.

²⁸¹ *Id.*

²⁸² 40 C.F.R. § 51.308(d)(3).

²⁸³ See, e.g., Draft SIP at 231.

consideration of the non-visibility air quality rules and program requirements and accounting for reductions that come from outside the program, the issues with the draft SIP are that there are no additive reductions and the alleged reductions that come from outside the regional haze program are unenforceable. Furthermore, as discussed above and in the attached Stamper and Kafka Reports, there are cost-effective pollution control measures that are readily achievable for many of Washington’s sources. In fact, several of the sources are already capable of achieving on a continuous basis better emission rates than they are currently displaying.

Additionally, reasonable progress requires that states consider the four statutory factors and adopt and include in their SIPs enforceable emission limitations to achieve reasonable progress toward the elimination of all anthropogenic pollution in Class I areas. This means that states must secure meaningful emission reductions that build on progress already achieved and requirements already underway. There is an expectation that reductions are additive to ongoing and upcoming reductions under other CAA programs. Indeed, as EPA’s July 2021 Memo makes clear:

[A] state should generally not reject cost-effective and otherwise reasonable controls merely because there have been emission reductions since the first planning period owing to other ongoing air pollution control programs or merely because visibility is otherwise projected to improve at Class I areas. More broadly, we do not think a state should rely on these two additional factors to summarily assert that the state has already made sufficient progress and, therefore, no sources need to be selected or no new controls are needed regardless of the outcome of four-factor analyses.²⁸⁴

I. Ecology’s Reliance on the “Glide Path” Violates the Clean Air Act and Regional Haze Rule

Ecology attempts to justify deferring any further emission reductions for every major source in the state by pointing out that Class I areas appear to be trending below these area’s glide path or URP, which it suggests is sufficient to achieve reasonable progress.²⁸⁵ EPA has made clear, however, that meeting or exceeding the URP does *not* obviate the need for states to conduct a robust analysis and making a technical demonstration that additional controls or emission reductions are not reasonable. “[A]n evaluation of the four statutory factors is required . . . regardless of the Class I area’s position on the glidepath . . . the URP does not establish a ‘safe harbor’ for the state in setting its progress goals.”²⁸⁶ Rather, states must “determine what

²⁸⁴ EPA July 2021 Memo at 13.

²⁸⁵ *See, e.g.*, Draft SIP at 41-42.

²⁸⁶ 81 Fed. Reg. 66,331, 66,631 (Sept. 27, 2016); *see also* 81 Fed. Reg. 296, 326 (Jan. 5, 2016) (determining, as part of the reasonable progress federal implementation plan for Texas, “the uniform rate of progress is not a ‘safe harbor’ under the Regional Haze Rule.”); EPA, Responses to Comments at 120, Promulgation of Air Quality Implementation Plans; State of Texas; Regional Haze and Interstate Visibility Transport Federal Implementation Plan: Best Available Retrofit Technology and Interstate Transport Provisions, EPA Docket No. EPA-R06-OAR-2016-6011 (June 2020) (“EPA has repeatedly and consistently taken the position that meeting a specific reasonable progress goal is not, itself, a “safe harbor,” and does not relieve the state of the obligation to consider additional measures for reasonable progress. If it is reasonable to make more progress than the URP, a state must do so, as EPA explained in the 1999 Regional Haze Rule) (citing 64 Fed. Reg. at 35732); *see also* 81 Fed. Reg. at 66,370 (“EPA’s longstanding interpretation of the Regional Haze Rule is that ‘the URP does not establish a ‘safe harbor’ for the state in setting its progress goals.’”) (quoting 79 Fed. Reg. 74818, 74834)).

emission limitations, compliance schedules and other measures are necessary to make reasonable progress by considering the four factors” and must not reject “control measures determined to be reasonable” based on the degree of progress.²⁸⁷

Indeed, in its July 8, 2021 Memo, EPA reiterated that the uniform rate of progress is “not a safe harbor,” and that it is not appropriate to reject cost-effective emission reductions on the basis that visibility in a particular Class I area is on the glide path. Instead, states are required to “evaluate and determine emission reduction measures that are necessary to make reasonable progress *by considering the four statutory factors.*”²⁸⁸ Here, Ecology’s decision to defer reasonable and cost-effective controls to another planning period, simply because Class I areas are on the glidepath, is contrary to the Clean Air Act and the Regional Haze Rule.

Ecology’s “glide path” rationale is also misplaced because the agency failed to evaluate the Clean Air Act’s reasonable progress factors in determining whether emission reductions may be necessary to ensure reasonable progress towards natural visibility in each Class I area that Washington’s sources affect, as required by the Regional Haze Rule.²⁸⁹ Ecology’s misunderstanding of the legal requirements is also made clear in Ecology’s communications with the National Park Service where it erroneously suggests that

WA is successfully navigating regional progress goals and will continue to do so as we will also re-evaluate these sources during the next implementation period.²⁹⁰

Ecology cannot rely on its goals until it first conducts the required four-factor analyses, establishes emission limits in the SIP, and uses those limitations to set the goals. Indeed, the Regional Haze Rule explicitly requires Washington to make meaningful reductions to ensure reasonable progress towards the national goal of restoring visibility. In so doing, Ecology must provide a “robust demonstration,” including documenting the criteria used to determine which sources or groups of sources were evaluated and how the four-factors were taken into consideration. As discussed above, commenters have considered each of the sources with the greatest impacts at the Class I areas, and conclude that there are cost-effective control measures available, or at a minimum, that those facilities should have their emissions limits tightened to ensure current levels do not rise. Contrary to Ecology’s assertions to the National Park Service, Ecology is not successfully navigating goals.

J. Retirements Relied On to Justify No Control and No Upgrades Must be Reflected as Enforceable SIP Measures

Where Ecology is relying on retirements or operation changes to justify a no control and no upgrade option, Ecology must make those changes enforceable as SIP measures. To the extent

²⁸⁷ 82 Fed. Reg. at 3093; see also 81 Fed. Reg. at 66,631.

²⁸⁸ *EPA July 2021 Memo* at 15-16 (emphasis added).

²⁸⁹ See 40 C.F.R. § 51.308(f)(2) (“Each State must submit a long-term strategy that addresses regional haze visibility impairment for each mandatory Class I Federal area within the State *and for each mandatory Class I Federal area located outside the State that may be affected by emissions from the State.*”) (emphasis added); *id.* § 51.308(f)(3)(ii)(A)-(B).

²⁹⁰ *Infra* note 321.

that a state declines to evaluate additional pollution controls for any source based on that source's planned retirement or decline in utilization, it must incorporate those operating parameters or assumptions as enforceable limitations in the second planning period SIP. The Clean Air Act requires that "[e]ach state implementation plan . . . *shall*" include "enforceable limitations and other control measures" as necessary to "meet the applicable requirements" of the Act.²⁹¹ The Regional Haze Rule similarly requires each state to include "enforceable emission limitations" as necessary to ensure reasonable progress toward the national visibility goal.²⁹² Moreover, where a source plans to permanently cease operations or projects that future operating parameters (*e.g.*, limited hours of operation or capacity utilization) will differ from past practice, and if this projection affects whether additional pollution controls are cost-effective or necessary to ensure reasonable progress, then the state "must" make those parameters or assumptions into enforceable limitations.²⁹³

K. The Draft SIP Lacks Provisions to Ensure Emission Limitations are Permanent, Enforceable and Apply at All Times

Contrary to the technical analysis presented in Stamper's Analysis and the attached Klafka Report demonstrating cost-effective controls at numerous sources, the proposed SIP merely includes for five sources in its regional haze plan:

- TransAlta Centralia Plant,
- Ash Grove Cement Plant,
- Cardinal FG Winlock Glass Plant,
- Intalco Aluminum Plant, and
- Alcoa Wenatchee Plant.

The Agreed Orders, Consent Decree and Permits in the proposed LTS "primarily rely on control requirements the owners already planned to meet under other Clean Air Act requirements (including under the first round regional haze plan) or reflect a commitment to conduct a four factor analysis of controls if/when a currently shutdown plant begins operations. In other words, Ecology's draft regional haze plan for the second implementation period does not include any additional regional haze control requirements for industrial sources of regional haze pollution beyond what was already required and on the books."²⁹⁴ Contrary to the requirements in the Act and EPA's RH regulations, as discussed elsewhere in these comments, Ecology fails to make the emission reductions enforceable in the SIP. Furthermore, Ecology relies on retirements to avoid the Four-Factor Analysis and further measures to reduce emissions. If Ecology is relying in any way on possible or projected operations changes or retirements – the agency needs to make sure those changes will actually happen and that they are practically enforceable SIP measures by incorporating them into the SIP.

²⁹¹ 42 U.S.C. § 7410(a)(2)(A).

²⁹² See generally 40 C.F.R. § 51.308(d)(3).

²⁹³ See 40 C.F.R. pt. 51, App. Y § (IV)D.4.d.2.

²⁹⁴ Stamper Report at 3.

VI. Ecology Should Analyze the Environmental Justice Impacts of its Regional Haze SIP, and Ensure the SIP Will Minimize Harms to Disproportionately Impacted Communities

Ecology has both state and federal obligations to meaningfully consider and advance environmental justice in its regional haze SIP. Unfortunately, the draft SIP's summary of what an environmental justice analysis entails falls short of these commitments.

A. Environmental Justice Communities in Washington

In Seattle, 13 of the 14 heaviest industrial polluters are located within a half-mile of the places where marginalized communities live, work, play, and worship in Seattle. Of the 20 biggest regional haze producing facilities in Washington, two of them are located in the Duwamish Valley – Ash Grove Cement and Ardagh Glass.

Ardagh's facility has had a long history of violations in addition to inadequate or lack of required emissions reporting. Ardagh's glass melting furnaces emit quantities of SO₂ and NO_x that place it in the "major source" Air Operating Permit program, and also significant quantities of total particulate matter (PM). For the last decade or more, the annual levels of fine particulate matter at the E. Marginal Way S (Duwamish) monitor in the industrial area, that includes Ardagh, have been higher than any monitor in the Puget Sound Clean Air Agency (PSCAA) four-county area. The Duwamish Valley's riverfront neighborhoods Georgetown and South Park are situated within two miles of the Ardagh Glass facility and have long been disproportionately exposed to contamination, cumulative environmental injustices, and subsequent adverse health-related outcomes. Residents who Georgetown and South Park have some of the highest health discrepancies in the City of Seattle. Childhood asthma hospitalization rates are the highest in the City. Heart disease death rates are 1.5 times higher than the rest of Seattle and King County. Life expectancy is 13 years shorter when compared to Laurelhurst in North Seattle; one of Seattle's wealthiest neighborhoods. Ardagh Glass has existed in the Duwamish Valley for over 100 years where old practices and technologies have led to a legacy of frequent air pollution violations.

By evaluating Ardagh Glass and other glass facilities as its own sector, we believe Washington state will identify emission-reducing options that if required will improve air quality and help achieve reasonable progress in this round of regional haze rulemaking. Ecology must also revisit the emission limitations for Ash Grove Cement, which must be strong, on par with requirements elsewhere and enforceable for environmental justice community purposes and SIP requirements. Historically, conservation and environmental work has concerned itself with protecting nature from people and has thus "siloe" its work (*e.g.*, mainstream conservation vs. environmental justice.) While this siloe approach has led to the protection of many vulnerable habitats, it ignores the reality that people live in concert with and are a part of nature; to protect one and not the other is a job half done. By considering viewshed protection and environmental justice at the same time, we can collectively begin to dismantle the silos that exist in conservation and environmental work and chart a new path forward.

B. Environmental Justice in Washington

Ecology recognizes these environmental justice concerns, and that “pollution and environmental contamination can affect everyone living in Washington, but some people are significantly more burdened than others.”²⁹⁵ Furthermore, DOE explains that “[r]esearch shows that people of color, low-income people, and indigenous people are disproportionately harmed by environmental hazards ... have real impacts on the lives of many in Washington, such as: ...[h]igher rates of illness and disease ... [m]ore frequent hospitalization [and] [l]ower life expectancy. We support the Department’s commitment “to making decisions that do not place disproportionate burdens on disadvantaged communities,” while “seeking to lift the weight of pollution and contamination borne by those communities.” Additionally, we applaud DOE’s “focus ... [of its] time and resources toward strategic actions to address these long-standing inequities” so that its actions “will lead to improvements in health and the environment, and more resilient communities in Washington.”²⁹⁶

In addition to Ecology’s commitments, the Governor’s Interagency Council on Health Disparities (Governor’s Council) was established by the Legislature in 2006 when it passed, and the Governor signed a bill to create it.²⁹⁷ Under the law, the Governor’s Council:

- Creates an action plan for eliminating health disparities by race, ethnicity, and gender in Washington.
- Convenes advisory committees to assist in the planning and development of specific issues in collaboration with several state agencies and non-government stakeholders.²⁹⁸

Additionally, Section 221, subsection 48 of the 2019-2021 biennial operating budget (Engrossed Substitute Senate Bill 1109) directed the Governor’s Council to convene and staff an Environmental Justice Task Force,^{299, 300} which includes a representative from Ecology. “The Task Force is responsible for recommending strategies to incorporate environmental justice principles into future state agency actions.”³⁰¹ The EJ Task Force was required to “submit a final report by October 31, 2020 to include:

1. Guidance for using the Washington Environmental Health Disparities Map, hosted on the Department of Health’s website to identify communities that are highly impacted by environmental justice issues with current demographic data.

²⁹⁵ Department of Ecology, “Environmental Justice at Ecology,” available at <https://ecology.wa.gov/About-us/Accountability-transparency/Environmental-Justice>. (Enclosure 9)

²⁹⁶ *Id.*

²⁹⁷ Governor’s Interagency Council on Health Disparities, “The Council’s Work,” available at <https://healthequity.wa.gov/TheCouncilsWork>. (Enclosure 10)

²⁹⁸ *Id.*

²⁹⁹ “The Governor’s Interagency Council on Health Disparities: State Policy Action Plan to Eliminate Health Disparities,” (Jan. 2020) (2020 Council Report), available at <https://healthequity.wa.gov/Portals/9/Doc/Publications/Reports/HDC-ActionPlan-Jan2020.pdf>. (Enclosure 11)

³⁰⁰ Governor’s Interagency Council on Health Disparities, 2019 and 2020 Environmental Justice Task Force Materials, available at <https://healthequity.wa.gov/TaskForceMeetings/EnvironmentalJusticeTaskForce>. (Enclosure 12)

³⁰¹ 2020 Council Report at 6.

2. Best practices for increasing meaningful and inclusive community engagement that takes into account barriers to participation.
3. Measurable goals for reducing environmental health disparities for each community in Washington state and ways in which state agencies may focus their work towards meeting those goals.
4. Model policies that prioritize highly impacted communities and vulnerable populations for the purpose of reducing environmental health disparities and advancing a healthy environment for all residents. The Governor’s Council includes several task force groups, including the Environmental Justice Task Force.³⁰²

The EJ Task Force’s posted materials for 2019 and 2020³⁰³ demonstrate considerable activity and include: Task Force meeting agendas, minutes and materials; Mapping Subcommittee meeting agendas and minutes; Community Engagement Subcommittee agendas and minutes; Task Force Feedback Listening Session agenda minutes, materials and minutes; and Task Force Work Group agenda and minutes.³⁰⁴ However, there is no information available on the final report that was due October 31, 2020. The January 2020, Report of the Governor’s Council’s recognizes EPA’s definition of environmental justice: “[t]he Environmental Protection Agency defines environmental justice as, ‘...the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.’”³⁰⁵

C. Consideration of Environmental Justice to Comply with Executive Orders

There are additional legal grounds for considering environmental justice when determining reasonable progress controls. Under the CAA, states are permitted to include in a SIP measures that are authorized by state law but go beyond the minimum requirements of federal law.³⁰⁶ Ultimately, EPA will review the haze plan that Washington submits, and EPA will be required to ensure that its action on Washington’ haze plan addresses any disproportionate environmental impacts of the pollution that contributes to haze. Executive Orders in place since 1994, require federal executive agencies such as EPA to:

³⁰² *Id.*

³⁰³ Environmental Justice Task Force Meeting Materials, available at <https://healthequity.wa.gov/TaskForceMeetings/EnvironmentalJusticeTaskForce>. (Enclosure 13)

³⁰⁴ *Id.*

³⁰⁵ 2020 Council Report at 6, citing EPA’s Environmental Justice website, <https://www.epa.gov/environmentaljustice>. (Enclosure 14)

³⁰⁶ See *Union Elec. Co v. EPA*, 427 U.S. 246, 265 (1976) (“States may submit implementation plans more stringent than federal law requires and . . . the Administrator must approve such plans if they meet the minimum requirements of s 110(a)(2).”); *Ariz. Pub. Serv. Co. v. EPA*, 562 F.3d 1116, 1126 (10th Cir. 2009) (quoting *Union Elec. Co.*, 427 U.S. at 265) (“In sum, the key criterion in determining the adequacy of any plan is attainment and maintenance of the national air standards . . . ‘States may submit implementation plans more stringent than federal law requires and [] the [EPA] must approve such plans if they meet the minimum [Clean Air Act] requirements of § 110(a)(2).’”); *BCCA Appeal Group v. EPA*, 355 F.3d 817, 826 n. 6 (5th Cir. 2003) (“Because the states can adopt more stringent air pollution control measures than federal law requires, the EPA is empowered to disapprove state plans only when they fall below the level of stringency required by federal law.”)

[M]ake achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations”³⁰⁷

On January 27, 2021, the current Administration signed “Executive Order on Tackling the Climate Crisis at Home and Abroad.”³⁰⁸ The new Executive Order on climate change and environmental justice amended the 1994 Order and provides that:

It is the policy of [this] Administration to organize and deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy; ... protects public health ... delivers environmental justice ... [and that] ... [s]uccessfully meeting these challenges will require the Federal Government to pursue such a coordinated approach from planning to implementation, coupled with substantive engagement by stakeholders, including State, local, and Tribal governments.³⁰⁹

Washington can facilitate EPA’s compliance with these Executive Orders by considering environmental justice in its SIP submission.

D. EPA’s Regional Haze Guidance and Clarification Memo for the Second Implementation Period

EPA’s 2021 Clarification Memo directs states to take into consideration environmental justice concerns and impacts in issuing any SIP revision for the second planning period.³¹⁰ EPA’s 2019 Regional Haze Guidance for the Second Planning Period specifies, “States may also consider any beneficial non-air quality environmental impacts.”³¹¹ This includes consideration of environmental justice in keeping with other agency policies. For example, EPA also pointed to another agency program that states could rely upon for guidance in interpreting how to apply the non-air quality environmental impacts standard.³¹²

When there are significant potential non-air environmental impacts, characterizing those impacts will usually be very source- and place-specific. Other EPA guidance intended for use in environmental impact assessments under the National Environmental Policy Act may be informative, but not obligatory to follow, in this task.

Additionally, a collection of EPA policies and guidance related to the National Environmental Policy Act (“NEPA”) is available at <https://www.epa.gov/nepa/national-environmental-policy->

³⁰⁷ Exec. Order No. 12898, § 1-101, 59 Fed. Reg. 7629 (Feb. 16, 1994), as amended by Exec. Order No. 12948, 60 Fed. Reg. 6381 (Feb. 1, 1995).

³⁰⁸ Exec. Order No. 14008, 86 Fed. Reg. 7619 (Jan. 27, 2021).

³⁰⁹ *Id.* at § 201.

³¹⁰ EPA July 2021 Memo at 16.

³¹¹ EPA 2019 RH Guidance at 49.

³¹² *Id.* at 33.

[act-policies-and-guidance](#). One of these policies concerns Environmental Justice.³¹³ Ecology should consider these sources of information in conducting a meaningful environmental justice analysis.

E. EPA has a Repository of Material Available for Considering Environmental Justice

In addition to the NEPA guidance materials referenced above, EPA provides a wealth of additional material.³¹⁴ The most important aspect of assessing Environmental Justice is to identify the areas where people are most vulnerable or likely to be exposed to different types of pollution. EPA's EJSCREEN tool can assist in that task. It uses standard and nationally consistent data to highlight places that may have higher environmental burdens and vulnerable populations.³¹⁵

F. EPA Must Consider Environmental Justice

As occurred in the first planning period, if a state fails to submit its SIP on time, or if EPA finds that all or part of a state's SIP does not satisfy the Regional Haze regulations, then EPA must promulgate its own Federal Implementation Plan to cover the SIP's inadequacy ("FIP"). Should EPA promulgate a FIP that reconsiders a state's four-factor analysis, it is completely free to reconsider any aspect of that state's analysis. The two Presidential Executive Orders referenced above require that federal agencies integrate Environmental Justice principles into their decision-making. EPA has a lead role in coordinating these efforts, and recently EPA Administrator Regan directed all EPA offices to clearly integrate environmental justice considerations into their plans and actions.³¹⁶ Consequently, should EPA promulgate a FIP, it has an obligation to integrate Environmental Justice principles into its decision-making. The non-air quality environmental impacts of compliance portion of the third factor, is a pathway for doing so.

G. Ecology Must Consider Environmental Justice under Title VI of the Civil Rights Act

As EPA must consider Environmental Justice, so must Ecology and all other entities that accept Federal funding. Under Title VI of the Civil Rights Act of 1964, "no person shall, on the ground of race, color, national origin, sex, age or disability be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity...". Ecology has an obligation to ensure the fair treatment of communities that have been

³¹³ See, EPA Environmental Justice Guidance for National Environmental Policy Act Reviews, <https://www.epa.gov/nepa/environmental-justice-guidance-national-environmental-policy-act-reviews>.

³¹⁴ See, EPA: Learn About Environmental Justice, <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>. (Enclosure 15)

³¹⁵ See, EPA EJSCREEN: Environmental Justice Screening and Mapping Tool, Additional Resources and Tools Related to EJSCREEN, <https://www.epa.gov/ejscreen/additional-resources-and-tools-related-ejscreen>.

³¹⁶ See, EPA News Release, EPA Administrator Announces Agency Actions to Advance Environmental Justice, *Administrator Regan Directs Agency to Take Steps to Better Serve Historically Marginalized Communities* (April 7, 2021), <https://www.epa.gov/newsreleases/epa-administrator-announces-agency-actions-advance-environmental-justice>. (Enclosure 16)

environmentally impacted by sources of pollution. That means going beyond the current analysis conducted to inform the “meaningful involvement” of impacted communities; environmental justice also requires the “fair treatment” of these communities in the development and implementation of agency programs and activities, including those related to the SIP.

Ecology should conduct a thorough analysis of the current and potential effects to impacted communities from sources considered in the SIP as well as those facilities identified by commenters and other stakeholders but not reviewed by Ecology. By not conducting this analysis and including the benefits of projected decline in emissions to these communities in their determination of the included emission sources, Ecology is not fulfilling its obligations under the law. Moreover, the state is making a mockery of Title VI by not using the SIP requirements to bring about the co-benefits of stronger reductions measures and reduce harms based on continued emissions.

H. Ecology’s Efforts on Environmental Justice Are Inadequate

While we appreciate Ecology’s preliminary environmental justice analysis, it falls short. Ecology’s proposed SIP explains that

Ecology consulted with our EJ coordinator to determine how best to address EJ concerns within the constraints of the Regional Haze Rule and guidance. Based upon her guidance and the use of EJSCREEN, we took the following actions:

- Identified the population characteristics of the people affected by the action (such as minority populations, low-income populations, non-English speaking populations, and tribes)
- Assessed and addressed disproportionately high and adverse human health or environmental effects on minority populations and low-income populations
- Planned for and facilitated the meaningful involvement of affected communities in the processes
- Ensured that potentially affected populations have appropriate opportunity to learn about, participate in, and influence Ecology’s decisions and actions.³¹⁷

The draft SIP and its appendices lack

- The EJSCREEN analysis Ecology generated from EPA’s online system.
- The information Ecology developed in assessing and addressing disproportionately high and adverse human health or environmental effects on minority populations and low-income populations.
- How it facilitated meaningful involvement of affected communities in the processes.
- How Ecology ensured that potentially affected populations have appropriate opportunity to learn about, participate in, and influence Ecology’s decisions and actions.

Furthermore, the draft SIP merely makes the following overarching claims:

³¹⁷ Draft SIP at 22.

The long-term strategy in this regional haze SIP revision includes emission reductions from permits and state rules. The visibility benefits of these controls provide co-benefits to the communities that are in the vicinity where emission reductions occur. An example of such controls would be federal fuel and engine rules that have resulted in large reductions in mobile source air pollution and improvements in visibility.³¹⁸

Ecology's draft SIP does not disclose the fact that many of the reasonable progress sources are located in communities of color and many live below the poverty line.

Consistent with the Governor's Council, the Environmental Task Force's efforts, and the federal requirements, Ecology should analyze the environmental justice impacts of its second planning period haze SIP. For those RP sources located near a low-income or minority community that suffers disproportionate environmental harms, Ecology's four-factor analysis for that source should take into consideration how each considered measure would either increase or reduce the environmental justice impacts to the community. Such considerations will not only lead to sound policy decisions but are also pragmatic as pointed out above, most of the same sectors and sources implicated under the regional haze program are of concern to disproportionately impacted communities in Washington. Thus, considering the intersection of these issues and advancing regulations accordingly will help deliver necessary environmental improvements across issue areas. Such consideration and associated action will reduce uncertainty for the regulated community, increase the state's regulatory efficiency, result in more rational decision making and be consistent with the Washington State Legislature's and Governor's directives, priorities and funding to focus on policies that "prioritize highly impacted communities and vulnerable populations for the purpose of reducing environmental health disparities and advancing a healthy environment for all residents."³¹⁹

Consistent with legal requirements and government efficiency, we urge Ecology to take impacts to EJ communities, like the ones we have expressed for the Ash Grove Cement and Ardagh Glass facilities, into consideration as it evaluates all sources that impact regional haze.

VII. Ecology Should Meaningfully Reconsider and Adapt Its SIP to Reflect Comments from the FLMs

The RHR and the CAA require that states consult with the FLMs that manage the Class I Areas impacted by a state's sources. Because the FLMs' role is to manage their resources – including air quality – Ecology should meaningfully consider and adapt its SIP measures to reflect comments and suggestions from the FLMs. Ecology has neither fully considered nor adapted its proposed SIP to reflect information and comments it received during the FLM consultation.

³¹⁸ Draft SIP at 23; and also explains that "[t]here are several emission control grant programs in Washington that take into account EJ concerns in awarding grants or have co-benefits for nearby disadvantaged communities. These include the wood stove buy-back and exchange program (Chapter 173-433 WAC), the low emission vehicles 2021 rulemaking to reduce emissions around ports, distribution centers, and freight corridors (which tend to be located within disadvantaged communities), and the Volkswagen enforcement action grants that prioritizes projects in or near communities disproportionately-impacted by diesel fumes." *id.*

³¹⁹ 2020 Council Report at 6.

Indeed, many of Ecology's responses were non-responsive and/or inconsistent with the legal CAA and RHR requirements. For example:

- Perceptibility should not be considered in screening source controls for reasonable progress,³²⁰
- Visibility improvement is not a fifth-factor "off-ramp" for emission controls,³²¹

³²⁰ The NPS noted that "Ecology appears to have set 0.13 dv as its criterion for what constitutes a significant improvement in visibility. Ecology provides no justification for this criterion. For comparison, EPA used 0.3% change in extinction, which is approximately equal to 0.03 dv, as its significance criterion in its TX FIP. However, in determining if a visibility improvement was adequate, Ecology dismissed greater improvements at 16 Class I areas." *Id.* at A-16, citing Feb. 19, 2021 email from NPS. Ecology's reply

The comment is incorrect. Ecology did not set 0.13 dv as a criterion. Ecology also did not set the BART 0.5 dv as a criterion. Instead, Ecology stated the following in Chapter 7 (p. 73) of the analysis:

An impact of 0.5 dv was considered the minimum visibility impact for a source to be subject to BART. While a potential visibility improvement of 0.5 dv or more would have clearly triggered a more in-depth evaluation of the RACT/Four-Factor reasonable progress factors, the significantly smaller annual visibility improvements that have been modeled were determined to be too small to pursue further at this time.

Considering that one deciview is generally considered to be the minimum amount of visibility change the average person can detect, Ecology would not require the controls listed in the 2016 RACT analysis for non-detectable (to humans) visibility improvements of only 0.03 dv. *Id.*

³²¹ The NPS expressed concern that "[u]nder the Reasonable Progress provisions of the Clean Air Act, visibility improvement is not a fifth-factor "off-ramp" for emission controls. EPA guidance has placed certain constraints on its use and we need to be sure we understand how Ecology is applying this 'fifth-factor.'" *Id.* at A-6, citing Nov. 19, 2020 email from NPS. Ecology's response what that

Washington State has a Reasonably Available Control Technology (RACT) provision that can be applied to attainment areas (unlike some other states and EPA which generally apply RACT exclusively to non-attainment areas). The five factors of Washington State's RACT rule are listed on page 4 of the 2016 RACT Analysis. Two of the factors (impact of source on air quality, and impact of additional controls on air quality) are described in Chapter 5 of the 2016 RACT Analysis. Two other factors (available controls; and cost) have an entire chapter devoted to each factor. Chapters 3 and 4 of the 2016 RACT Analysis describe in depth a fifth factor in the WA RACT process (emission reductions to be achieved by additional controls).

According to Washington State University, which prepared Appendix C of the 2016 RACT Analysis, "Results from this modeling study show that RACT implementation in the pulp and paper industry does little to improve visibility in Class I areas." They found that "the 8th highest deciview change was less than 0.05 dv at all of the IMPROVE sites." This is a valid off-ramp for using the WA RACT provisions to address regional haze.

In terms of 4-factor analyses, the pulp mill information presented to Ecology fully satisfies the current EPA requirements for regional haze 4-factor analysis as specified in the August 20, 2019 EPA Guidance on Regional Haze State Implementation Plans for the Second Implementation Period (2019 EPA Guidance). Based on the current 2019 EPA Guidance, and confirmed on November 3, 2020 in consultation with EPA, Ecology is in full compliance with the regional haze rule by deciding to not pursue controls for pulp mills at this time.

- If visibility benefit analyses are undertaken, they should reference a clean – not dirty –background;³²²
- RACT, which Ecology describes as a “C-grade” control or emission limit, clearly is less stringent than emission limits developed from application of the four-factor reasonable progress analysis;³²³
- Use of an outdated emission inventory is not allowed under the RHR;³²⁴
- The state must document support for its proposed SIP decisions;³²⁵ and
- Reliance on the lack of a federal action by Department of Interior in another program that does apply to existing sources is not a legitimate basis to justify no controls at those sources.³²⁶

In terms of Reasonable Progress provisions of the Clean Air Act, WA is successfully navigating regional progress goals and will continue to do so as we will also re-evaluate these sources during the next implementation period. *Id.* at A-6.

³²² *Id.* at A-15. (“...modeling annual emissions against a “dirty” background [*e.g.*, Ecology’s 2016 Pulp and Paper analysis] underestimates the benefits of reducing emissions. It is generally recognized that NOx emissions in the local climate have an enhanced impact upon visibility impairment and their reductions should not have been excluded.” The NPS further explained that “Ecology modeled 2007 baseline actual emission rates and the potential RACT emission rates using CMAQ against a “dirty” background. This is contrary to EPA guidance and underestimates the visibility benefits of reducing emissions.” NPS Formal Consultation PowerPoint Presentation (June 16, 2021), at 17. (Enclosure 17) (“NPS 2021 Consultation”)

³²³ In responding to a question from the FLM’s that asked, “What is the basis for this assumption?” (RE: RACT cost of 50% of BACT cost), Draft SIP, Appendix A at A-10, citing Nov. 19, 2020 email from NPS, Ecology explained that

When not being applied to address non-attainment area concerns, RACT in Washington State is understood by at least three agencies (NWCAA, PSCAA, and Ecology) to be a *C-grade level control or emission limit*. There is a precedent threshold in a previous WA state RACT determination from p. 77 of 107 of the combined (Ecology/ NWCAA/ PSCAA) Washington State Oil Refinery RACT – TSD FINAL – 11/25/2013: “The proposed RACT defines a reasonably efficient refinery... comparable to or above the 50% percentile of similar-sized US refineries...” *Id.* (emphasis added)

Further explaining that “Ecology used its discretion to also apply a similar type of 50% factor to BACT costs to arrive at a RACT cost. In a December 5, 2019 conversation between Ecology and EPA, EPA agreed that this was a reasonable approach.” *Id.* EPA’s final action comes *after* notice and comment rulemaking, not before.

³²⁴ *Id.* at A-15. 40 C.F.R. § 51.308(f)(3)(iii).

³²⁵ “The State must document the technical basis, including modeling, monitoring, cost, engineering, and emissions information, on which the State is relying to determine the emission reduction measures that are necessary to make reasonable progress in each mandatory Class I Federal area it affects.” 40 C.F.R. § 51.308(f)(3)(iii). Which is contrary to Ecology’s assertion that

Ecology is not required to put all documents that support a SIP determination into a SIP. The amount of documentation from all the different programs and permits that support SIP determinations is immense. It is not historical practice to include all such documentation in a SIP and is problematic due to changing conditions (in permits for example), which may not be related to the SIP determination. In such situations (and many others), the SIP would unnecessarily contain inaccurate and outdated information.” *Id.* at A-1.

³²⁶ Ecology’s use of the FLM’s lack of adverse impact determination on existing chemical pulp mills in Washington state to justify ignoring opportunities for emission reductions during this planning period is misplaced and as the FLM’s explain “irrelevant.” *Id.* at A-12. As the FLM’s accurately explained to Ecology:

Conclusion

We appreciate Ecology's consideration of these comments and ask the agency to revise its SIP accordingly. Please do not hesitate to contact us with any questions.

Sincerely,

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The potential for an adverse impact determination only occurs when new emissions from a major source or major modification rise to the level that the FLM has no other recourse. Instead of these rare instances, the facilities under review here are already in existence and have much greater emissions. Due to such congoing emissions, the DoI made a determination in 1985 that all Class I areas it administered were experiencing impaired visibility—that determination has not been changed and is supported by current visibility monitoring data. For example, our monitoring data indicates that visibility in Mount Rainier, North Cascades, and Olympic national parks is “fair” and unchanging. *Id.*, citing Nov. 19, 2020 email from NPS.

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Enclosures

List of Enclosures

1. Victoria R. Stamper, “Review and Comments on Washington Department of Ecology’s Draft Regional Haze Plan for the Second Implementation Period: Long Term Strategy and Four-Factor Analysis of Controls” (Nov. 19, 2021), with exhibits.
2. Steven Klafka, P.E. BCEE, Environmental Engineer, Wingra Engineering, S.C, “The Four-Factor Reasonable Progress Analysis for Ardagh Glass” (Jan. 27, 2021) (“Klafka Report”) (Enclosure 2).
3. National Parks Conservation Association comments submitted on the Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), and Intalco Agreed Order 18216 (Whatcom County) (Dec. 3, 2020).
4. Comments submitted by the Conservation Organizations on February 16, 2021 (submitted with corrections on February 19, 2021) for Informal comment period: Regional Haze SIP Revision - 2nd 10-Year Plan.
5. “Petition for Reconsideration of Guidance on Regional Haze State Implementation Plans for the Second Implementation Period,” submitted by National Parks Conservation Association, Sierra Club, Natural Resources Defense Council, Coalition to Protect America's National Parks, Appalachian Mountain Club, Western Environmental Law Center and Earthjustice, to former EPA Administrator Andrew Wheeler (May 8, 2020).
6. *National Parks Conservation Association v. State of Washington, Department of Ecology; and BP West Coast Products, LLC*, PCHB No. 10-162, Department of Ecology’s Prehearing Brief (April 12, 2018).
7. *National Parks Conservation Association v. State of Washington, Department of Ecology; and BP West Coast Products, LLC*, PCHB No. 10-162, Hearing Transcript, Volume IV (April 26, 2018).
8. “Prehearing Statement of the Colorado Department of Public Health and Environmental, Air Pollution Control Division,” *In the Matter of Proposed Revisions to Regulation No 23* (Oct. 7, 2021).
9. Department of Ecology, “Environmental Justice at Ecology,” available at <https://ecology.wa.gov/About-us/Accountability-transparency/Environmental-Justice>.
10. Governor’s Interagency Council on Health Disparities, “The Council’s Work,” available at <https://healthequity.wa.gov/TheCouncilsWork>.
11. “The Governor’s Interagency Council on Health Disparities: State Policy Action Plan to Eliminate Health Disparities,” (Jan. 2020) (2020 Council Report), available at <https://healthequity.wa.gov/Portals/9/Doc/Publications/Reports/HDC-ActionPlan-Jan2020.pdf>.
12. Governor’s Interagency Council on Health Disparities, Environmental Justice Task Force Materials, available at <https://healthequity.wa.gov/TaskForceMeetings/EnvironmentalJusticeTaskForce>.
13. Environmental Justice Task Force Meeting Materials, available at <https://healthequity.wa.gov/TaskForceMeetings/EnvironmentalJusticeTaskForce>.
14. EPA’s Environmental Justice website, <https://www.epa.gov/environmentaljustice>.
15. EPA: Learn About Environmental Justice, <https://www.epa.gov/environmentaljustice/learn-about-environmental-justice>.
16. EPA News Release, EPA Administrator Announces Agency Actions to Advance Environmental Justice, *Administrator Regan Directs Agency to Take Steps to Better Serve*

Historically Marginalized Communities (April 7, 2021),
<https://www.epa.gov/newsreleases/epa-administrator-announces-agency-actions-advance-environmental-justice>.

17. NPS Formal Consultation PowerPoint Presentation (June 16, 2021).

Enclosure 1

**Review and Comments on
Washington Department of Ecology's
Draft Regional Haze Plan for the Second Implementation Period:
Long Term Strategy and Four-Factor Analysis of Controls**

By Victoria Stamper

November 19, 2021

Prepared for
National Parks Conservation Association

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The Clean Air Act’s regional haze provisions require states to adopt periodic, comprehensive revisions to their implementation plans for regional haze on 10-year increments to achieve reasonable progress towards the national visibility goal. The plan revision for the second implementation period was due to be submitted to EPA by July 31, 2021.¹ As part of the comprehensive revisions to their regional haze plan, states must submit a long-term strategy that includes enforceable emission limits and other measures as may be necessary to make reasonable progress towards the national visibility goal.²

To that end, in October of 2021, the Washington Department of Ecology (Ecology or WDOE) made available its plan for addressing reasonable progress toward the national visibility goal for Class I areas.³ Ecology has proposed to include requirements for five facilities in its regional haze plan: the TransAlta Centralia Plant, the Ash Grove Cement Plant, the Cardinal FG Winlock Glass Plant, the Intalco Aluminum Plant, and the Alcoa Wenatchee Plant. However, the Agreed Orders, Consent Decree, and Permits that it has included in its proposed Long Term Strategy primarily rely on control requirements the owners already planned to meet under other Clean Air Act requirements (including under the first round regional haze plan) or reflect a commitment to conduct a four factor analysis of controls if/when a currently shutdown plant begins operations. In other words, Ecology’s draft regional haze plan for the second implementation period does not include any additional regional haze control requirements for industrial sources of regional haze pollution beyond what was already required and on the books.

There are several other facilities that met Ecology’s criteria for selecting sources to evaluate for controls in its regional haze plan for the second implementation period for which Ecology is not currently proposing to adopt any new controls as part of its second round regional haze plan. Yet, there are pollution controls (primarily for nitrogen oxides (NOx)) that Ecology found could be cost effectively installed at these sources to significantly reduce emissions of the visibility-impairing pollutants. Ecology has indicated that it will address these sources in a subsequent revision to its regional haze plan. In other words, Ecology’s regional haze plan for the second implementation period is not complete.

The four factors that must be considered in determining appropriate emissions controls for the second implementation period are as follows: (1) the costs of compliance, (2) the time necessary for compliance, (3) the energy and non-air quality environmental impacts of compliance, and (4) the remaining useful life of any source being evaluated for controls.⁴ EPA states that it anticipates the cost of controls being the predominant factor in the evaluation of reasonable

¹ 40 C.F.R. §51.308(f).

² 40 C.F.R. §51.308(f)(2)(i); 42 U.S.C. § 7491(b)(2). Under the Clean Air Act, state implementation plans must include “include enforceable emission limitations and other control measures, means, or techniques . . . , as well as schedules and timetables for compliance, as may be necessary or appropriate to meet the applicable requirements of this chapter.” 42 U.S.C. § 7491(a)(2)(A). An emission limitation is a “requirement” that “limits the quantity, rate, or concentration of emissions of air pollutants on a continuous basis, including any requirement relating to the operation or maintenance of a source to assure continuous emission reduction.” *Id.* § 7602(k).

³ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021.

⁴ 40 C.F.R. §51.308(f)(2)(i).

progress controls and that the other factors will either be considered in the cost analysis or not be a major consideration.⁵ Such is the case with the add-on controls evaluated in this report. Specifically, the remaining useful life of a source is taken into account in assessing the length of time the pollution control will be in service to determine the annualized costs of controls. If there are no enforceable limitations on the remaining useful life of a source, the expected life of the pollution controls is generally considered the remaining life of the source.⁶ In addition, costs of energy for selective noncatalytic reduction (SNCR), selective catalytic reduction (SCR), and other controls at a particular source are considered in determining the annual costs of these controls, which means that the bulk of the non-air quality and energy impacts are generally taken into account in the cost effectiveness analyses as is the remaining useful life of a unit. With respect to the length of time to install controls, that is not generally an issue for SCR or SNCR which can and have been installed within three to five years of promulgation of a requirement to install such controls.⁷ In any event, EPA's August 20, 2019 regional haze guidance states that, with respect to controls needed to make reasonable progress, the "time necessary for compliance" factor does not limit the ability of EPA or the states to impose controls that might not be able to be fully implemented within the planning period; more specifically, when considering the time necessary for compliance, a state may not reject a control measure because it cannot be installed and become operational until after the end of the implementation period."⁸

This report comments on the proposed Long Term Strategy and on Ecology's review of the four-factor analyses of pollution controls that were submitted for facilities in Washington.

I. Background.

Ecology used 2014 emissions data and Q/d (i.e., the ratio of a source's visibility-impairing emissions in tons per year (Q) divided by the source's distance from the nearest Class I area (d)) to identify sources to prioritize for evaluation of regional haze controls for its plan for the second implementation period. Ecology based on their review only on major sources. Ecology did not explain whether it focused on major sources based on the actual emissions of each source or based on the potential emissions of each source, and that should be clarified. Ecology used a

⁵ See U.S. EPA, August 20, 2019 Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 37.

⁶ *Id.* at 33. While we are aware that some EGUs evaluated in this report have planned decommission dates, we are not aware that any of those dates are enforceable. Thus, for all of the EGUs evaluated for add-on NO_x controls in this report, we assumed that the expected useful life of the pollution control being evaluated was the remaining useful life of the source, as directed to by EPA in its August 2019 guidance.

⁷ For example, in Colorado, SCR was operational at Hayden Unit 1 in August of 2015 and at Hayden Unit 2 in June of 2016, according to data in EPA's Air Markets Program Database, within 3.5 years of EPA's December 31, 2012 approval of Colorado's regional haze plan. In Wyoming, SCR was operational at Jim Bridger Units 3 and 4 in 2015 and 2016, less than three years from EPA's January 30, 2014 final approval of Wyoming's regional haze plan.

⁸ See U.S. EPA, August 20, 2019 Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 41 (it would be inconsistent with the regional haze regulations to discount an otherwise reasonable control "simply because the time frame for implementing it falls outside the regulatory established implementation period.").

Q/d value of 10 or higher as a cutoff for selecting major sources and included two other facilities with a lower than 10 Q/d value because they were in a selected source category. Based on this analysis, Ecology came up with the following list of sources to evaluate for controls.

Table 1. WDOE’s List of Sources to Conduct a Four-Factor Analysis of Controls⁹

Facility Site Name	Q (tons of NO _x , PM ₁₀ , SO ₂ , and NH ₃)	D (km) to nearest Class I area	Q/d	Nearest Class I Area	Number of Class I Areas Impacted (NPCA Analysis) ¹⁰	Source Category
TransAlta Centralia Generation LLC	10,749.4	71.8	149.8	Mount Rainier NP		Coal-powered electric
McKinley Paper Company	367.2	4.4	83.1	Olympic NP	1	Pulp and Paper Plant
Alcoa Primary Metals Wenatchee Works	3,461.7	42.8	80.9	Alpine Lakes WA		Alumina Refining and Aluminum Production
Alcoa Primary Metals Intalco Works	5,658.5	78.9	71.7	North Cascades NP	38	Alumina Refining and Aluminum Production
BP Cherry Point Refinery	2,945.1	80.8	36.4	North Cascades NP	14	Petroleum refineries
Tesoro Northwest Company	2,312.3	75.4	30.7	Olympic NP	10	Petroleum refineries
WestRock Tacoma	1,353.7	48.4	27.9	Mount Rainier NP	10	Pulp, Paper, and Paperboard Mills

⁹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 161-162.

¹⁰ Based on NPCA’s Regional Haze Fact Sheet for Washington, Sources of Visibility Impairing Pollution in Washington, available at <https://drive.google.com/file/d/1TKDlVvNwQ6LnVIVjzq4FYoQIOOLPyFmp/view>. Note that neither the TransAlta Centralia power plant nor the Alcoa Wenatchee plant were included in NPCA’s evaluation, presumably because of TransAlta’s prior requirement to decommission the Centralia coal-fired power plant by 2025 and because the Alcoa Wenatchee plant has been shut down since 2015. Note that in the NPCA fact sheet, the Weyerhaeuser NR Company plant is now the Nippon Dynawave plant, and the Boise Paper facility is now the Packaging Corp. of America plant. Note that the U.S. Oil refinery in Tacoma is not in NPCA’s Fact Sheet.

Facility Site Name	Q (tons of NOx, PM10, SO2, and NH3)	D (km) to nearest Class I area	Q/d	Nearest Class I Area	Number of Class I Areas Impacted (NPCA Analysis)¹⁰	Source Category
Nippon Dynawave Packaging Company	2,656.0	104.8	25.3	Mount Adams WA	21	Paperboard Mills
Puget Sound Refining Co. (Shell)	1,793.1	73.0	24.5	Olympic NP	8	Petroleum Refineries
Pt Townsend Paper Corp.	848.0	35.0	24.2	Olympic NP	5	Paper (not Newsprint) Mills
Ash Grove Cement Co., E Marginal	1,243.6	53.8	23.1	Alpine Lakes WA	9	Cement Manufacturing
Cosmo Specialty Fibers, Inc.	973.8	58.2	16.7	Olympic NP	5	Paperboard Mills
WestRock Longview, LLC	1,574.2	100.7	15.6	Mount Adams WA	10	Paperboard Mills
Georgia-Pacific Consumer Operations LLC	653.0	45.4	14.4	Mount Hood WA	5	Paper (except Newsprint) Mills
Phillips 66	840.6	77.2	10.9	North Cascades NP	5	Petroleum Refineries
Cardinal FG Winlock	859.8	80.1	10.7	Mount Rainier NP	6	Flat Glass Manufacture
Packaging Corp. of America (PCA), Wallowa	1,048.3	111.5	9.4	Eagle Cap WA	16	Paperboard Mills
U.S. Oil & Refining Co.	149.2	46.4	3.2	Mount Rainier NP		Oil Refinery

Of the above list, there were a few sources for which Ecology did not request a four-factor analysis of controls for, because “[s]ome of these facilities had existing legal requirements or pending permit actions to reduce emissions.”¹¹ Those facilities were the TransAlta Centralia power plant, the Cardinal FG Winlock glass plant, and the Ash Grove Cement Plant.¹² Ecology also will only request a four-factor analysis of controls for the Intalco Aluminum Plant and the Alcoa Wenatchee Aluminum Plant if the plants restart operations.¹³ In addition, it appears that Ecology did not request a four-factor analysis of controls for the McKinley Paper Company located near Port Angeles, and Ecology’s draft regional haze plan does not mention this facility other than to show its Q/d value of 83.1 (making it the facility with the second highest Q/d value).¹⁴

Its Long Term Strategy addresses the Centralia Power Plant, Intalco and Alcoa Wenatchee Aluminum plants, the Ash Grove Cement Plant, and the Cardinal FG Winlock Glass Plant, although it does not require additional pollution control measures other than what was already required for these facilities. This is discussed in Section II below.

For the remaining facilities for which Ecology requested four-factor analyses of controls, Ecology selected the refineries as the first priority of sources to focus on for regional haze controls. Ecology’s reasons for prioritizing the refineries included the following:

- Four of the five refinery facilities are located in the Puget trough, west of several Class 1 Areas. Their cumulative regional haze causing emissions influence the same Class 1 Areas.
- Predominant winds direct the emissions from the refineries toward several Class 1 Areas.
- The refineries’ potential emission reductions of 4,200 tons per year account for the vast amount of potential emission reductions.

WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 166.

Ecology prioritized pulp and paper mills lower than refineries because they “are not located as close to each other as the refineries so they do not have as great of a cumulative effect.”¹⁵ Ecology also states that the potential reduction in regional haze emissions from pulp and paper mills is “vastly less than the potential refinery emission reductions.”¹⁶

¹¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 163.

¹² *Id.* at 212.

¹³ *Id.* at 178, 180-181.

¹⁴ Note that the Technical Support Document for the current operating permit for the McKinley Plant states that the McKinley facility was purchased from Nippon Paper Industries USA Co. in 2017. See https://www.orcaa.org/wp-content/uploads/TSD_McKinley_Final_17August2021.pdf. This is a different facility than the Nippon Dynawave facility that is located in Longview, Washington.

¹⁵ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 166.

¹⁶ *Id.* at 167.

The regional haze plan regulations require states to include a description of the criteria that it used to determine the sources or groups of sources that it evaluated for controls,¹⁷ which Ecology has done in its draft regional haze plan. As stated above, it selected sources with a Q/d value equal to or greater than 10. EPA’s July 8, 2021 guidance memo states that “[u]nder the [regional haze rule], each state has an obligation to submit a long-term strategy that addresses the regional haze visibility impairment resulting from emissions from within that state.”¹⁸ While states have the discretion to select any reasonable source selection methodology, the source selection methodology must “produce a reasonable outcome.”¹⁹ In the case of Ecology’s source selection process and four factor analyses, the outcome of its approach as proposed in the draft regional haze plan is a long term strategy that does not include any control measures other than those control measures that were either previously imposed to meet best available retrofit technology (BART), i.e., at the TransAlta Centralia Plant, that were already required under other requirements, i.e., Ash Grove Cement Plant, that were voluntarily proposed by the source due to an increase in capacity (i.e., Cardinal FG Winlock Glass Plant), or that simply require the submittal of a four-factor analysis of controls if the currently “curtailed” plants start operating again (Intalco Aluminum and Alcoa Wenatchee). Ecology’s selection of sources to include in its long term strategy ignored the fact that Ecology has found cost effective control options for several sources identified in Table 1 above. Ecology states that it must follow its reasonably available control technology (RACT) rule requirements before it can establish legally establish control requirements.²⁰ Given that the regional haze pollution controls are required to be part of the regional haze plan pursuant to 40 C.F.R. 51.308(f)(2)(i), Ecology’s regional haze plan for the second implementation period is not yet complete or it otherwise fails to meet the requirements for regional haze plans. Given that Ecology’s Public Review Draft is stated to be its State Implementation Plan (SIP) revision for the second regional haze plan implementation period of 2018 to 2028, it will be assumed for the purpose of these comments that the Public Review Draft is the complete plan to be submitted to EPA for approval. This report provides comments and analyses on the source-specific requirements of Ecology’s proposed Long Term Strategy of the Public Review Draft and also on the other sources evaluated for control by Ecology in the context of its regional haze plan for the second implementation period.

¹⁷ 40 C.F.R. 51.308(f)(2)(i).

¹⁸ July 8, 2021 EPA RHR Clarifications Memo at 3. See also 40 C.F.R. 51.308(f)(2).

¹⁹ *Id.*

²⁰ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 163.

II. Review and Comments on Ecology's Proposed Long Term Strategy Source-Specific Control Measures

Ecology lists the following source-specific emission limits and shutdowns of its long term strategy:

- TransAlta Centralia Generation BART order revision, which ceased coal-fired operation of one boiler in December 2020 and will cease coal-fired operation of the other boiler by the end of 2025.
- Cardinal FG Winlock Glass Plant, which voluntarily requested a permit to install selective catalytic reduction (SCR) on its glass furnace in conjunction with an increase in glass production capacity. A permit was issued authorizing these actions on February 11, 2001, and Ecology states that the SCR should be installed and operating by 2022.
- Ash Grove Cement Company, which entered into a Consent Decree in 2013 with EPA, Ecology, and other state agencies that required optimization of the Seattle Kiln to reduce NOx emissions and is currently subject to a NOx limit of 5.1 pounds per ton (“lb/ton”) of clinker.
- Alcoa Wenatchee and Intalco Aluminum, which are both currently in “curtailment due to market conditions,” for which ECOLOGY has proposed Agreed Orders to require the plants to conduct and submit a four-factor analysis of controls if they decide to restart operations.²¹

A. TransAlta Centralia Generation

The TransAlta Centralia Generating Station is a coal-fired power plant located near Centralia, Washington. In its 2010 Regional Haze SIP, Ecology indicated that the Centralia plant significantly impacts regional haze in twelve Class I areas in Washington and Oregon.²² The Centralia power plant was subject to BART in Washington’s regional haze plan. In 2003, EPA approved requirements applicable to the Centralia units’ SO₂ and PM emissions as meeting BART.²³ In 2012, EPA approved a NO_x BART determination in First Revised BART Order 6426 for the Centralia power plant, which included the following control requirements: an initial NO_x emission limitation of 0.21 lb/MMBtu for each unit based on the installation of SNCR on both coal-fired units plus Flex Fuel followed by an optimization study and lowering of the

²¹ *Id.* at 212.

²² WDOE, Regional Haze Plan, December 2010, at 11-13 (Table 11-11), available at <https://apps.ecology.wa.gov/publications/documents/1002041.pdf>.

²³ See 68 Fed. Reg. 34821 (June 11, 2003).

emission limits based on the study results.²⁴ In addition, the BART order required each of the two Centralia units to cease burning coal and be “decommissioned” by December 31, 2020 for one unit and by December 31, 2025 for the other unit, unless Ecology determined that state or federal law requires selective catalytic reduction (SCR) to be installed on either unit.²⁵ In 2021, EPA approved a revision to the BART requirements for the Centralia power plant.²⁶ Specifically, TransAlta had installed a Combustion Optimization System with Neural Network program (Neural Net) to decrease ammonia slip from the SNCR, and such Neural Net controls also help to reduce NOx emissions among other things. Ecology reduced the NOx limit applicable to one unit from to 0.18 lb/MMBtu and changed other requirements pertaining to use and monitoring of ammonia and analyzing coal sulfur and nitrogen content.²⁷ Ecology also eliminated the requirement in the BART Order 6426 that required that the units be “decommissioned” once they stopped burning coal, based on 2017 changes to a Memorandum of Agreement between TransAlta and the state of Washington.²⁸ As EPA states “[t]he 2017 MOA makes clear that TransAlta is not precluded from the possibility of retrofitting the facility to natural gas, or other non-coal energy source, as long as it meets the statutory requirements of Chapter 80.80 RCW.”²⁹ This state statute addresses greenhouse gas emissions from baseload electric generating plants.³⁰

Ecology’s Technical Support Document for its 2020 BART SIP revision states that "Ecology is aware that if TransAlta repowers the units on natural gas the visibility improvements anticipated by the current BART order and state implementation plan limits would not be met. Repowering would change the emission reduction used in determining the 2028 further progress goals for the nearby Class I Areas (Mt. Rainier and Olympic National Parks, and the Goat Rocks and Alpine Lakes Wilderness Areas) under the 2021 Regional Haze State Implementation Plan." It would also change the emission reductions used in determining the 2028 reasonable progress goals for several Oregon Class I areas. In its 2010 Regional Haze SIP, Washington identified twelve Class I areas where the Centralia Power Plant had an impact greater than or equal to 0.5 deciviews (dvs). Thus, if the Centralia units repowered to natural gas, it could significantly affect the reasonable progress goals for all of those Class I areas, which are listed in Table 2.

²⁴ See 77 Fed. Reg. 72742(12/6/2012). See also First Revised BART Order 6426, attached as Ex. 1.

²⁵ See 77 Fed. Reg. 72742(12/6/2012). See also First Revised BART Order 6426, available at Ex. 1.

²⁶ 86 Fed. Reg. 24502 (May 7, 2021).

²⁷ Ecology, Technical Support Document for Second BART (Best Available Retrofit Technology) Order Revision, July 2020, at i (attached as Ex. 2).

²⁸ As discussed in 86 Fed. Reg. 13256 at 13258 (Mar. 8, 2021)

²⁹ 86 Fed. Reg. 13258 (Mar. 8, 2021).

³⁰ See Chapter 80.80 RCW, available at <https://app.leg.wa.gov/rcw/default.aspx?cite=80.80>.

Table 2. Washington and Oregon Class I Areas Where Ecology Modeled Significant Visibility Impacts from the Centralia Power Plant in its 2010 Regional Haze SIP.³¹

Alpine Lakes Wilderness (WA)
Glacier Peak Wilderness (WA)
Goat Rocks Wilderness (WA)
Mt. Adams Wilderness (WA)
Mt. Hood Wilderness (OR)
Mt. Jefferson Wilderness (OR)
Mt. Rainier National Park (WA)
Mt. Washington Wilderness (OR)
North Cascades National Park (WA)
Olympic National Park (WA)
Pasayten Wilderness (WA)
Three Sisters Wilderness (OR)

In its Technical Support Document for its 2020 BART SIP revision, Ecology states “[i]f TransAlta decides to switch to non-coal power generation, a Notice of Construction application would need to be submitted to Southwest Clean Air Agency by the company. Ecology would require the company to do, at a minimum, emissions modeling that would be required under the BART process to quantify the visibility impacts resulting from the operation as a natural gas boiler plant (EGU).”³² It appears that Ecology may have been stating that it would evaluate whether the Centralia plant, powered with a fuel other than coal, would be subject to BART or subject to additional control requirements, by evaluating what the impacts of the plant would be on visibility in Class I areas. But the Centralia plant was already determined to be subject to BART.³³ Applicability to BART would not change if either or both units were repowered to natural gas or some other fuel.³⁴

Ecology’s draft regional haze plan for the second implementation period does not address the possibility that one or both the Centralia units could be allowed to repower with a fuel other than coal under the revised 2020 BART Order. In fact, Ecology states that the 2028 “on the books” emissions of SO₂ and NO_x will decrease significantly when coal-fired power production ceases at TransAlta.³⁵ Ecology also makes clear in its draft regional haze plan that it set Centralia’s 2028 emissions to zero based on the facility ceasing coal-fired energy production by 2020 for one unit and by 2025 for the other unit.³⁶ Ecology identifies the cessation of coal-firing at the

³¹ 2010 Washington Regional Haze State Implementation Plan at 11-13 (Table 11-11), available at <https://apps.ecology.wa.gov/publications/documents/1002041.pdf>.

³² Ecology, Technical Support Document for Second BART (Best Available Retrofit Technology) Order Revision, July 2020, at 3 (Ex. 2).

³³ 2010 Washington Regional Haze State Implementation Plan at 11-13 (Table 11-9), available at <https://apps.ecology.wa.gov/publications/documents/1002041.pdf>.

³⁴ See, e.g., 77 Fed. Reg. 39425 at 39429 (July 3, 2012).

³⁵ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 77-78.

³⁶ *Id.* at 82 and at 176.

Centralia units as a “shutdown schedule” control and as part of its Long Term Strategy.³⁷ Yet, if the Centralia units could lawfully be repowered with natural gas or another fuel, which Ecology has made clear in its 2020 Technical Support Document for its BART order revision could occur, then its assumption of zero emissions in 2028 from the Centralia Power Plant is significantly flawed. EPA has said if a state is going to rely on a source shutdown in its regional haze plan, the shutdown needs to be federally enforceable.³⁸ Thus, Ecology needs to make federally enforceable the decommissioning of the Centralia Generating Station’s coal-fired units in its SIP and issue a revised Order, as was required in the Order prior to the 2020 revisions.

In its 2020 Technical Support Document for the 2020 BART Revision, Ecology explains some of the requirements that would apply if the Centralia units repowered to natural gas or another fuel. For example, Ecology states that under Chapter 80.80 RCW that sets greenhouse gas emission limits reflective of combined cycle combustion turbines, TransAlta would need to take an enforceable limit to keep operations annually below a 60% capacity factor to avoid being classified as a baseload power plant under Chapter 80.80 RCW which would require that the facility meet GHG emission limits.³⁹ Ecology ignores the possibility that the units could be repowered to a natural gas-fired combined cycle power plant by retaining the steam turbine but replacing the coal boiler with a gas-fired combustion turbine and a heat recovery steam generator, in which case it could likely meet the GHG emission limit of Chapter 80.80 RCW and thus be allowed to operate at higher capacity factors.

Ecology also states that if TransAlta decided to switch to non-coal fired power generation, they would have to submit a Notice of Construction application to the Southwest Clean Air Agency and that Ecology would “require the company to do, at a minimum, emissions modeling that would be required under the BART process to quantify the visibility impacts resulting from the operation as a natural gas boiler plant (EGU).”⁴⁰ Neither the modeling nor the requirement to obtain a construction permit would guarantee that any specified level of emissions reduction would be required if the units were repowered with another fuel such as natural gas because it depends on how applicability to emissions control requirements such as best available control technology (BACT) would be determined.

³⁷ *Id.* at 212.

³⁸ See U.S. EPA, Clarifications Regarding Regional Haze State Implementation Plans for the Second Implementation Period, July 8, 2021, at 10 (“[O]n the way measures, including anticipated shutdowns that are relied on to forgo a four-factor analysis or shorten the remaining useful life of a source, are necessary to make reasonable progress and must be included in a SIP.”). See also, e.g., 11/1/2021 EPA letter to Wyoming Department of Environmental Quality, Comments on Draft Wyoming State Implementation Plan Regional Haze Round Two, at 5 (“If the State is relying on the source shutdowns as part of its long-term strategy for making reasonable progress, Wyoming must make these planned retirements enforceable in the SIP. Similarly, if the State is relying on the source shutdowns to forgo conducting a four-factor analysis because a shutdown is effectively the most stringent control available, the shutdown must be in the SIP.”)

³⁹ Ecology, Technical Support Document for Second BART (Best Available Retrofit Technology) Order Revision, July 2020, at 6-7 (Ex. 2).

⁴⁰ *Id.* at 3.

An estimate of what the NO_x emissions could be assuming a conversion of the existing boilers from coal to natural gas can be made based on the following assumptions:

- Assume same generating capacity with gas of 670 MW
- Assume slightly higher hourly heat input with natural gas, based on Energy Information Administration data that shows the average heat rate of a natural gas-fired steam generation is 10,416 Btu/kW-hr as compared to the average heat rate of a coal-fired steam generator of 10,142 Btu/kW-hr⁴¹ (meaning the heat input per hour would be 2.7% higher for natural gas firing, assuming the same generating capacity could be achieved with natural gas). Thus, assuming a coal-fired heat rate of 10,142 Btu/kW-hr, the hourly heat input to each boiler with coal would be approximately 6,795 MMBtu/hour, and the maximum hourly heat input to each boiler with natural gas would be 2.7% higher or 6,979 MMBtu/hour.

Using AP-42 emission factors and assuming that the burners would continue to be low NO_x burners, the NO_x emission factor for the boilers would be 140 lb per MMscf, which equates to approximately 0.14 lb/MMBtu.⁴² If the units had to be limited to 60% capacity factor to avoid the GHG emission limits of Chapter 80.80 RCW, the potential NO_x emissions of each Centralia unit repowered to natural gas would be 2,568 tons per year per unit or 5,135 tons per year total. In comparison, the NO_x emissions from the two Centralia units per 2018-2020 averaged about 3,300 tons per year per unit or 6,600 tons per year when both units were operating. Thus, while repowering the Centralia units from coal to gas would reduce emissions from the units, it would not by any means eliminate the regional haze pollutants from the units as was required in the first planning period SIP and was assumed for the plant in the reasonable progress goals determination and in the modeling of the Long Term Strategy for this second planning period SIP.

It appears that TransAlta has been pursuing a coal-to-gas conversion program at some of its other units in Canada.⁴³ Thus, Ecology cannot just dismiss the possibility of repowering the Centralia units as unlikely. For these reasons, Ecology needs to specifically require the decommissioning of the Centralia Generating Station's coal-fired units to be consistent with its proposed Long Term Strategy and its determination of reasonable progress goals. Failing that, Ecology must include the expected emissions from a re-powered Centralia Power Plant in its 2028 modeling and determination of reasonable progress goals and advise nearby states of the changes in 2028 emissions from the facility so that they also revise their Class I area reasonable progress goals.

B. Alcoa Primary Metals Intalco Works and Alcoa Wenatchee

The Alcoa Primary Metals Intalco Works Plant (Intalco Plant) is an aluminum smelter located in Ferndale, Washington. In its 2010 Regional Haze SIP, Ecology indicated that the Intalco plant

⁴¹ See https://www.eia.gov/electricity/annual/html/epa_08_02.html.

⁴² EPA, AP-42, table 1.4-1.

⁴³ <https://www.nenergybusiness.com/features/coal-gas-conversion-us-canada/>.

significantly impacted regional haze in seven Class I areas in Washington.⁴⁴ NPCA has found that the Alcoa Intalco plant potentially impacts up to 42 Class I areas and that it is the most significant industrial contributor to regional haze at North Cascades National Park.⁴⁵ Ecology states that the Intalco Plant has been under curtailment since 2020.⁴⁶

The Alcoa Wenatchee Plant is an aluminum smelter located in Wenatchee, Washington. As shown in Table 1 above, the Wenatchee plant has a Q/d value of 80.9 based on 2014 emissions. According to NPCA's analysis, emissions from the Wenatchee plant potentially impact 34 Class I areas, including the Alpine Lakes Wilderness area,⁴⁷ located approximately 28 miles west of the facility, and also North Cascades National Park to the northwest and Mount Rainier National Park to the southwest.⁴⁸ Ecology states that the Wenatchee plant has been in curtailment since 2015.⁴⁹

Washington's 5-year regional haze progress report acknowledged that the SO₂ emissions from Intalco and, to a lesser extent the Wenatchee facility, create a challenge to additional visibility improvement in North Cascades and Olympic National Park.⁵⁰ Thus, Ecology is including the Intalco plant and the Wenatchee plant as part of its Long Term Strategy for the regional haze plan for the second implementation period.⁵¹ These plants have the third and fourth highest Q/d values based on 2014 emissions, and Ecology has acknowledged that the plants would contribute to regional haze if the plants restarted operations.⁵² However, Ecology's Long Term Strategy does not specify any controls to be installed at these plants if operations resume.

Ecology has developed Agreed Orders 18100 and 18216 that require these plants to complete a four-factor analysis of controls prior to startup, if either plant decides to restart.⁵³ The Agreed Orders require that Alcoa submit four-factor analyses at least 180 days before restarting any of the facilities' potlines, and the analyses must be based on permitted emission limits (not the recent past years of zero to very low emissions). Compliance with any controls identified in the four-factor analyses would not be required until three years after Ecology's approval of the four-factor analyses. However, the Agreed Orders do not set any deadline for Ecology to approve the four-factor analyses, nor do they define the process that would be followed for Ecology to grant approval. The Agreed Orders also do not spell out what the public review and input process would be. Moreover, the Agreed Orders allow Alcoa or Ecology "to request a change to the

⁴⁴ WDOE, Regional Haze Plan, December 2010, at 11-10 (Table 11-6), available at <https://apps.ecology.wa.gov/publications/documents/1002041.pdf>.

⁴⁵ NPCA, Comments on Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County), at 3.

⁴⁶ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 82.

⁴⁷ 78 Fed. Reg. 79344, 79348-79349. (Dec. 30, 2013).

⁴⁸ NPCA, Comments on Draft Air Quality Agreed Orders for Alcoa Wenatchee Agreed Order 18100 (Chelan County), Intalco Agreed Order 18216 (Whatcom County), at 3.

⁴⁹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 82.

⁵⁰ WDOE, "Washington State Regional Haze 5-Year Progress Report," at 213, (Sept. 2017), <https://www.regulations.gov/document?D=EPA-R10-OAR-2018-0001-0004>. (Progress Report)

⁵¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 212.

⁵² *Id.* at 82.

⁵³ *Id.*

conditions” of each Order by submitting a written request to the other party.⁵⁴ Thus, these requirements of the Agreed Orders, which do not in and of themselves require implementation of any control measures, could be modified via a written request by Alcoa. These Agreed Orders cannot be considered to suffice for the four-factor analyses and control measures that Ecology states are needed in the event the plants start up again. Instead, Ecology must conduct four-factor analyses for these plants now based on permitted emission rates, so Alcoa is on notice as to the control requirements it must meet before it decides whether to restart either plant. Alternatively, Ecology should revoke the plants’ operating permits and require each plant to go through major source new source review permitting before restarting operations.

Ecology states that if it conducted a four-factor analysis on the Intalco planta and the Wenatchee plant now, controls would not be cost effective because the plants have extremely low emissions due to being “in curtailment.”⁵⁵ However, Ecology has not revoked either plants’ permits, and Ecology states the plants could restart at any time.⁵⁶ Further, Ecology has included both plants’ emissions in its 2028 emissions inventory, and both plants’ emissions are reflected in the reasonable progress goals.⁵⁷ Thus, Ecology is without justification to claim that it can delay conducting a four-factor analysis and imposing control requirements because controls based on current emissions would not be cost effective. Just as EPA requires forthcoming source shutdowns to be enforceable in order for a state to take into account a shortened remaining useful life in a four-factor control analysis, states cannot take into account significantly reduced emissions to determine no controls are cost effective without making such assumptions enforceable.⁵⁸ This is particularly true for the two aluminum plants, for which Ecology states could restart at any time under their existing permits and for which Ecology claims controls would be needed to address regional haze impacts if these sources restart.

With respect to the Intalco Plant, Alcoa had previously agreed to complete a Notice of Construction application for the installation of a wet scrubber.⁵⁹ That wet scrubber was required to address the area’s noncompliance with the 1-hour SO₂ National Ambient Air Quality Standard (NAAQS). However, according to Ecology, once Alcoa decided to curtail operations of the Intalco plant, the requirement to install a scrubber became null and void.⁶⁰

Since the Intalco plant has curtailed operations and emissions have essentially been close to nil, the 1-hour SO₂ ambient air concentrations in the area have decreased considerably. The table below presents the 99th percentile 1-hour average SO₂ values from the two ambient air SO₂ monitors in Whatcom County: One that is located at the same address as the Intalco Plant (4050 Mountain View Road, Ferndale) and the other that is located 0.5 miles away from the Intalco

⁵⁴ See Section V Agreed Order Nos. 18100 and 18216 in Appendix Q of WDOE Public Review Draft, Second Regional Haze Plan, October 2021.

⁵⁵ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 177-180.

⁵⁶ *Id.*

⁵⁷ *Id.* at 82, 84-86, and 176.

⁵⁸ See U.S. EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019, at 17, 20. See also U.S. EPA, Clarification Regarding Regional Haze Plans for the Second Implementation Period, July 8, 2021, at 12.

⁵⁹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 179. See also Agreed Order 16449.

⁶⁰ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 179.

Plant (6036 Kickerville Road, Ferndale). EPA has indicated that both of these monitoring sites were established to characterize air quality around the Intalco plant.⁶¹ For comparison, compliance with the 1-hour SO₂ NAAQS of 75 parts per billion (ppb) is based on the three-year average of the 99th percentile of the daily maximum 1-hour average SO₂ concentration.⁶²

Table 3. 99th Percentile 1-hour SO₂ Concentrations in Whatcom County, 2017 to 2021⁶³

Year	Monitor Location	99 th Percentile 1-hour SO ₂ Concentration, ppb	Observations, 1-hour
2017	6036 Kickerville Road, Ferndale, WA	70	7884
2018		74	8087
2019		70	7688
2020		59	8133
2021		2	4083
2017	4050 Mountain View Rd, Ferndale, WA	114	8469
2018		101	8542
2019		105	8535
2020		62	8541
2021		3	4239

According to Ecology, the Intalco facility began curtailing production in April 2020. The SO₂ monitors around the plant showed a dramatic decrease in hourly SO₂ concentrations in 2020 and 2021, compared to the three years prior. EPA designated part of Whatcom County as nonattainment for the 1-hour SO₂ NAAQS effective April 3, 2021.⁶⁴ Ecology must develop and submit a nonattainment plan to EPA by October 30, 2022, which is less than a year from now.⁶⁵ Given that the SO₂ emissions from the Intalco plant also are the primary contributor to regional haze, Ecology should coordinate the development of regional haze measures and 1-hour SO₂ measures.

The EPA has previously found that the cost effectiveness of a lime spray forced oxidation (LSFO) scrubber at the Intalco plant would cost \$3,875/ton to \$4,363/ton in a 2012 proposed rulemaking.⁶⁶ That would equate to roughly \$4,530/ton at most in 2019 dollars.⁶⁷ Not only would those SO₂ controls be cost effective at the Intalco Plant, but such controls would presumably be required in order for the Intalco Plant to restart since the area must demonstrate attainment with the 1-hour SO₂ NAAQS as expeditiously as practicable and no later than April

⁶¹ See, e.g., 85 Fed. Reg. 45146 at 45150 (Table 6) (July 27, 2020).

⁶² 40 C.F.R. 50.17

⁶³ Data from EPA's Air Data Monitor Values Report for Whatcom County SO₂ Monitors available at <https://www.epa.gov/outdoor-air-quality-data/monitor-values-report>.

⁶⁴ 86 Fed. Reg. 16055 at 16073 (Mar. 26, 2021); 40 C.F.R. 81.348.

⁶⁵ 86 Fed. Reg. 16055 at 16057, 16059 (Mar. 26, 2021). (Nonattainment plans are due within 18 months of the effective date of the nonattainment designation).

⁶⁶ 77 Fed. Reg. 76174 at 76191 (Dec. 26, 2012).

⁶⁷ Based on changes in the Chemical Engineering Plant Cost Indices (CEPCI).

2026 (i.e., five years after the effective date of the SO₂ nonattainment designation).⁶⁸ Ecology states it generally takes two to three years for the design and installation of SO₂ controls,⁶⁹ and it is commonly assumed that a 180 day shakedown period is needed after installation of a pollution control. Thus, to attain the SO₂ NAAQS by April 2026, the permit to install the scrubber should be approved by no later than October 2023, which is less than one year away. Based on that timeframe, Ecology should require the submittal of a construction permit application to install an LSFO scrubber at the Intalco Plant now, so that the permit authorizing such controls can be issued no later than October 2023.

It has recently been reported that negotiations are underway to potentially restart the Intalco aluminum plant (possibly under a different owner) or to build a steel mill on the site.⁷⁰ Thus, with the possibility of aluminum plant operations resuming and the fact that an SO₂ nonattainment plan is required for the Intalco plant area, Ecology has no reasonable justification to allow Alcoa to wait to submit its regional haze control analysis. If the Intalco plant resumes operation, the level of SO₂ control that needs to be met is known and the most effective way to meet that level of control is the installation of an LSFO wet scrubber, based on the analysis EPA previously conducted for the BART evaluation and based on analyses that presumably was done by Alcoa and Ecology in the process of developing Agreed Order 16449.⁷¹ Thus, Ecology should re-impose the requirement in Agreed Order 16449 for Alcoa to apply for a permit to construct a new scrubber at the Intalco Plant, which presumably was necessary for the Intalco plant to comply with the SO₂ NAAQS. And Ecology should issue the permit for the new scrubber no later than October 2022.

For the Intalco Wenatchee plant, Ecology should not wait to decide what controls to require to address regional haze until Alcoa decides to restart the plant. Ecology must require the submittal of a four-factor analysis of regional haze controls now and propose appropriate controls as part of its regional haze plan that would apply should the plant restart. Alternatively, Ecology should revoke the permit for the Alcoa Wenatchee plant and require the facility to obtain a new source review permit as a new source if it decides to restart.

If Ecology is going to claim that controls at these two aluminum plants are necessary as part of its Long Term Strategy for the second implementation period, then the state's plan must include the requirements that would be imposed if either of the plants resume operation. Such evaluations of the emission reduction measures necessary to make reasonable progress is required to be included in the long term strategy pursuant to 40 C.F.R. 51.308(f)(2)(i). Further, it would also give Alcoa notice as to the control requirements it must meet before it decides whether to restart either plant which would ensure expeditious limitations emissions should either plant restart.

⁶⁸ 86 Fed. Reg. 16055 at 16057 (Mar. 26, 2021).

⁶⁹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 170.

⁷⁰ See, e.g., Gallagher, Dave, Two front-runners in reopening the Intalco facility offer jobs, cleaner operation, Bellingham Herald, October 20, 2021, available at <https://www.bellinghamherald.com/news/business/article255135332.html>.

⁷¹ 77 Fed. Reg. 76174 at 76191 (Dec. 26, 2012).

C. Ash Grove Cement Plant

The Ash Grove Cement plant is a dry process cement kiln in the Duwamish Industrial area of Seattle. The cement plant has a Q/d value based on 2014 emissions of 23.1. The plant is located only 53.8 kilometers from Alpine Lakes Wilderness Area⁷² and, according to NPCA, impacts 9 Class I areas in total.⁷³ According to Ecology, the primary regional haze pollution from the plant come from the cement kiln and the associated clinker cooler baghouses.⁷⁴ The plant is capable of burning coal, natural gas, and tire-derived fuels.⁷⁵ The plant is equipped with a Dustex 10-module pulse jet baghouse which it installed in 2019.⁷⁶

Ecology identifies a 5.1 pound NOx per ton of clinker on a 30-day rolling average as an emission limit for the Ash Grove cement plant that is part of its long term strategy.⁷⁷ However, Ecology has not included any evidence in its draft SIP that the 5.1 lb NOx/ton clinker emission limit is an enforceable requirement of any permit or rule, or that there is an enforceable requirement to install SNCR which Ecology also states must be installed (or perhaps is currently installed). Ecology did include in the draft SIP a 2013 Consent Decree between EPA, Ash Grove Cement Company, and other parties including Ecology and Puget Sound Clean Air Agency (PSCAA) in Appendix E of its draft regional haze SIP. That Consent Decree did not set any specific NOx emission limit or NOx control requirement for the Seattle Ash Grove cement plant, although it did set specific limits for other Ash Grove cement plants located in other states. For example, for the Ash Grove cement plants in Foreman, Arkansas and in Chanute, Kansas, the 2013 Consent Decree required installation of SNCR and imposed a NOx limit of 1.5 lb/ton of clinker, applicable on a 30-day rolling average, to be met by 12/31/2015.⁷⁸ For the Ash Grove cement plant in Seattle, the 2013 Consent Decree required Ash Grove to submit an optimization protocol in accordance with Appendix A of the Consent Decree “for the purpose of optimizing the operation of the Seattle Kiln to reduce NOx emissions to the maximum extent practicable from that Kiln.”⁷⁹ The Consent Decree requires that the “Seattle Kiln NOx Emission Reduction Report shall conform to the applicable procedures set forth in Appendix A [of the Consent Decree] for the establishment of a 30-Day Rolling Average Emission Limit for NOx at the Seattle Kiln” and that Ash Grove must demonstrate compliance with that emission limit “consistent with the requirements and deadlines specified in Appendix A” of the Consent Decree.⁸⁰ While the Consent Decree outlined the process for establishing and complying with a

⁷² WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 162.

⁷³ Based on NPCA’s Regional Haze Fact Sheet for Washington, Sources of Visibility Impairing Pollution in Washington, available at <https://drive.google.com/file/d/1TKDIvNwQ6LnVIVjzq4FYoQIOIPyFmp/view>.

⁷⁴ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 167.

⁷⁵ *Id.*

⁷⁶ *Id.* at 169.

⁷⁷ *Id.* at 212.

⁷⁸ See 2013 Consent Decree, *United States et al. v. Ash Grove Cement Company*, (No. 2:13-cv-02299-JTM-DJW) at 22-23 (¶¶13 and 15), in Appendix E of the Public Review Draft, Second Regional Haze Plan, October 2021.

⁷⁹ 2013 Consent Decree, *United States et al. v. Ash Grove Cement Company*, (No. 2:13-cv-02299-JTM-DJW) at 25 (¶¶21), in Appendix E of the Public Review Draft, Second Regional Haze Plan, October 2021.

⁸⁰ *Id.*

NOx emission limit with EPA and PSCAA,⁸¹ it does not specify a specific emission limit to be complied with. Ecology has not adequately explained or provided any documents that show how the 5.1 lb/ton of clinker NOx limit has been made into an enforceable requirement⁸² or that it is being complied with. It does not appear that requirements that Ecology states have been established under the 2013 Consent Decree have been incorporated into the Ash Grove operating permit yet either, as the current operating permit in place for the Ash Grove cement plant does not require the use of SNCR and does not specify a NOx emission limit of 5.1 lb/ton of clinker.⁸³

While it is assumed that the 5.1 lb/ton of clinker limit is enforceable by the PSCAA and Ecology through the mechanism established under 2013 Consent Decree, for the purpose of taking credit for the NOx emission limit as part of its Long Term Strategy and Regional Haze SIP, Ecology is required to provide evidence that it has adopted any requirement of its Long Term Strategy in final form.⁸⁴ Such evidence would include the submittal of the actual regulation or document to be incorporated into the SIP as an enforceable requirement.⁸⁵ However, the Draft SIP does not cite to any documents which include the 5.1 lb/ton of clinker NOx limit at the Ash Grove Cement Plant. Any measure included in the Long Term Strategy is required to have enforceable emission limitations pursuant to 40 C.F.R. 51.308(f)(2), and Ecology thus needs to provide evidence that the 5.1 lb/ton of clinker NOx limit is an enforceable emission limit.

In its discussion of the facility-specific four factor analyses for the Ash Grove Cement Plant, Ecology states that the 2013 Consent Decree required the Seattle Ash Grove Cement Plant to optimize an SNCR system.⁸⁶ However, the Consent Decree does not specifically refer to an SNCR system at the Seattle Ash Grove plant, and the current operating permit for the Seattle Ash Grove plant does not even mention an SNCR system. Ecology acknowledges that Ash Grove submitted a permit application in 2016 for installation of an SNCR system, but a permit has not been issued yet “because of unresolved technical issues.”⁸⁷ Ecology describes the main technical issue as that the “permit application requested to be operated the SNCR process on an ‘as needed’ basis” to achieve the 5.1 lb/ton of clinker NOx limit.⁸⁸ The facility, which has a capacity of 750,000 tons of clinker per year,⁸⁹ is currently subject to a NOx limit of 1,846 tons

⁸¹ *Id.* at ¶22.

⁸² Appendix M of the WDOE Draft Regional Haze Plan does include an August 26, 2016 letter from EPA to Ash Grove Cement Company that approves the limit of 5.1 pounds of NOx per ton of clinker on a 30-day rolling average, but it is not clear that the EPA letter is an enforceable document. Further, the EPA letter does not mention an SNCR system.

⁸³ Air Operating Permit No. 11339 issued to Ash Grove Cement Company, last amended June 13, 2018, available at <https://pscleanair.gov/DocumentCenter/View/214/Air-Operating-Permit-PDF?bidId=>.

⁸⁴ This is required by EPA’s SIP submittal completeness guidelines in 40 C.F.R. Part 51, Appendix V, Sections 2.1.b and d.

⁸⁵ 40 C.F.R. Part 51, Appendix V, Section 2.1.d.

⁸⁶ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 169.

⁸⁷ *Id.* at 169.

⁸⁸ *Id.*

⁸⁹ PSCAA Statement of Basis for Ash Grove Cement Company, Air Operating Permit Administrative Amendment 4 issued 6/13/18, at 1, 47, available at <https://pscleanair.gov/DocumentCenter/View/216/Statement-of-Basis-PDF?bidId=>.

per 12-month period,⁹⁰ which equates to an annual limit of 4.92 lb/ton of clinker when the plant is operating at maximum capacity. Unless the Ash Grove plant is not currently complying with the 5.1 lb/ton of clinker NO_x limit, it is not clear that SNCR would be required to meet the 5.1 lb/ton clinker NO_x limit. Ecology must disclose the current compliance status of the Ash Grove plant with the 5.1 lb/ton limit on NO_x which Ecology is claiming is part of its Long Term Strategy.

Further, Ecology has failed to provide an adequate four-factor analysis of controls for the Ash Grove Cement Plant. It appears that Ecology may be finding that SNCR is a cost effective control for the Ash Grove plant that it will require as part of its regional haze plan, but it is unclear. Ecology states “PSCAA and Ash Grove are working on resolving the technical issues in the [SNCR] application with the goal of issuing a permit for the SNCR system. This permit will form the basis for emission standards that will apply to the SNCR system. Ecology intends to supplement the RHR SIP once the permit is issued.”⁹¹ Ecology has selected the Ash Grove Cement Plant as a facility to be included in its Long Term Strategy in its regional haze plan for the second implementation period. Thus, Ecology is required to perform a four-factor analysis of controls for the facility and to establish the enforceable requirements for the facility in the context of this current regional haze SIP revision. Considering that Ash Grove has requested to operate the SNCR on an “as needed” basis to achieve the NO_x limit of 5.1 lb/ton of clinker, it is clear that the 5.1 lb/ton of clinker NO_x limit is not reflective of the NO_x removal capabilities of SNCR at the Ash Grove Cement Kiln. As stated above, the 2013 Consent Decree required at least two cement kilns to meet a much lower 1.5 lb/ton of clinker NO_x limit with SNCR and .

Rather than determine the appropriate limit with SNCR at the Ash Grove cement kiln or address other methods of reducing NO_x at the plant, Ecology states that it “has determined the EPA Consent Decree limit of 5.1 pounds of NO_x per ton of clinker on a 30-day rolling average is adequate for reasonable progress at this time until a final permit for the SNCR system is issued by Puget Sound Clean Air Agency.”⁹² Ecology’s approach does not meet the regional haze requirement that the emission reduction measures necessary to make reasonable progress be included in the long term strategy pursuant to 40 C.F.R. 51.308(f)(2)(i). Ecology must conduct a four-factor analysis now as part of its regional haze plan for the Ash Grove cement plant to fully evaluate all cost-effective controls and to impose an emission limit reflective of the efficacy of the control required.

Ecology briefly evaluated the top NO_x control technology, SCR, for the Ash Grove plant, but discounted the control due to SCR operational problems that could occur if it was installed upstream of the baghouse (because the high particulate could foul the catalyst) or if it was installed downstream of the baghouse (because the exhaust temperature would be too low for effective operation of the SCR and require installation of a heat exchanger).⁹³ However, another top control that Ecology failed to evaluate is the control option of installing catalytic ceramic

⁹⁰ Air Operating Permit No. 11339, issued to Ash Grove Cement Company by PSCAA, last amended June 13, 2018, at 10, available at <https://psccleanair.gov/DocumentCenter/View/214/Air-Operating-Permit-PDF?bidId=>.

⁹¹ *Id.*

⁹² *Id.*

⁹³ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 168.

filters in the existing main baghouse at the cement kiln. Several vendors are offering catalytic ceramic filter systems for baghouses that can remove NOx through embedded catalysts in the filter, particulate matter, and SO2 with the use of dry sorbent injection, such as Tri-Mer UltraCat and Haldor Topsoe CataFlex™ catalytic filter bags that can be installed in place of or inside a standard filter bag at an existing baghouse. Such vendors claim that catalytic filters can achieve 90% or greater NOx removal.⁹⁴ Notably, the catalytic ceramic filters have been geared towards cement kilns, among other facilities, to help meet the Portland cement maximum achievable control technology (MACT) standards.⁹⁵

Recently, a cost assessment for the use of a ceramic catalytic filtration system was done for the GCC Pueblo Cement Plant in Colorado.⁹⁶ That information can be used to estimate the costs of using a catalytic ceramic filtration system at the Ash Grove plant. The GCC plant is somewhat similar to the Ash Grove Seattle plant in that both cement kilns use the dry kiln process and use a preheater and precalciner.⁹⁷ The GCC Pueblo Plant has a higher cement production rate at 3,750 tons/day compared to 2,200 tons per day at the Seattle Ash Grove cement plant.⁹⁸ Thus, the cost estimate of the use of a ceramic catalytic filtration system would be higher than the costs of such a system at the Ash Grove plant in Seattle.

There are a few options for using a ceramic catalytic filtration system at the Ash Grove Plant:

1) install a stand-alone catalytic ceramic filtration system that would be used after the existing baghouse, 2) replace an existing baghouse with a stand-alone catalytic ceramic filter system, and 3) install catalytic filter bags within the existing baghouse. Given that a new baghouse was recently installed at the Ash Grove plant, the third option would be the most cost effective option.

Tri-Mer provided a cost estimate to replace the existing bags of the baghouse at the GCC Pueblo cement plant with catalytic ceramic filter elements. As discussed in the attached report on GCC Pueblo, Tri-Mer's costs take into account the addition of an ammonia injection system and that the exhaust flue gas of the cement kiln would no longer need to be cooled to a temperature required by the existing fabric filter bags.⁹⁹ Tri-Mer determined that the cost for a bag-to-ceramic filter retrofit would cost \$800/ton of NOx removed at the GCC Pueblo Plant and would reduce NOx by 90%, as well as continuing to remove PM10 and PM2.5 at very high efficiencies (greater than 99.9%).¹⁰⁰ Tri-Mer's cost effectiveness value reflects a capital cost of \$8,999,200

⁹⁴ See, e.g., <https://tri-mer.com/hot-gas-treatment/hot-gas-filtration.html>. See also Exhibit 3, Haldor Topsoe CataFlex™ brochure; and GEA BisCat – Ceramic catalyst filter information available at <https://www.gea.com/en/news/trade-press/2019/biscat-ceramic-catalyst-filter.jsp>.

⁹⁵ See Air & Waste Management Association, The Magazine for Environmental Managers, Sponsored Content, "Catalytic Filter Technology Provides Important Flexibility for Controlling PM, NOx, SOx, O-HAPS," October 2018, attached as Ex. 4 and available at https://pubs.awma.org/flip/EM-Oct-2018/sponsoredcontent_trimer.pdf.

⁹⁶ Klafka, Steve, Wingra Engineering, GCC Rio Grande – Pueblo Cement Plant, Four-Factor Reasonable Progress Analysis, September 23, 2021, hereinafter GCC Pueblo Four Factor Analysis, attached as Ex. 5.

⁹⁷ See GCC Pueblo Four Factor Analysis, Appendix B at 2 (Ex. 5); see also PSCAA Statement of Basis for Ash Grove Cement Company, Air Operating Permit Administrative Amendment 4 issued 6/13/18 at 3 (Ex. 6).

⁹⁸ See GCC Pueblo Four Factor Analysis, Appendix B at 2; see also PSCAA Statement of Basis for Ash Grove Cement Company Air Operating Permit at 1.

⁹⁹ GCC Pueblo Four Factor Analysis at 12.

¹⁰⁰ *Id.*, Appendix F at 5-6.

for bag replacement with catalytic ceramic filters and an annual operating expense cost for the control system of \$1,620,000/year.¹⁰¹ The annual operating costs take into account power costs, use of aqueous ammonia (19% by weight), maintenance, and replacement of the filters every 10 years.¹⁰² The use of aqueous ammonia is safer than using anhydrous ammonia, and there is not a federal requirement for an accidental release plan.

Tri-Mer states that some of the added benefits of using a ceramic catalytic filtration system for control of NOx, as well as particulate, include that there is minimal catalyst plugging, reduced ammonia slip (well below 10 parts per million), and negligible catalyst deactivation.¹⁰³ Tri-Mer states that “a ceramic filter has no deactivation of the catalyst in a continuous operation for 10 years+.”¹⁰⁴ In addition, with the use of sorbent injection, the catalytic ceramic filtration system could also be used to reduce SO2 emissions by 90% or more.¹⁰⁵

The Seattle Ash Grove Cement facility had NOx emissions of 1,144 tons per year in 2014,¹⁰⁶ thus a 90% reduction would equate to 1,030 tons per year of NOx reduced from 2014 levels. Based on the allowable NOx emission rate of 1,846 tons per 12-month period and the annual capacity of the Ash Grove plant of 750,000 tons of clinker production, the use of catalytic ceramic baghouse filters would allow for a NOx emission limit of approximately 0.5 lb/ton of clinker.¹⁰⁷ This is significantly lower than the 5.1 lb/ton clinker NOx limit that Ecology is proposing to be part of the state’s Long Term Strategy. Thus, Ecology must fully evaluate the use of catalytic ceramic filter bags at the Ash Grove cement plant as a top regional haze control.

SNCR should be considered a second tier control compared to catalytic ceramic baghouse filters. However, SNCR can most assuredly reduce NOx to lower emission rates than the 5.1 lb/ton of clinker emission rate that Ash Grove is apparently negotiating with PSCAA for its SNCR system.¹⁰⁸ There are several cement kilns with SNCR with lower NOx limits than 5.1 lb/ton of clinker. Indeed, the 2013 Consent Decree requires a NOx limit of 1.5 lb/ton of clinker, applicable on a 30-day rolling average, to be met by 12/31/2015 at several cement kilns.¹⁰⁹ In any evaluation of SNCR as a regional haze control for the Seattle Ash Grove plant, Ecology must evaluate the maximum emission reduction capabilities of the control and not simply allow

¹⁰¹ *Id.*, Appendix F at 6. Note that the annual operating expense was calculated by subtracting the estimated Capital Investment of \$8,999,200 from estimated lifetime cost (Capital expense plus 20 years of operating expenses) of \$41,399,200 provided for the GCC Pueblo plant by Tri-Mer.

¹⁰² *Id.*, Appendix F at 6.

¹⁰³ *Id.*, Appendix F at 7.

¹⁰⁴ *Id.*

¹⁰⁵ *Id.*, Appendix F at 5.

¹⁰⁶ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 84.

¹⁰⁷ See PSCAA Statement of Basis for Ash Grove Cement Company, Air Operating Permit Administrative Amendment 4 issued 6/13/18, at 1 (Ex. 6); and Air Operating Permit No. 11339, issued to Ash Grove Cement Company by PSCAA, last amended June 13, 2018, at 10 (Ex. 7). Assuming 90% NOx control from the 1,846 tons NOx per 12-month period limit equates to 0.5 lb/ton of clinker at maximum production capacity of 750,000 tons of clinker per year.

¹⁰⁸ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 168.

¹⁰⁹ See 2013 Consent Decree, *United States et al. v. Ash Grove Cement Company*, (No. 2:13-cv-02299-JTM-DJW) at 22-23 (¶¶13, 15, 25, 30), in Appendix E of the Public Review Draft, Second Regional Haze Plan, October 2021.

periodic implementation of an SNCR system at the Ash Grove cement plant to meet an unreasonably high NOx emission limit.

With respect to SO2 emissions from the Ash Grove Plant, Ecology states the following about the cement plant:

SO2 emissions at the plant come from burning sulfur containing fuels. The plant is capable of burning coal, natural gas, and tire-derived fuels. The plant has not been using coal for the last couple of years, but still has the ability to use it. As the facility can still use coal, SO2 emissions from the 2014 EI (with coal combustion) were included in the modeling to determine progress. The alkaline cement clinker removes some SO2 from the combustion gases. The facility uses this as a primary method of SO2 control.

WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 167.

If the plant has not been using coal in the past couple of years then, assuming that fuel change has reduced SO2 emissions, an emission control requirement of at least no longer burning coal at the Seattle Ash Grove plant should be imposed as a minimum regional haze control for SO2 emissions from the cement plant. However, the use of catalytic ceramic filter with sorbent injection should also be evaluated as an available SO2 control for the cement plant.

In summary, if Ecology is going to include the Ash Grove cement plant as part of its Long Term Strategy, the state's plan must evaluate controls for the facility in a four-factor analysis and impose appropriate emission limits and control requirements. Ecology admits that the 5.1 lb/ton of clinker emission rate is not reflective of even full-time operation of an SNCR system, and yet it is proposing a 5.1 lb/ton NOx limit that purportedly requires SNCR for the facility in its Long Term Strategy with a plan to revise the regional haze plan once a permit for the SNCR system is issued by PSCAA. Ecology has not even provided evidence that the 5.1 lb/ton clinker NOx limit has been adopted in a final enforceable form such that it can be incorporated into the federally enforceable SIP. Ecology's approach does not meet the regional haze requirement that the emission reduction measures necessary to make reasonable progress be included in the long term strategy pursuant to 40 C.F.R. 51.308(f)(2)(i). Ecology must conduct a four-factor analysis now as part of its regional haze plan for the Ash Grove cement plant to fully evaluate all cost-effective controls and to impose an emission limit reflective of the efficacy of the control required.

D. Cardinal FG Winlock Glass Plant

The Cardinal FG Winlock plant is a flat glass manufacturing plant in Winlock, WA. According to Ecology, its 2014 NOx emissions were 791 tons per year based on 2014 emissions.¹¹⁰ Thus, the facility is a large source of NOx. Ecology calculated a Q/d value for this facility of 10.7,

¹¹⁰ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 84.

which exceeded its threshold of 10 that it used to select sources for four-factor analyses of controls.¹¹¹ Therefore, the Cardinal Glass Plant is subject to the four-factor analysis.

Ecology did not request a four-factor analysis of pollution controls for the Cardinal Glass Plant. Instead, Ecology proposes to rely on the fact that the company recently submitted a permit application to install SCR controls, which it proposed concurrently with an increase in glass production capacity from 650 tons per day to 750 tons per day.¹¹² According to Ecology, the company is also requesting a much lower facility-wide NOx limit of 249.62 tons per year, which apparently is 583.05 tons per year lower than the facility's current emission limits.¹¹³ According to Ecology, to ensure kiln exhaust gas temperatures are high enough for the successful operation of the SCR, the existing spray dryer and electrostatic precipitator (ESP) will have to operate at higher temperatures which will increase emissions of SO₂, PM₁₀, and PM_{2.5}.¹¹⁴ It also appears that the company is requesting lower NOx limits, as well as lower carbon monoxide limits, to allow the Cardinal Glass Plant to be considered a minor source (i.e., under 250 tons per year), so that the emission increases of SO₂ and PM_{2.5} due not trigger prevention of significant permitting requirements as a major modification.

Ecology is relying on the Cardinal's plans to install SCR as part of its Long Term Strategy. Ecology has included a copy of SWCAA's Air Discharge Permit 20-3409, issued February 11, 2021, in Appendix H of its SIP and presumably will be including that permit as the enforceable requirement to incorporate into its regional haze SIP.

However, the issuance of the permit for the SCR and increase in capacity does not negate the need for Ecology to conduct its own four-factor analysis of controls and, particularly in this case, to establish appropriate emission limits as is required to be included in the Long Term Strategy pursuant to 40 C.F.R. 51.308(f)(2).

With respect to NOx, the facility-wide NOx emissions in 2014 were 791 tons per year, and the facility-wide potential to emit is 249.62 tons per year,¹¹⁵ which only reflects a NOx reduction with SCR of 68%. That is much lower than the 90%+ control efficiency that SCR is capable of achieving. In addition, the prior permit for the Cardinal FG Winlock Glass Plant required use of the 3R Process for control of NOx emissions,¹¹⁶ and it appears that process is no longer required in the 2021 permit. The Pilkington 3R Process is described as using "various hydrocarbon fuels, injected into the furnace waste gas stream, as the agent to reduce NOx to harmless nitrogen and water vapor."¹¹⁷ If the company were required to add SCR along with using the existing 3R Process, it could achieve lower NOx emission rates. Ecology must explain why it is justifiable

¹¹¹ *Id.* at 160 and 162.

¹¹² *Id.* at 171.

¹¹³ *Id.* at 172.

¹¹⁴ *Id.*

¹¹⁵ *Id.*

¹¹⁶ SWCAA Air Discharge Permit 04-2568R2, 12/16/2008, at 4, available at <https://www.swcleanair.gov/docs/permits/TitleV/SW08-14-R1AOP.pdf> and attached as Ex. 8.

¹¹⁷ State of New Jersey, Department of Environmental Protection, State of the Art (SOTA) Manual for the Glass Industry, July 1997, at 3.15-22, available at <https://p2infohouse.org/ref/14/13344.pdf>.

for Cardinal FG Winlock to stop using the 3R Process to control NOx, when it could readily use additional NOx controls in addition to the 3R Process.

In addition, the use of low temperature catalysts should have been evaluated for the SCR, to avoid having to reheat the gas stream which will reduce the effectiveness of the PM and SO2 controls. Such low temperature catalysts would reduce if not eliminate the projected increases in SO2 and particulate matter with the SCR, which are claimed to be due to the need to achieve a higher temperature in the flue gas due to the SCR.

Another option Ecology should consider for the Cardinal Glass Plant is the use of ceramic catalyst filters along with the existing 3R process, which can reduce NOx at lower temperatures than conventional SCR and also capture particulate and SO2. This control method is discussed above in Section II.C above on the Ash Grove Cement Plant and it is also discussed in the January 27, 2021 Four-Factor Reasonable Progress Analysis for the Ardagh Glass plant in Seattle, Washington, done by Wingra Engineering, S.C. and attached as Exhibit 10.

Ecology states that RCS 70A.15.2220 “requires that when a source decides to modify or replace an existing emission control system, Ecology or the local air pollution control authority must assure that the modified ore replacement control system meets a reasonably available control technology (RACT) level of emissions control at a minimum.”¹¹⁸ RACT is defined under Washington State law 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 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. RACT requirements for a source or source category shall be adopted only after notice and opportunity for comment are afforded.

RWA 70A.15.1030(20) (emphasis added).

While SCR is a control technology capable of meeting the lowest emission limit, the proposed NOx emission limit does not appear to require the “lowest emission limit” that can be met with SCR. Further, with the decreases in SO2 and PM removal efficacy that will occur as a result of the SCR installation, it is questionable whether the SO2 and PM emission limits reflect RACT because the revised SO2 and PM emission limits do not reflect the lowest emission limit for the spray dryer and electrostatic precipitator that are installed at the glass furnace. Ecology must comply with the state law RCW 70A.15.2220 cited in its draft Long-Term Strategy as part of its review and determination of appropriate regional haze emission limitations for the Cardinal FG Winlock glass plant in its Regional Haze plan for the second implementation period. It has an obligation to ensure RACT level controls are met.

¹¹⁸ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 215.

The regional haze four-factor analysis applies to the Cardinal Glass Plant *in conjunction with any* other Clean Air Act requirements. The fact that the Cardinal Glass Plant has received a permit requiring the installation of SCR does not obviate the need for the state to comply with reasonable progress requirements. The emission limits of the permit, as described in the draft regional haze SIP, do not reflect the maximum capabilities of SCR, including the ability to use low temperature catalyst to avoid or eliminate the SO₂ and particulate matter increases that were projected to occur with SCR. Ecology must conduct its own four-factor analysis of regional haze controls and impose emission limits that reflect the controls it determines are necessary to make reasonable progress towards the national visibility goal.

III. Review and Comments on Other Sources Selected by Ecology for Review That Were Unjustifiably Deferred from Ecology’s Proposed Long Term Strategy

As previously stated, Ecology used a Q/d analysis and selected a Q/d value of 10 or higher as a threshold for selecting sources to require a four-factor analysis of regional haze controls.¹¹⁹ Ecology required four-factor analyses for five petroleum refineries and seven pulp and paper mills.¹²⁰ Ecology then selected the refineries as the first priority of sources to focus on for regional haze controls. Ecology prioritized pulp and paper mills lower than refineries because they “are not located as close to each other as the refineries so they do not have as great of a cumulative effect.”¹²¹ Ecology also states that the potential reduction in regional haze emissions from pulp and paper mills is “vastly less than the potential refinery emission reductions.”¹²²

Ecology states that it must follow its RACT rule requirements before it can legally establish control requirements.¹²³ However, Ecology has not conducted a RACT evaluation in this regional haze plan. Yet, the regional haze plan for the second implementation period is required to evaluate controls for selected sources and determine through a four-factor analysis what control measures are necessary to make reasonable progress towards the national visibility goal.¹²⁴ For a source that is found subject to the required reasonable progress four-factor analysis as a result of a state’s reasonable progress screening process, the state must ensure the analysis is conducted as part of its regional haze plan. Neither the Act nor EPA’s rules provide an “off-ramp” for a source in this situation. Ecology’s Public Review Draft is stated to be its State Implementation Plan (SIP) revision for the second regional haze plan implementation period of

¹¹⁹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 160.

¹²⁰ These company four-factor analyses are provided at <https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/RegionalHaze.htm>.

¹²¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 166.

¹²² *Id.* at 167.

¹²³ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 163.

¹²⁴ See U.S. EPA, Guidance on Regional Haze Plans for the Second Implementation Period, August 20, 2019, at 28 (Step 4).

2018 to 2028, and thus it is assumed for the purpose of these comments that the Public Review Draft is the plan to be submitted to EPA for approval.

Comments are provided herein on the four-factor analyses and Ecology's analysis of controls for the five refineries and the seven pulp and paper mills.

A. Four-Factor Analyses for the Oil Refineries

Ecology states in its draft regional haze plan that the refineries in Washington “are over 40 years old and the facilities have maintained the majority of the equipment in a manner that has not required updating emission controls to current standards.”¹²⁵ Ecology did a nationwide comparison of 2014 facility-wide NO_x emissions per barrel of production capacity for the five Washington refineries to 83 other refineries located in the U.S. and found that “Washington refineries represent four of the top five facilities in the nine states in terms of NO_x emissions per 1,000 barrels produced per day.”¹²⁶

Ecology requested four-factor analyses from the five Washington refineries to address each fluid catalytic cracking unit (FCCU), each boiler with heat input greater than 40 MMBtu/hr, and each heater with heat input greater than 40 MMBtu/hr that has not been retrofitted with NO_x controls since 2005.¹²⁷ None of the five refineries for which Ecology requested four-factor analyses found that low NO_x burners or ultra low NO_x burners (LNB/ULNB) or SCR were appropriate for regional haze reasonable progress controls. Either the companies claimed that a control, such as ULNB, was not technically feasible for a heater or boiler, or a company claimed that controls were not cost effective. Ecology conducted its own cost effectiveness analyses for the application of SCR to the refinery heaters and boilers. Ecology states that two refineries did not submit analyses for their FCCUs, and Ecology subsequently decided to evaluate SCR for those FCCUs “since they are a large source of NO_x emissions.”¹²⁸

1. Comments on Ecology's Determination of Cost Effective Controls for the Petroleum Refineries

Ecology conducted SCR cost effectiveness analyses for several emissions units at the refineries using EPA's SCR cost calculation spreadsheet made available with its Control Cost Manual.¹²⁹ Ecology states in its discussion of the four-factor analyses of controls for the units at each refinery that it found SCR would be cost effective for the FCC units and for various heaters and boilers.¹³⁰ Ecology's draft SIP identifies a \$6,300/ton reasonableness threshold for NO_x controls

¹²⁵ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 184.

¹²⁶ *Id.* at 185-186 (Table 7-6).

¹²⁷ *See, e.g.,* BP Cherry Point Refinery Regional Haze Four Factor Analysis, April 2020 (hereinafter “BP Cherry Point Analysis”) at 2, available at <https://fortress.wa.gov/ecy/ezshare/AQ/RegionalHaze/RegionalHaze.htm>.

¹²⁸ *Id.* at 187.

¹²⁹ *Id.* at 187.

¹³⁰ *Id.*

in its discussion of controls for the pulp and paper industry.¹³¹ It appears, but is not entirely clear, that Ecology is using a similar reasonableness threshold for NOx controls at the refineries. For any cost threshold selected by a state, EPA’s regional haze guidance requires that the State Implementation Plan (SIP) “explain why the selected threshold is appropriate for that purpose and consistent with the requirements to make reasonable progress.”¹³² It must be noted that other states have adopted higher cost effectiveness reasonableness thresholds. For example, Oregon has adopted a much higher regional haze control cost threshold of \$10,000/ton.¹³³ Colorado is also using a reasonableness cost threshold of \$10,000/ton.¹³⁴ New Mexico is using a reasonableness cost effectiveness threshold of \$7,000/ton.¹³⁵

With respect to determining whether a NOx control is cost effective for a particular heater or boiler at a refinery, it is important to consider the costs that similar sources have had to bear to meet Clean Air Act requirements for NOx. For example, several Californian Air Districts as well as the states of Texas, Massachusetts, New York, and Georgia have set NOx emission limits for existing heaters and boilers that are reflective of the use of LNB/ULNB, SNCR, or SCR.¹³⁶ While these emission limits were often set to address ozone and/or PM2.5 nonattainment issues, the fact is that each of these controls can be quite cost effective. For example, a San Joaquin Valley Air Pollution Control District (SJVAPCD) cost analysis for ULNBs shows that the retrofiting of such controls to meet a NOx limit of 6 ppm would have cost effectiveness values ranging from \$545/ton to \$3,270/ton, with the higher cost effectiveness values being at smaller units (the smallest size unit evaluated was 30 MMBtu/hr) and/or lower capacity factors.¹³⁷ In addition, based on a SJVAPCD cost analysis for SCR to meet NOx emission rates of 2.5 ppm, SCR was found to have a cost effectiveness of \$1,025/ton to \$6,149/ton for heaters and boilers as small as 30 MMBtu/hr, with the lowest cost effectiveness values for the larger units and units that operate at higher capacity factors.¹³⁸

We encourage Ecology to review Table 42 of the attached March 6, 2020 report of four-factor analyses for the oil and gas industry,¹³⁹ which includes a list of state and local air agency emission limits and rules applicable to existing natural gas-fired heaters and boilers. As that report indicates, the most stringent NOx limit for units greater than or equal to 75 MMBtu/hour required of existing sources in the listed state and local rules is 5 ppm, which most likely reflects

¹³¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 182.

¹³² EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 39.

¹³³ See Oregon Regional Haze State Implementation Plan for the Period 2018-2028, Aug. 27, 2021 Public Notice Draft, at 35, 45.

¹³⁴ See Colorado Department of Public Health and Environment, In the Matter of Proposed Revisions to Regulation No. 23, November 17 to 19, 2021 Public Hearing, Prehearing Statement, at 7, available at <https://drive.google.com/drive/u/1/folders/1TK41unOYnMKp5uuakhZiDK0-fuziE58v>.

¹³⁵ See NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12, available at https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2017/01/NMED_EHD-RH2_8_25_2020.pdf.

¹³⁶ Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, March 6, 2020, at 139-145, attached as Ex. 10.

¹³⁷ *Id.* at 125 (Table 36).

¹³⁸ *Id.* at 135 (Table 41).

¹³⁹ Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, March 6, 2020, at 139-145, attached as Ex. 10.

use of SCR. There are several examples of similar sources having to bear the costs of these controls to meet Clean Air Act requirements. Ecology would thus be justified in finding SCR for the heaters, boilers and FCCUs that it evaluated in its draft regional haze plan as cost effective.

Although Ecology states that SCR would be cost effective for several refinery emission units, Ecology also states it “will perform a more extensive and in-depth engineering evaluation on each refinery to generate more accurate and defensible cost estimates.”¹⁴⁰ Presumably, Ecology states this because the Western States Petroleum Association (WSPA) has apparently contended that Ecology did not use the EPA SCR cost spreadsheet appropriately and that Ecology’s application of the EPA’s SCR cost spreadsheet is not appropriate for refineries.¹⁴¹ However, as Ecology stated in its draft regional haze plan, the Washington refineries generally did not adequately document the basis for their SCR cost assessments. Ecology chose to use EPA’s SCR cost spreadsheet which is based on the SCR chapter of the Control Cost Manual and which, in turn, has been very well documented and which also went through public notice and comment.

The EPA’s SCR cost calculation spreadsheet was based on cost algorithms for utility boilers, but that fact does not make the SCR cost algorithms not applicable to other types of emission units such as those at refineries. Several of the refinery emission units that Ecology evaluated for SCR are boilers and process heaters. The emissions characteristics from those sources are similar or identical to the emission characteristics from boilers. In fact, EPA’s AP-42 emission factors for petroleum refining refer to its emission factors for boilers (i.e., Section 1.3 “Fuel Oil Combustion” or Section 1.4 “Natural Gas Combustion”) for determining emissions from boilers and process heaters used in the petroleum refining industry.¹⁴²

The SCR cost spreadsheet algorithms were developed based on its Integrated Planning Model (IPM) version 6. The SCR cost documentation for the IPM written by Sargent & Lundy was in turn based on a wealth of design and cost information, including from the “Analysis of the [Midwest Ozone Group (MOG)] and [Lake Michigan Air Directors Consortium (Ladco) FGD and SCR Capacity and Cost Assumptions in the Evaluation of the Proposed EGU 1 and EGU 2 Emission Controls” and the J.E. Cichanowicz study “Current Capital Costs and Cost-effectiveness of Power Plant Emissions Control Technologies,” as well as Sargent & Lundy’s in-house database of recent SCR projects.¹⁴³ The costs generally reflect hot side, high dust SCRs, which also likely reflects the type of SCR that would be employed at refinery emission units including FCCUs.¹⁴⁴ While the cost algorithms are identified as providing the “average” costs with the “average” project,¹⁴⁵ the algorithms are also based on a significant amount of SCR

¹⁴⁰ *Id.*

¹⁴¹ *Id.* at 188, 192, and 194.

¹⁴² See U.S. EPA, AP-42, Chapter 5.1, Table 5.5-1, available at https://www.epa.gov/sites/default/files/2020-09/documents/5.1_petroleum_refining.pdf. See also EPA, AP-42, Chapter 1 External Combustion Sources, Sections 1.3 and 1.4, available at <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-fifth-edition-volume-i-chapter-1-external-0>.

¹⁴³ See Sargent & Lundy, IPM Model – Updates to Cost and Performance for APC Technologies, SCR Cost Development Methodology, Final, January 2017, prepared by Sargent & Lundy, at 1, available at https://www.epa.gov/sites/default/files/2018-05/documents/attachment_5-3_scr_cost_development_methodology.pdf.

¹⁴⁴ *Id.*

¹⁴⁵ *Id.*

installation and SCR retrofit data from the industry where such controls are probably the most widely used (i.e., the fossil fuel-fired electric utility industry).

EPA's August 20, 2019 regional haze guidance refers to its cost spreadsheets developed as part of its recommendation that states follow the EPA's Control Cost Manual "to facilitate apples-to-apples comparisons of different controls options for the same source, and comparisons across different sources."¹⁴⁶ EPA does not require vendor-generated cost assessments for making regional haze control decisions.¹⁴⁷ EPA also cautions against relying solely on vendor cost estimates that are not sufficiently documented and without verifying that the vendor followed the costing principles of the EPA's Control Cost Manual.¹⁴⁸ The Washington refineries relied on the EPA SCR cost calculation spreadsheet for SCR cost analyses for at least some refinery emission units, although the refineries did not generally document its decisions to use higher retrofit factors or higher costs for items such as ammonia reagent as is discussed further below.¹⁴⁹ Thus, Ecology should not discount its cost effectiveness analyses of SCR for refinery emission units as not sufficiently accurate to determine that SCR is cost effective for an emission unit at a refinery.

SCR systems have been retrofit to many refinery emission units over the years, including at fluid catalytic cracking units (FCCUs). A paper from 2002 discusses the success of SCR retrofit at an FCCU at the BP Whiting Refinery and refers to SCR installations at FCCUs dating back to 1986.¹⁵⁰ SCR has also been used on refinery boilers and heaters, including at some Washington refineries,¹⁵¹ and can achieve in excess of 95% NO_x control from the NO_x emitted from the heaters.¹⁵² Experience using SCRs in the refinery industry shows the controls are reliable and have low operational and maintenance costs.¹⁵³

For all of these reasons, Ecology is justified to use the EPA SCR cost spreadsheet to determine cost effectiveness of SCR at the heaters, boilers and FCCUs for the five refineries it evaluated for controls for its regional haze plan.

In its draft regional haze plan, Ecology identified the emission units listed in Table 4 for which SCR would be a cost effective regional haze control. The cost effective controls identified by

¹⁴⁶ See U.S. EPA, Guidance on Regional Haze Plans for the Second Implementation Period, August 20, 2019, at 31.

¹⁴⁷ *Id.* at 32.

¹⁴⁸ *Id.*

¹⁴⁹ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P at P-173 to P-194 (Shell Four-Factor Analysis), P-229 to P-283 (Tesoro Four-Factor Analysis), and P-334 to P-336 (U.S. Oil Four-Factor Analysis).

¹⁵⁰ See Bouziden, Gerald, K. Gentile and R.G. Kunz, Selective Catalytic Reduction of NO_x from Fluid Catalytic Cracking Case Study: BP Whiting Refinery, National Environmental & Safety Conference, April 23-24, 2002, New Orleans, LA, at 1, available at <https://www.cormetech.com/wp-content/uploads/2018/05/env-03-128-kunz-0-Whiting-Refinery-FCC.pdf>.

¹⁵¹ For example, BP Cherry Point has installed SCR on its #2 hydrogen plant SMR furnace, its #6 and #7 boilers, according to its August 26, 2014 Air Operating Permit #015R1M1 on the Northwest Clean Air Agency's (NWCAA's) website at <https://nwcleanairwa.gov/?wpdmdl=981>.

¹⁵² See, e.g., Jensen-Holm, Hans et al., Haldor-Topsoe, Combating NO_x from refinery sources using SCR, available at http://www.topsoe.com/sites/default/files/combating_nox_from_refinery_sources_using_scr.ashx.pdf; LaPlante, Marie P. et al., How Low Can You Go? Catalytic NO_x Reduction in Refineries, available at <http://nawabi.de/project/hrsg/Topsoe.pdf>.

¹⁵³ *Id.*

Ecology and listed in Table 4 below would reduce NOx emissions from the refineries by a total of 3,803 tons per year (based on Ecology’s assumed NOx emissions reduced with SCR), reflecting a 64.5% reduction in the total 2014 annual NOx emissions from the five refineries

Table 4. Ecology’s Identification of Cost Effective SCR Determinations at the Petroleum Refineries¹⁵⁴

Plant	Emission Unit	Cost Effectiveness, \$/ton	NOx Reduced, tons per year
BP Cherry Point	#1 Reformer Heaters	\$3,101/ton	304 tpy
	Crude Heater	\$2,051/ton	393 tpy
	Reforming furnace #1 (N H2 Plant)	\$6,161/ton	262 tpy
	Reforming furnace #2 (S H2 Plant)		
Phillips 66 Ferndale	Crude Heater 1F-1	\$2,640/ton	166 tpy
	FCCU/CO Boiler/Wet Gas Scrubber 4F-101	\$3,954/ton	247 tpy
Shell Puget Sound	Boiler #1 Erie City – 31G-F1	\$2,441/ton	179 tpy
	FCCU Regenerator Unit	\$1,948/ton	521 tpy
	CRU #2 HTR, INTERHTR—10H-101, 102, 103	\$6,346/ton	69 tpy
Marathon Petroleum Company (Tesoro) Anacortes Refinery	FCCU	\$1,159/ton	843.3 tpy
	F 102 Crude Heater	\$2,962/ton	147.6 tpy
	F 201 Vacuum Flasher Heater	\$7,589/ton	57.6 tpy
	F 6650 CAT Reformer Heater	\$3,736/ton	117 tpy
	F 6651 CAT Reformer Heater	\$3,520/ton	124.2 tpy
	F 751 Main Boiler	\$2,159/ton	202.5 tpy
	F 752 Main Boiler	\$2,570/ton	170.1 tpy

Ecology evaluated SCR to achieve 90% NOx removal and assumed a 3.25% interest rate and a 25-year life in amortizing capital costs of control. Ecology’s assumptions are defensible. EPA’s Control Cost Manual states that, while in theory, SCR can achieve close to 100% NOx removal,

¹⁵⁴ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, at 188 (finding SCR at BP Cherry Point units was cost effective), at 192 (finding SCR at Phillips 66 units was cost effective), at 194 (finding SCR at Shell units was cost effective), and at 198 (finding SCR at Marathon Petroleum Company (Tesoro) units was cost effective). Appendix J at J-1.

in practice, SCRs are routinely designed to achieve 90% or greater NO_x removal.¹⁵⁵ Ecology's use of a 3.25% interest rate is justified, as the Federal Reserve Prime Rate has been at 3.25% since March 2020.¹⁵⁶ In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate.¹⁵⁷ A 25-year life of an SCR system is also justifiable as discussed in EPA's Control Cost Manual,¹⁵⁸ as long as the remaining useful life of the emission unit in question is not restricted to a shorter time period. None of the refineries indicated a restricted remaining useful life of any of the above units in the company four-factor analyses.

For those refinery units for which SCR was not determined to be cost effective, Ecology should evaluate SNCR as a NO_x control. The McIlvaine Company indicates that urea-based SNCR used at refinery process units and boilers has generally achieved 50-70% NO_x reduction.¹⁵⁹

In addition, Ecology should not limit evaluation of LNB/ULNBs for units greater than 40 MMBtu/hour capacity, as such burners are available for smaller units.¹⁶⁰ The California Air Resources Board (CARB) determined as far back as 1991 that heaters and boilers as small as 5 MMBtu/hour or greater could meet NO_x "best available retrofit control technology" (BARCT) limits of 30 ppmv (or about 0.036 lb/MMBtu).¹⁶¹ However, more recently, California's South Coast Air Quality Management District (AQMD) concluded that even lower NO_x limits, as low as 9 ppm, could be met with ULNB at boilers and process heaters as small as 2 MMBtu/hr.¹⁶² This was based on actual ULNB retrofit experience at boilers and heaters in the San Joaquin Unified Air Pollution Control District (SJVAPCD).¹⁶³ The Ventura County Air Pollution Control District in California also found that boilers and process heaters as small as 2 MMBtu/hr could meet NO_x limits of 9 ppm with ULNB.¹⁶⁴ Thus, Ecology should not limit the evaluation of reasonable progress controls to only heaters and boilers greater than 40 MMBtu/hr.

For companies demonstrating that the retrofit of ULNBs is not technically feasible and for which SNCR or SCR are truly not cost effective, Ecology should evaluate the costs of replacing an existing boiler or heater with a new unit equipped with state-of-the-art ULNBs. If a unit is near the end of its useful life, this could be a very cost effective and readily implementable approach to reducing NO_x emissions.

¹⁵⁵ See U.S. EPA, Control Cost Manual, Section 4, Chapter 2, at pdf page 5, available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

¹⁵⁶ <https://fred.stlouisfed.org/series/DPRIME>.

¹⁵⁷ U.S. EPA, Control Cost Manual, Section 1, Chapter 2 (November 2016) at 16, available at https://www.epa.gov/sites/production/files/2017-12/documents/epacmcostestimationmethodchapter_7thedition_2017.pdf.

¹⁵⁸ See U.S. EPA, Control Cost Manual, Section 4, Chapter 2, at pdf page 80, available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

¹⁵⁹ See <http://www.mcilvainecompany.com/industryforecast/refineries/background1/text/Chapter%20X/Chapter%20X.htm>.

¹⁶⁰ See, e.g., BP Cherry Point Refinery Regional Haze Four Factor Analysis, April 2020, in Appendix P of Public Review Draft Regional Haze Plan, October 2021, at P-3.

¹⁶¹ As discussed in Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, March 6, 2020 at 120 (attached as Ex. 10).

¹⁶² *Id.* at 121.

¹⁶³ *Id.*

¹⁶⁴ *Id.* at 121-122.

For those units listed in Table 4 above that Ecology found SCR to be a cost effective control, Ecology should adopt requirements for the companies to install SCR as part of its current regional haze action. Ecology has shown that SCR is cost effective for those units, and Ecology's review of the other three factors do not provide a reason to exclude any of the emission units in Table 4 above from requirement to install SCR requirement to achieve reasonable progress towards the national visibility goal.

Instead of adopting SCR control requirements for the emission units listed in Table 4 above, Ecology states that it will conduct a more extensive cost evaluation of SCR. Yet, the cost algorithms of the EPA SCR cost spreadsheet are already based on numerous SCR cost evaluations. Further, Ecology already requested four-factor analyses of potential regional haze controls from the refineries include for SCR, and Ecology determined that the company analyses were not well documented or justified.¹⁶⁵ In most cases, the cost analyses submitted by the refineries overstate costs and understate emissions reductions, and so the cost effectiveness numbers should not be relied upon by Ecology. In the sections that follow, more specific concerns with each company's four-factor analyses of NO_x controls are provided along with a discussion of the four-factor analyses provided by Ecology in its current draft regional haze plan.

2. BP Cherry Point Refinery

Ecology calculated a Q/d value for the BP Cherry Point facility of 36.4, and it is ranked 5th highest Q/d on Ecology's list of sources it evaluated.¹⁶⁶ NPCA data shows that the facility impacts regional haze at 14 Class I areas.¹⁶⁷ BP Cherry Point submitted a four-factor analysis for nine emission units at the refinery:

- Crude Charge Heater;
- South Vacuum Heater;
- #1 Reformer Heaters;
- #2 Reformer Heaters;
- Naphtha HDS Charger Heater;
- Naphtha HDS Stripper Reboiler;
- Hydrocracker R-4 Heater;
- #1 Hydrogen Plant (North and South Furnaces);
- #5 Boiler.

¹⁶⁵ *Id.* at 190, 192, 195, 196, 199, and 202 (Ecology stating that the various refinery companies provided limited supporting data for their cost analyses).

¹⁶⁶ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 161.

¹⁶⁷ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvNwQ6LnVIVjzq4FYoQIOOlPyFmp/view>.

BP states that Ecology narrowed the request to only LNB/ ULNB and SCR. BP analyzed the cost effectiveness of LNB/ULNB and SCR for these units and found that no controls were cost-effective. The following provides comments on BP’s cost effectiveness analyses in its Four-Factor submittal.

Issues with Four-Factor Analyses for BP Cherry Point

1. One of the deficiencies in BP Cherry Point’s cost analyses is that it used a 5% interest rate in amortizing capital costs.¹⁶⁸ BP claimed that this interest rate was based on the past Federal Reserve Prime Rate, but the Federal Reserve Prime Rate has been at 3.25% since March 2020.¹⁶⁹ In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate.¹⁷⁰ In a cost effectiveness analyses being done today, even a 5.0% interest rate is unreasonably high, given the current bank prime lending rate of 3.25%. Use of a higher interest rate results in higher annualized capital costs.
2. For all of the units except the #5 boiler and the #3 reformer heater, BP used cost estimates that were previously done in 2010 and which reflected a 2007 dollar basis.¹⁷¹ BP scaled those costs up from 2007 dollars to 2020 dollars using the Nelson Farrar Refinery Construction cost index, which increased capital costs by 41%.¹⁷² EPA’s Control Cost Manual cautions against attempting to escalate costs more than five years from the original cost analysis.¹⁷³ EPA states that “[e]scalation with a time horizon of more than five years is typically not considered appropriate as such escalation does not yield a reasonably accurate estimate.”¹⁷⁴ Further, the prices of an air pollution control do not always rise at the same level as price inflation rates. As an air pollution control is required to be implemented more frequently over time, the costs of the air pollution control often decrease due to improvements in the manufacturing of the parts used for the control or different, less expensive materials used, etc. Notably, for SCR, EPA’s SCR cost effectiveness spreadsheet can be used to estimate costs of SCR, as was used by Ecology for the #1 reformer heaters, the crude heater, the reforming furnace #1 (N H₂ Plant), and for the reforming furnace #2 (S H₂ plant).¹⁷⁵
3. BP Cherry Point stated that LNBS/ULNBs were not technically feasible on the crude charge heater, the naphtha HDS charge heater, the naphtha HDS stripper reboiler, and the

¹⁶⁸ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P-6.

¹⁶⁹ <https://fred.stlouisfed.org/series/DPRIME>.

¹⁷⁰ EPA, Control Cost Manual, Section 1, Chapter 2 (November 2016) at 16, available at https://www.epa.gov/sites/production/files/2017-12/documents/epacmcostestimationmethodchapter_7thedition_2017.pdf.

¹⁷¹ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses) at P-10 to P-13.

¹⁷² *Id.* at P-13.

¹⁷³ EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017, at 19.

¹⁷⁴ *Id.*

¹⁷⁵ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 189-191.

hydrocracker R-4 heater due to flame impingement and that they would need to rebuild the heater to accommodate the burner retrofit.¹⁷⁶ A review of the air operating permit for BP Cherry Point shows that most of these heaters and boilers were installed fifty years ago in 1970. Given the age of the heaters, it could be more economical to replace the heaters and boilers with new heaters equipped with state-of-the-art ultra-low NO_x burners. The heaters could also be retrofitted with SCR, which Ecology found to be cost effective.¹⁷⁷

4. BP Cherry Point Assumed that LNB and ULNB could only achieve NO_x emission rates of 0.055 to 0.060 lb/MMBtu for forced and balanced draft heaters with air preheaters.¹⁷⁸ The company provided no citation or support for that statement. NO_x emission limits for refinery heaters and boilers reflective of LNB/ULNB are typically set at 0.040 lb/MMBtu or lower.¹⁷⁹ Tesoro evaluated LNB/ULNB to meet NO_x emission rates of 0.040 lb/MMBtu in its four-factor analyses.¹⁸⁰
5. BP applied retrofit factors to the costs of SCR which would increase the capital costs due to purported retrofit difficulty, but BP provided no justification for the use of retrofit factors. For the one unit for which BP utilized EPA's SCR cost spreadsheet, it must be noted that the cost algorithms in EPA's SCR cost spreadsheet are based on the average SCR retrofit costs for utility boilers, which often have retrofit difficulties and additional costs. Thus, some retrofit difficulty is already built into the costs of EPA's SCR cost spreadsheet. Ecology must request justification and documentation for use of any SCR retrofit factors.
6. BP assumed a cost for ammonia reagent in the SCR systems of \$0.33/lb, or \$660/ton, which is unreasonably high.¹⁸¹ No basis was cited for this cost. EPA's SCR Control Cost Manual chapter assumes a much lower cost for 29% aqueous ammonia of \$0.293/gallon, based on the average cost for ammonia for 2016 from the U.S. Geological Survey's Minerals Commodities Summaries for which EPA provided a weblink.¹⁸² The U.S. Geological Survey Minerals Commodities Report currently lists the 2020 average cost for ammonia at \$220/ton.¹⁸³ Thus, BP's costs of ammonia reagent were greatly overstated. Use of anhydrous ammonia is the least expensive form of the reagent and is commonly

¹⁷⁶ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses), at P16-P18.

¹⁷⁷ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 189-191.

¹⁷⁸ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses), at P-8.

¹⁷⁹ See Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, at 139-144, Attached as Ex. 10.

¹⁸⁰ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses), at P-20.

¹⁸¹ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses) at Attachment B.

¹⁸² See EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 82.

¹⁸³ U.S. Geological Survey, Minerals Commodities Summaries 2020, at 116, available at <https://www.usgs.gov/centers/nmic/mineral-commodity-summaries>.

used at utility installations. The State must ensure that the most cost-effective approaches to controlling NO_x emissions with SCR and also that wholly unjustified and unreasonably high costs for ammonia are not used. Notably, Ecology used EPA's default cost for 29% aqueous ammonia in its SCR cost calculations.¹⁸⁴

7. BP assumed an SCR would operate 8,784 hours per year (i.e., the total number of hours in a leap year) in estimating the reagent costs for SCR at the South Vacuum Heater, which clearly is in error as that could only occur once every four years. BP also assumed 8,760 hours of operation for estimating reagent costs for SCR at the #1 Hydrogen Plant North and South Reforming Furnaces. Ecology must ensure that the assumed operating hours for estimating reagent costs are consistent with the baseline emissions and baseline capacity factor assumed in each SCR cost analysis.
8. With respect to non-air quality impacts of SCR controls, BP has indicated that spent catalyst will require off-site disposal or recycling.¹⁸⁵ However, EPA's Control Cost Manual states that use of rejuvenated and regenerated catalyst can both reduce catalyst replacement costs and eliminate catalyst disposal costs. Ecology must ensure that the SCR cost analyses assume the most cost-effective options for catalyst replacement.
9. BP assumed it would take 7 to 10 years to implement additional NO_x control strategies.¹⁸⁶ The company states that it would need to follow the refinery maintenance turnaround (TAR) schedule, which is 5 to 6 years per unit, but it seems very unlikely that each unit is on the same maintenance schedule and instead the maintenance schedules are likely staggered.

In its public review draft regional haze plan, Ecology presented SCR cost effectiveness evaluations for the reformer heaters, the crude heater, and the hydrogen plant (North and South furnaces).¹⁸⁷ Ecology's cost effectiveness analyses were based on EPA's SCR cost spreadsheet, and it appears Ecology relied on the default cost assumptions of the EPA spreadsheet (such as the cost of ammonia and catalyst replacement cost).¹⁸⁸ Ecology assumed 90% NO_x reduction with SCR, and Ecology assumed a 25 year life and a 3.25% interest rate in amortizing capital costs of control. The cost differences between Ecology's cost estimates based on EPA's Control Cost Manual Spreadsheet and BP's are very significant, as shown in the table below. This information is from Ecology's discussion in the narrative section of the draft regional haze SIP, and additional information on Ecology's costs are included in a spreadsheet printout in Appendix P of its draft plan.

¹⁸⁴ WDOE, Public Review Draft, Regional Haze Plan for the Second Implementation Period, October 2021, Appendix P at P357.

¹⁸⁵ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P (BP Cherry Point Four-Factor Analyses) at P-14.

¹⁸⁶ *Id.*

¹⁸⁷ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 189.

¹⁸⁸ Based on a review of the tables with heading "EPA Cost Control Estimates Compared to Refinery Estimates for SCR 8/18/2020, Refineries Regional Haze Review – BP Cherry Point" in Appendix P of the WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at P-355 to P-361.

Table 5. Summary from Draft Washington Regional Haze SIP: Comparison of BP’s Cost Analysis to Ecology’s Cost Analysis for SCR at Certain BP Cherry Point Emission Units¹⁸⁹

BP’s Capital Cost	BP’s Annual Maintenance Cost	BP’s Cost Effectiveness, \$/ton	WDOE’s Capital Cost	WDOE’s Maintenance Cost	WDOE’s Cost Effectiveness	NOx Reduced, tpy
Reformer Heaters						
\$94,809,582	\$420,048	\$24,378/ton	\$9,929,730	\$49,649	\$3,101/ton	304 tpy
Crude Heater						
\$94,809,582	\$420,048	\$24,378/ton	\$9,325,358	\$46,627	\$2,051/ton	425 tpy
Hydrogen Plant Reforming Furnaces						
\$143,325,183	\$479,126	\$78,065/ton	\$9,325,358	\$46,627	\$6,161/ton	141 tpy

BP’s cost estimates are almost ten times as high as the SCR cost estimates for the same units calculated by Ecology with EPA’s SCR cost spreadsheet. Ecology’s analysis clearly shows that SCR at these BP Cherry Point units would be cost effective and would reduce NOx emissions by a total of 870 tons per year. Ecology states that BP did not provide the data it used to scale the cost data.¹⁹⁰ Thus, Ecology has found BP did not adequately support its SCR cost calculations.

Ecology did not find that the energy and non-air quality impacts of compliance with SCR should be an impediment to implementation of SCR, because the costs for the additional power needed to drive exhaust fans is included in the EPA Control Cost Manual SCR cost estimate.¹⁹¹ Ecology also states that BP Cherry Point did not indicate that any equipment had a limited lifetime.¹⁹² Ecology did state that the time necessary for compliance needed to accommodate installation during a planned shutdown to ensure reasonable costs, and Ecology states that installation of controls would likely occur in the next implementation period.¹⁹³ However, BP indicated in its four-factor submittal that currently scheduled cycle ending turnarounds for the emission units affected, which BP states vary from 2021 to 2026.¹⁹⁴ Thus, Ecology could ensure installation of SCR during the second implementation period and coordinate the installation with planned shutdowns at BP Cherry Point.

Ecology points out in its draft plan that the National Park Service has issued a finding to Ecology stating that emissions from BP Cherry Point “were adversely impacting air quality related values at North Cascades and Olympic National Parks.”¹⁹⁵ Thus, Ecology should prioritize regional haze controls at the BP Cherry Point refinery to not only address regional haze but also to address visibility impairment at these parks which the National Park Service has reasonably attributed to the BP Cherry Point refinery. Ecology has found that SCR is cost effective for the

¹⁸⁹ Data from WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 189-190 (Tables 7-8, 7-9, and 7-10).

¹⁹⁰ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 191.

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*, Appendix P at P-12 (BP Cherry Point Four-Factor Submittal).

¹⁹⁵ *Id.* at 188.

reformer heaters, crude heater, and the hydrogen plant reforming furnaces to reduce NOx emissions by 90% from these emission units. Ecology should include these control requirements in its regional haze plan for the second implementation period.

3. Marathon Petroleum Company (MPC) Anacortes Refinery (Formerly Tesoro Refinery)

The Anacortes Refinery is currently owned by Marathon Petroleum Company (MPC) and was previously owned by Tesoro Refining & Marketing Company LLC (Tesoro, which Ecology also refers to as “Tesoro Northwest Company”¹⁹⁶). Ecology calculated a Q/d value for the Tesoro Anacortes Refinery of 30.7, and it is ranked 6th highest Q/d on Ecology’s list of sources it evaluated.¹⁹⁷ NPCA data shows that the facility likely impacts regional haze at 10 Class I areas.¹⁹⁸ Tesoro submitted a four-factor analysis of controls for the Anacortes facility on April 29, 2020.¹⁹⁹ In Ecology’s review of NOx emission rates per 1,000 barrels per day (bpd) production rate at refineries nationwide, the Anacortes refinery formerly owned by Tesoro was at the highest emitter of NOx at 16.12 tons per year per 1,000 bpd production, which was two to five times as high as the NOx emissions per 1,000 bpd at all other refineries in the United States that Ecology reviewed.²⁰⁰

Tesoro submitted a four-factor analysis for FCCU and boilers and heaters greater than 40 MMBtu/hr. Specifically, Tesoro submitted a four-factor analysis for the following emission units at the refinery:

- Crude Heater 2
- Vacuum Flasher Heater
- CCU Feed Heater
- DHT Feed Heater
- Boiler 1
- Boiler 2
- Boiler 3
- NHT Feed Heater
- NHT Column C-6600 Reboiler
- CR Feed Heaters
- CO Boiler 2
- FCCU.

Tesoro only evaluated controls for NOx. The company stated that Ecology only requested evaluations of low NOx burners/ultra-low NOx burners and SCR. The following provides comments on Tesoro’s cost effectiveness analyses in its Four-Factor submittal.

¹⁹⁶ *Id.* at 185.

¹⁹⁷ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 161.

¹⁹⁸ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOLPyFmp/view>.

¹⁹⁹ *Id.*, Appendix P at P-199 through P-291.

²⁰⁰ *Id.* at 185-186 (Table 7-6).

Issues with Four-Factor Analyses for Boilers and Heaters at Tesoro Refinery

1. Tesoro did not conduct four-factor analyses for any heaters or boilers that had installed NOx controls since 2005.²⁰¹ However, none of Tesoro's heaters or boilers that it exempted from a four-factor analysis have installed controls to reduce NOx emissions. Those units that it exempted include Crude Heater 1 (Unit F-101), Crude Heater 3 (Unit F-103), CGS Column C C-113 Reboiler (Unit F-104), BenSat Column C – 6601 Reboiler (Unit F-6602), and Carbon Monoxide Boiler 2 (Unit F-302).²⁰² Given that SCR is such a highly effective NOx control, the state should require SCR installation for these units.
2. Tesoro used 2014 as the baseline year for cost effectiveness analysis for the various emission units, but it did not provide any analysis to show that 2014 emissions were reflective of emissions expected in 2028. EPA's regional haze guidance for the second implementation period provides that the cost effectiveness analyses for pollution controls evaluated in four-factor analyses should be based on current emissions or projected 2028 emissions.²⁰³ The use of emissions from over six years ago needs to be justified. For example, Tesoro assumed the CCU Feed Heater, Unit F-301, only operated 839 hours per year.²⁰⁴ The Crude Heater 2 (Unit F-102) and the Vacuum Flash Heater (F-201) were evaluated at operational levels over 8,000 hours per year, whereas most other units were evaluated at lower operating hours in the range of 4,600-5,500 hours per year.²⁰⁵ The annual hours of operation define how much pollution is emitted in a year and thus how much pollution can be decreased with a particular control being evaluated, which can greatly impact the cost effectiveness of a pollution control. Thus, the state should ensure that the assumptions are reasonable projections of emissions in 2028.
3. In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate. The current bank prime rate is 3.25%. Yet, much higher interest rates were used in amortizing capital costs of controls evaluated in the four-factor analyses. Tesoro used an interest rate of 5.5%. In a cost effectiveness analyses being done today, even a 5.5% interest rate is unreasonably high, given the current bank prime lending rate of 3.25%. Use of a higher interest rate results in higher annualized capital costs.
4. In the SCR cost analyses, a very high and unjustified cost of ammonia was assumed of \$900/ton.²⁰⁶ No basis was cited for this cost. The company calculated a cost per gallon for 19.5% aqueous ammonia of \$3.513 per gallon.²⁰⁷ Yet, EPA's SCR Control Cost Manual chapter assumes a much lower cost for 29% aqueous ammonia of \$0.293/gallon, based on the average cost for ammonia for 2016 from the U.S. Geological Survey's

²⁰¹ *Id.*, Appendix P at P-207 (Tesoro Four-Factor Analysis).

²⁰² *Id.*

²⁰³ EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, at 29.

²⁰⁴ Tesoro Four-Factor Analysis at pdf page 39 (Appendix A at F-301).

²⁰⁵ WDOE, Public Review Draft, Second Regional Haze Plan, Appendix P, Tesoro Four-Factor Analysis at Appendix A in SCR cost spreadsheets for Units F-652, F-751, F-752, F-753, F-6600, F-6650/1/2/3, F-6601, and F-304.

²⁰⁶ *Id.* at P-224 (Tesoro Four-Factor Analysis, Appendix A at F-102)

²⁰⁷ *Id.*

Minerals Commodities Summaries for which EPA provided a weblink.²⁰⁸ The U.S. Geological Survey Minerals Commodities Report currently lists the 2020 average cost for ammonia at \$220/ton.²⁰⁹ Thus, Tesoro's costs of ammonia reagent were greatly overstated. It is also not clear why only 19.5% aqueous ammonia was considered as a reagent. EPA's Control Cost Manual states that 29% aqueous ammonia is the more commonly used form of aqueous ammonia.²¹⁰ Use of anhydrous ammonia is the least expensive form of the reagent and is commonly used at utility installations.²¹¹ The State must evaluate the most cost-effective approaches to controlling NOx emissions with SCR and must not use a wholly unjustified and very high cost for ammonia of \$900/ton.

5. Tesoro's cost effectiveness evaluations of SCR used the EPA SCR cost spreadsheet that has been made available with its SCR Control Cost Manual chapter for all units except for the FCCU for which Tesoro used a cost estimate from a similar installation.²¹² For the FCCU, only a one-page printout of an apparent spreadsheet was provided for review. The State should not accept cost effectiveness calculations without the underlying data and assumptions, so it can ensure that the cost analysis is consistent with the methodology of EPA's Control Cost Manual and that the assumptions for items such as reagent and catalyst costs are reasonable. In addition, EPA states "[i]f a cost quote or opinion prepared for one source is adopted or adapted to another source, EPA recommends the state explain in its SIP submittal how the source for which the original cost estimate was made is relevant to estimating the cost of compliance for the source in question."²¹³
6. With respect to the use of EPA's cost spreadsheet for SCR, there is one entry made by Tesoro into the EPA cost spreadsheet that ultimately defines the size of the SCR reactor, and that is the "base case fuel gas volumetric flow rate factor" which is in units of ft³/min-MMBtu/hr. These numbers seem very high in comparison to the values EPA uses for coal-fired boilers for which EPA defines as a constant for fuel type regardless of unit size or actual gas throughput.²¹⁴ Tesoro's fuel gas volumetric flow rate factors for each combustion turbine are roughly a factor of 100 higher than the fuel gas volumetric flow rate factors of 484-547 cubic ft³/min-MMBtu/hour (depending on coal type) used by EPA in its SCR cost spreadsheet for coal-fired boilers.²¹⁵ If the state may rely on that information, Ecology must request documentation and justification for the base case fuel gas volumetric flow rate factors used by Tesoro.
7. Tesoro assumed NOx control efficiencies across the SCRs of 90%-96% for most boilers and heaters, with the exception of Boiler 3 (F-753) for which Tesoro only assumed a

²⁰⁸ See EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 82.

²⁰⁹ U.S. Geological Survey, Minerals Commodities Summaries 2020, at 116, available at <https://www.usgs.gov/centers/nmic/mineral-commodity-summaries>.

²¹⁰ EPA, Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 15.

²¹¹ *Id.* at pdf page 5.

²¹² Tesoro Four-Factor Analysis at Appendix A.

²¹³ U.S. EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019, at 32.

²¹⁴ EPA Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction at pdf page 59, Table 2.6.

²¹⁵ Compare values used for flue gas volumetric flow rate factors in Draft Washington Regional Haze Plan, Appendix P, in Appendix A of Tesoro's Four-Factor Analyses to Table 2.6 of EPA's Control Cost Manual, Section 4, Chapter 2 Selective Catalytic Reduction.

control efficiency of 75%.²¹⁶ No justification was provided for assuming a much lower than typical NOx removal rate across the SCR.

8. With respect to the cost evaluations for ULNB for the heaters and boilers, Tesoro only assumed a 20-year life of controls in determining the amortizing the capital costs of control.²¹⁷ There was no basis provided for only assuming a 20-year life of ULNB.²¹⁸ If ULNB only have a life of 20-years, then the State should not exempt any boiler or heater from a four-factor analysis if it has installed controls by 2005 as claimed by Tesoro,²¹⁹ because the low NOx burners installed at Crude Heater 1 (F-101), Crude Heater 3 (F-103), CGS Column C-113 Reboiler (F-104), BenSat Column C-6601 Reboiler (F-6602), and Carbon Monoxide Boiler 1 (F-302)²²⁰ will be at the end of their useful lives during the second planning period. Ultra-low NOx burners should have a useful life 25-30 years or more. In evaluations of BART for natural gas and oil-fired utility boilers, EPA evaluated combustion controls such as low NOx burners and SCR at lifetimes of 30 years.²²¹ In the four-factor submittals made to Ecology, BP Cherry Point assumed 25 years for LNB/ULNBs as well as SCR.²²² Thus, the State should not allow the use of a useful life of an ULNB any less than 25 years for the Tesoro units.
9. Tesoro did not provide justification for the NOx emission rate for the ULNBs. For most units, Tesoro assumed a 0.04 lb/MMBtu achievable NOx rate with ULNB.²²³ Yet, the CGH Heater F-104, which has ULNBs,²²⁴ is subject to a NOx limit of 0.035 lb/MMBtu.²²⁵ The State should thus require an evaluation of ULNBs to meet a similar 0.035 lb/MMBtu NOx rate. For Units F-751 and F-752 which are boilers, a much higher NOx rate of 0.11 lb/MMBtu was assumed for ULNB.²²⁶ Yet, Unit F-753 which is also a boiler of similar size to Units F-751 and F-752 but which has been retrofitted with low NOx burners and internal flue gas recirculation (IFGR),²²⁷ Tesoro assumed a NOx rate of 0.04 lb/MMBtu in its evaluation of SCR cost effectiveness²²⁸ which presumably reflects its current emission rate. Thus, Tesoro's evaluation of ULNBs for Units F-751 and F-752

²¹⁶ WDOE, Public Review Draft, Second Regional Haze Plan, Appendix P, Tesoro Four Factor Analysis, Appendix A, SCR spreadsheet printouts.

²¹⁷ *Id.* at P-284 to P-291.

²¹⁸ *Id.* at P-219.

²¹⁹ *Id.* at P-207.

²²⁰ *Id.*

²²¹ *See, e.g.,* EPA's proposed action on Arkansas' Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944 at 18953, 18960 (Apr. 8, 2015).

²²² WDOE, Public Review Draft, Second Regional Haze Plan, Appendix P, at P-15 (BP Cherry Point Four-Factor Analysis).

²²³ *Id.*, Appendix P at P-284 to P-291 (Tesoro Four-Factor Analyses).

²²⁴ *Id.* at P-207 to P-208.

²²⁵ January 26, 2010 Air Operating Permit #013R1 for Tesoro Refining and Marketing Company at 72 (Permit Term 5.2.13).

²²⁶ WDOE, Public Review Draft, Second Regional Haze Plan, Appendix P at P-287 to P-288 (Tesoro Four-Factor Analyses).

²²⁷ *Id.* at P-211.

²²⁸ *Id.* at P-262.

should have evaluated cost effectiveness to meet a similar NO_x rate as has been achieved at Unit F-753 with a similar control.

10. Tesoro did not evaluate the cost effectiveness of the most effective control – ULNB plus SCR.

In its public review draft regional haze plan, Ecology presented SCR cost effectiveness evaluations for seven emission units at the Anacortes refinery (FCCU, F102 Crude Heater, F201 Vacuum Flasher Heater, F6650 CAT Reformer Heater, F751 Main Boiler, and F752 Main Boiler).²²⁹ Ecology's cost effectiveness analyses were based on EPA's SCR cost spreadsheet, and it appears Ecology relied on the default cost assumptions of the EPA spreadsheet (such as the cost of ammonia and catalyst replacement cost).²³⁰ Ecology assumed 90% NO_x reduction with SCR, and Ecology assumed a 25 year life and a 3.25% interest rate in amortizing capital costs of control. The cost differences between Ecology's cost estimates based on EPA's Control Cost Manual Spreadsheet and Tesoro's are very significant, as shown in the tables below. Note that Ecology refers to the cost estimates as "MPC" cost estimates, but the cost estimates are from Tesoro's April 20, 2020 Four-Factor Analysis of controls, which is in Appendix P of Ecology's draft regional haze plan.

Table 6 shows the differences in Tesoro's and Ecology's calculated capital costs and annual maintenance costs for SCRs at the FCCU and at the F102 Crude Heater, to show how significant the cost differences are between Tesoro and Ecology. This information was provided in and discussed in Ecology's draft regional haze plan.²³¹ Note that Ecology states that Tesoro's (MPC's) cost is based on SNCR controls at 60% NO_x removal efficiency.²³² However, that appears to be in error. A review of Tesoro's four-factor analysis shows that the Tesoro cost numbers (labeled as MPC cost numbers in the draft plan) are reflective of SCR costs (not SNCR) to achieve 89.7% NO_x control (not 60% control) and 833.10 tons per year of NO_x reduction.²³³

Table 7 further below shows the difference in cost of SCR per ton of NO_x removed between Tesoro and Ecology's cost analyses for all other units for which Ecology evaluated SCR costs. The differences in capital costs and maintenance costs of the units other than the FCCU and the F102 Crude Heater were not discussed in the narrative section of Ecology's draft plan but are provided in Appendix P of Ecology's draft second regional haze plan.²³⁴ The differences in calculated SCR costs/ton of NO_x removed make clear that Tesoro's costs are significantly higher than the costs calculated by Ecology using the EPA SCR cost spreadsheet provided with EPA's Control Cost Manual.

²²⁹ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 199.

²³⁰ Based on a review of the tables with heading "EPA Cost Control Estimates Compared to Refinery Estimates for SCR 8/18/2020, Refineries Regional Haze Review – Tesoro" in Appendix P of the WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at P-347 to P-354.

²³¹ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021 at 199-200.

²³² *Id.* at 200.

²³³ *Id.*, Appendix P at P-223.

²³⁴ Ecology's specific cost data in Appendix P is difficult to ascertain from what appear to be printed tables from a spreadsheet that span several pages.

Table 6. Summary from Draft Washington Regional Haze SIP, SCR Cost Analysis for the FCCU and the F102 Crude Heater at the Anacortes Refinery – Comparison of Tesoro’s (MPC’s) Cost Analysis to Ecology’s Cost Analysis²³⁵

Tesoro’s Capital Cost	Tesoro’s Maintenance Costs (\$/yr)	Tesoro’s Cost Effectiveness, \$/ton	WDOE’s Capital Cost	WDOE’s Maintenance Costs (\$/yr)	WDOE’s Cost Effectiveness	NOx Reduced, tpy
FCCU						
\$114,030,975	\$570,155	\$14,381/ton	\$10,286,436	\$51,432	\$1,159/ton	843.3 tpy
F102 Crude Heater						
\$20,876,000	\$104,380	\$16,086/ton	\$5,084,927	\$25,425	\$2,962/ton	147.6 tpy

Table 7. Comparison of SCR Cost Effectiveness as Calculated by Tesoro to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Anacortes Refinery²³⁶

Anacortes Refinery Emission Unit	Tesoro’s Cost Effectiveness, \$/ton	WDOE’s Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
FCCU	\$14,381/ton	\$1,159/ton	843.3 tpy
F102 Crude Heater	\$16,086/ton	\$2,962/ton	147.6 tpy
F201 Vacuum Heater	\$35,276/ton	\$7,589/ton	57.6 tpy
F6650 CAT Reformer Heater	\$21,196/ton	\$3,736/ton	117 tpy
F6651 CAT Reformer Heater	\$21,196/ton	\$3,520/ton	124.2 tpy
F751 Main Boiler	\$10,060/ton	\$2,159/ton	202.5 tpy
F752 Main Boiler	\$10,513/ton	\$2,570/ton	170.1 tpy

For SCR at the FCCU, Tesoro’s cost estimates are roughly ten times as high as the SCR cost estimates for the same units calculated by Ecology with EPA’s SCR cost spreadsheet. Ecology’s analysis clearly shows that SCR at the FCCU would be cost effective at \$1,159/ton and would reduce NOx emissions by 843 tons per year. For the F102 Crude heater, Ecology states that MPC (Tesoro) “incorrectly changed the default value for the Ft³/min-MMBtu/hr input to the EPA Control Cost manual for all their determinations other than the FCCU.”²³⁷ That issue is discussed in Comment 6 above. Thus, Ecology has found Tesoro (MPC) did not adequately support its SCR cost calculations. Ecology’s SCR cost estimates are much lower than Tesoro’s (MPC’s) for all of the emission units listed in Table 6 above. Assuming Ecology is using a \$6,300/ton cost effectiveness threshold for refineries as it has proposed for the pulp and paper

²³⁵ Data from WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 189-190 (Tables 7-8, 7-9, and 7-10).

²³⁶ *Id.* at 199.

²³⁷ *Id.* at 200.

industry,²³⁸ SCR must be considered a cost effective control for all units listed in Table 6 above except the F201 Vacuum Heater. Those cost effective SCR installations could collectively reduce NOx emissions from the Anacortes Refinery by 1,604.7 tons per year.

Ecology did not find that the energy and non-air quality impacts of compliance with SCR should be an impediment to implementation of SCR, because the costs for the additional power needed to drive exhaust fans is included in the EPA Control Cost Manual SCR cost estimate.²³⁹ Ecology also states that MPC (Tesoro) did not indicate that any equipment had a limited lifetime.²⁴⁰ Ecology did state that the time necessary for compliance needed to accommodate installation during a planned shutdown to ensure reasonable costs, and Ecology states that installation of controls would likely occur in the next implementation period.²⁴¹ However, if Ecology met the requirements of EPA's regional haze regulations and included final determinations to require SCR in this regional haze plan for the second implementation period, many of these SCR installations could occur during the second implementation period and be coordinated with maintenance outages at the Anacortes refinery.

Ecology points out in its draft plan that the Federal Land Managers have “made comments regarding the impacts to the Olympic [National Park] Class I area” in the context of commenting on a PSD permit for the Tesoro Anacortes Refinery.²⁴² Indeed, the National Park Service's 2017 comments stated that Tesoro Anacortes refinery contributed significantly to visibility impairment at North Cascades National Park and at Olympic National Park, and the Park Service noted that the refinery should be considered for controls in the next regional haze plan.²⁴³ It is not clear whether these comments constituted a determination of reasonably attributable visibility impairment. Nonetheless, Ecology should prioritize regional haze controls at the MPC Anacortes refinery to not only address regional haze but also to address visibility impairment at Olympic National Park attributable to the refinery. Ecology has found that SCR is cost effective for the FCCU, CAT reformer heaters, main boilers, and the F102 crude heater. Ecology should include these control requirements in its regional haze plan for the second implementation period.

4. Shell Puget Sound Refinery

The Shell Puget Sound Refinery is another refinery located near Anacortes, Washington. Ecology calculated a Q/d value for the BP Cherry Point facility of 24.5.²⁴⁴ NPCA data shows that the facility can potentially impact regional haze at 8 Class I areas.²⁴⁵ Shell submitted a four-factor analysis evaluating NOx controls for its FCCU and boilers and heaters greater than 40

²³⁸ *Id.* at 182.

²³⁹ *Id.* at 201.

²⁴⁰ *Id.*

²⁴¹ *Id.*

²⁴² *Id.* at 198.

²⁴³ April 27, 2017 Letter from the National Park Service to the Washington Department of Ecology at 4, attached as Ex. 11.

²⁴⁴ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 161.

²⁴⁵ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvNwQ6LnVIVjzq4FYoQIOOLPyFmp/view>.

MMBtu/hr. The company stated that Ecology only requested evaluations of LNB/ULNB and SCR.²⁴⁶ The units that Shell evaluated NOx controls for include the following:

- Vacuum Pipe Still (VPS) Charge Heater 1
- VPS Charge Heater 2
- Vacuum Tower Heater
- Delayed Coking Unit (DCU) Charge Heater
- Hydrotreater Unit 1 (HTU1) Charge Heater
- HTU1 Fractionator Reboiler
- HTU2 Stripper Reboiler
- Hydrotreater Unit 2 (HTU2) Fractionator Reboiler
- Catalytic Reforming Unit #2 (CRU2) Charge Heater
- CRU2 Interheater #1
- CRU2 Stabilizer Reboiler
- Erie City Boiler #1
- Cogen Gas Turbine Generator (GTG) Heat Recover Steam Generator (HRSG) with duct burners (GTG1, GTG2, and GTG3)

Shell states that Ecology narrowed the request to only LNB/ ULNB and SCR. Shell analyzed the cost effectiveness of LNB/ULNB and SCR for these units.

Shell concludes that SCR is not a cost-effective control for NOx emissions at the refinery.²⁴⁷ Shell indicates that the cost-effectiveness of LNB is much lower than those of SCR. However, Shell argues that a more thorough, unit-specific evaluation by vendors will be required to determine if the installation of low-NOx is technically feasible and cost-effective.²⁴⁸ It must be noted that several of the units listed above already have LNBS installed, as do some additional units at the Shell refinery which were not evaluated in the four-factor analysis. The following provides comments on Shell's cost effectiveness analyses in its Four-Factor submittals.

Issues with Four-Factor Analyses for Shell Puget Sound Refinery

1. Shell used 2019 emissions as baseline and stated that 2019 "is representative of the anticipated actual emissions in the near future."²⁴⁹ Shell identifies the 2019 baseline emissions for NOx as 592.6 tons per year for "all applicable units."²⁵⁰ It is not clear whether this includes all NOx emissions at the source, but emissions data provided in Ecology's draft second regional haze implementation plan for the years 2011 through 2018 show much higher NOx emissions, ranging from 1,054 tons per year to 1,409 tons per year.²⁵¹ EPA states that generally, baseline emissions for pollution control analyses should be based on a recent period of historical emissions. If a company is proposing that 2028 emissions will be significantly lower than past historical emissions, there must be a documented basis for that assumption such as enforceable requirements or a

²⁴⁶ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P-138 (Shell Puget Sound Refinery Four-Factor Analysis).

²⁴⁷ *Id.* at P-148.

²⁴⁸ *Id.*

²⁴⁹ *Id.* at P-142.

²⁵⁰ *Id.*

²⁵¹ *Id.* at 84 (Table 4-8).

documented commitment to participate in energy efficiency or renewable energy programs.²⁵² Ecology has indicated that 2014 emissions of 1,230 tons per year are the representative baseline NOx emissions and the expected 2028 emissions for the Shell refinery.²⁵³ Given that Shell has not provided documentation to indicate that the much lower NOx baseline of 592.6 tons per year that it relied on as reflective of 2028 emissions is based on enforceable limits or other documented and verifiable commitments, the state is justified in assuming 2014 NOx emissions are reflective of 2028 emissions for the Shell Puget Sound Refinery.

2. In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate. The current bank prime rate is 3.25%. Yet, much higher interest rates were used in amortizing capital costs of controls evaluated in the four-factor analyses. Shell used an unreasonably high interest rate of 7%.²⁵⁴ In a cost effectiveness analyses being done today, an interest rate of 3.25% must be used to be consistent with EPA's Control Cost Manual. Use of a higher interest rate results in significantly higher annualized capital costs.
3. For all units except the Erie City Boiler, the Shell cost effectiveness analyses assumed a 20-year life of controls.²⁵⁵ No justification has been included in Shell's four-factor analysis for only assuming a 20-year life of controls in the cost-effectiveness analyses. As previously stated, in evaluations of BART for natural gas and oil-fired utility boilers, EPA evaluated combustion controls such as low NOx burners and SCR at lifetimes of 30 years.²⁵⁶ EPA's SCR chapter of its Control Cost Manual indicates that the life of SCR at industrial boilers would be 20-25 years.²⁵⁷ In the four-factor submittals made to Ecology, BP Cherry Point assumed 25 years for LNB/ULNBs as well as SCR.²⁵⁸ Thus, the State should not allow the use of a 20-year useful life of a LNB or an SCR to be assumed in the cost effectiveness analyses for any of the Shell units, with one possible exception being the Erie City Boiler 1 (ECB1).
4. With respect to the remaining useful life of the Erie City Boiler 1, Shell provided brief information for this boiler that "substantial upgrades will be required to replace the boiler's refractory and the boiler skin" and that "the remaining useful life of the unit is

²⁵² See U.S. EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, August 20, 2019, at 29.

²⁵³ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 84 (Table 4-8).

²⁵⁴ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P-146.

²⁵⁵ *Id.* at P-196.

²⁵⁶ See, e.g., EPA's proposed action on Arkansas' Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944 at 18953, 18960 (Apr. 8, 2015).

²⁵⁷ EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 82.

²⁵⁷ U.S. Geological Survey, Minerals Commodities Summaries 2020, at 80.

²⁵⁸ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P4, P-15, and Attachment B of the BP Cherry Point Four-Factor Analysis.

expected to be less than 10 years.”²⁵⁹ The company assumed 8 years in its four-factor analysis for the Erie City Boiler.²⁶⁰ Importantly, Shell did not indicate that it would be retiring Erie City Boiler 1. If Shell plans on these substantial upgrades to the boiler, then Ecology should not consider this boiler as having a shortened remaining useful life in the NOx control cost effectiveness analyses. If the company is planning to retire and replace the boiler within the next 8 years, then Ecology should impose an enforceable retirement date for the boiler.²⁶¹ Ecology should also require that any replacement boiler should, at the very least, be equipped with state-of-the-art NOx controls. The Erie City Boiler 1 currently has no controls and, at 182.4 tons per year, has the highest emissions of NOx of any of the units evaluated in Shell’s four-factor analysis. Ecology should not allow this unit or its replacement to avoid controls because it is either going to be reconstructed or removed from service in the next 8-10 years.

5. In its four-factor analysis, Shell assumed that LNB would only achieve a NOx emission rate of 0.06 lb/MMBtu. Shell provided no justification for assuming such a high NOx emission rate with LNB. As was discussed above, NOx emission limits for refinery heaters and boilers reflective of LNB/ULNB are typically set at 0.040 lb/MMBtu or lower.²⁶² In fact, one unit at the Shell Puget Sound refinery, the 95 MMBtu/hour CDHDS Heater in the Hydrotreater Unit #3, which was constructed in 2003, is subject to a NOx limit of 0.035 lb/MMBtu with an LNB for NOx control.²⁶³ It is also worth noting that Tesoro evaluated LNB/ULNB to meet NOx emission rates of 0.040 lb/MMBtu in its four-factor analyses.²⁶⁴
6. For SCR, Shell used the EPA SCR cost spreadsheet made available with EPA’s recent update to its SCR chapter of the Control Cost Manual. However, Shell applied a very high retrofit factor of 1.5 to each SCR evaluation, without providing any justification for any retrofit factor much less a retrofit factor that increases SCR costs by 50%. The cost algorithms in EPA’s SCR cost spreadsheet are based on the average SCR retrofit costs for utility boilers, which often have retrofit difficulties and additional costs. Thus, some retrofit difficulty is already built into the costs of EPA’s SCR cost spreadsheet. Ecology must scrutinize the use of any retrofit factor. EPA’s SCR cost spreadsheet already adds a retrofit factor of 20% compared to the cost of SCR installation at a new unit for SCR retrofits at existing units.²⁶⁵ EPA’s Control Cost Manual states that higher retrofit factors than 1 can be used “provided the reasons for using a higher retrofit factor are appropriate and fully documented.”²⁶⁶ No unit-specific documentation of the justification for higher SCR retrofit factors was included in Shell’s four-factor submittal.

²⁵⁹ *Id.* at P-148 (Shell Four-Factor Analyses).

²⁶⁰ *Id.*

²⁶¹ See EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 20, which states that a state “may be able to justify not selecting a source for analysis of control measures because there is an enforceable requirement for the source to cease operation by a date after 2028.”

²⁶² See Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, at 139-144. (Ex. 10.)

²⁶³ May 5, 2015 Air Operating Permit AOP 014R1M1 for Shell Puget Sound Refinery at 13 and 127.

²⁶⁴ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P-222 to P-291 (Appendix A of Tesoro Four-Factor Analysis).

²⁶⁵ EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 66.

²⁶⁶ *Id.* (emphasis added)

7. Shell appears to have assumed that that the gas stream of each heater/boiler would need to be reheated to accommodate SCR.²⁶⁷ However, Shell did not provide any data on each of the units for which these costs were included in the SCR cost effectiveness to indicate that reheating the gas stream to accommodate SCR operation is necessary. Ecology must request further information before it can justify the inclusion of these costs for reheating the gas stream for each of the emission units at the Shell refinery.

In its public review draft regional haze plan, Ecology presented SCR cost effectiveness evaluations for three emission units at Shell Puget Sound Refinery (Boiler #1 Erie City- 31G-F1, FCCU Regenerator Unit, and CRU2 Heater and Interheaters).²⁶⁸ Ecology’s cost effectiveness analyses were based on EPA’s SCR cost spreadsheet, and it appears Ecology relied on the default cost assumptions of the EPA spreadsheet (such as the cost of ammonia and catalyst replacement cost).²⁶⁹ Ecology assumed 90% NOx reduction with SCR, and Ecology assumed a 25 year life and a 3.25% interest rate in amortizing capital costs of control. The cost differences between Ecology’s cost estimates based on EPA’s Control Cost Manual Spreadsheet and Shell’s are significant, as shown in the table below.

Table 8 shows the differences in Shell’s and Ecology’s calculated capital costs and annual maintenance costs for SCRs at the Boiler #1 Erie City, FCCU Regenerator Unit, and the CRU2 Heater, to show how significant the cost differences are between Shell and Ecology. This information was provided in and discussed in Ecology’s draft regional haze plan.²⁷⁰

Table 8. Comparison of SCR Cost Effectiveness as Calculated by Shell to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Shell Puget Sound Refinery²⁷¹

Puget Sound Refinery Emission Unit	Shell’s Cost Effectiveness, \$/ton	WDOE’s Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
Erie City Boiler 1	\$12,511/ton	\$2,441/ton	179 tpy
FCCU Regenerator Unit	Not Evaluated	\$1,948/ton	521 tpy
CRU2 Charge Heater/Interheaters	\$10,813/ton	\$6,346/ton	69 tpy

For SCR at Erie City Boiler 1, Shell’s cost estimates are more than five times as high as the SCR cost estimates for the same units calculated by Ecology with EPA’s SCR cost spreadsheet.

²⁶⁷ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P Shell Four-Factor Analysis at Appendix B.

²⁶⁸ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 195.

²⁶⁹ Based on a review of the tables with heading “EPA Cost Control Estimates Compared to Refinery Estimates for SCR 8/18/2020, Refineries Regional Haze Review – Tesoro” in Appendix P of the WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at P-347 to P-354.

²⁷⁰ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021 at 195-196.

²⁷¹ *Id.* at 195.

Ecology did not take into account a shortened remaining useful life of the boiler in its SCR cost effectiveness analysis, as Shell did. Ecology states “With an eight-year lifetime, a requirement for the boiler to be retired after this period would be justified and the boiler should be required to decommission. Any new boiler brought in to replace it would need to go through the permitting process as a new source.”²⁷² Ecology stated in the draft regional haze plan that it will work with the Northwest Clean Air Agency “to have a regulatory order on the boiler to shut down by January of 2028.”²⁷³ It is not clear why such a regulatory order has not been established and included as part of this regional haze plan. Ecology should not allow the Erie City boiler to avoid regional haze controls without making the decommissioning and the requirement to obtain a permit for any replacement boiler as a new source (meaning not allowing a replacement boiler to “net out” of permitting review) enforceable requirements.

Shell did not evaluate controls for the FCCU regenerator unit, but Ecology did and found that SCR at that unit would be cost effective at \$1,948/ton and would reduce NO_x by 521 tpy. Ecology’s analysis clearly shows that SCR at the FCCU would be cost effective. Ecology’s analysis of SCR cost effectiveness at the CRU#2 heater and interheaters also shows that the cost effectiveness is reasonable.

Ecology did not find that the energy and non-air quality impacts of compliance with SCR should be an impediment to implementation of SCR, because the costs for the additional power needed to drive exhaust fans is included in the EPA Control Cost Manual SCR cost estimate.²⁷⁴ Ecology did not indicate that Shell had stated that any equipment had a limited lifetime other than Erie City Boiler 1.²⁷⁵ Ecology did state that the time necessary for compliance needed to accommodate installation during a planned shutdown to ensure reasonable costs, and Ecology states that installation of controls would likely occur in the next implementation period.²⁷⁶ However, if Ecology met the requirements of EPA’s regional haze regulations and included final determinations to require SCR in this regional haze plan for the second implementation period, these SCR installations could occur during the second implementation period and be coordinated with maintenance outages at the Shell Puget Sound refinery. Ecology found that the Shell Puget Sound Refinery had the second highest NO_x emissions per 1,000 bpd production of all of the eighty-four refineries nationwide that it evaluated.²⁷⁷ Ecology has found that SCR is cost effective for Erie City Boiler 1, the FCCU, regenerator unit, and the CRU #2 heater and interheaters. Ecology should include these control requirements (or, for Eric City Boiler 1, a requirement to be decommissioned by 2028) in its regional haze plan for the second implementation period.

²⁷² *Id.* at 195-196.

²⁷³ *Id.* at 197.

²⁷⁴ *Id.* at 197.

²⁷⁵ *Id.*

²⁷⁶ *Id.*

²⁷⁷ *Id.* at 185.

5. Phillips 66 Ferndale Refinery

Ecology calculated a Q/d value for the BP Cherry Point facility of 10.9.²⁷⁸ NPCA data shows that the facility impacts regional haze at 5 Class I areas.²⁷⁹ Phillips 66 provided four-factor analyses of NO_x controls for the following emission units at its Ferndale Refinery:²⁸⁰

- Crude Heater
- Crude Heater
- Alky Heater
- Reformer - Pretreater heater
- Reformer heater
- Reformer heater
- Reformer heater
- Reformer heater
- #1 Boiler
- #2 Boiler
- #3 Boiler
- DHT Heater
- S-Zorb Heater.

Phillips 66 states that Ecology narrowed the request to only LNB/ ULNB and SCR.²⁸¹ Phillips 66 analyzed the cost effectiveness of LNB/ULNB and SCR for these units and concluded that neither SCR nor LNB are cost-effective control for NO_x emissions reductions at the refinery.²⁸² The following provides comments on the four-factor analyses submitted by Phillips 66.

Deficiencies and shortcomings in the Phillips 66 Analyses are as follows:

1. Phillips 66 used a five-year average of annual emissions from 2014-2018 as baseline emissions.²⁸³ EPA's regional haze guidance for the second implementation period provides that the cost effectiveness analyses for pollution controls evaluated in four-factor analyses should be based on current emissions or projected 2028 emissions. Ecology has indicated that 2014 emissions of 723 tons per year are the representative baseline NO_x emissions and the expected 2028 emissions for the Phillips 66 Ferndale

²⁷⁸ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 161.

²⁷⁹ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOIPyFmp/view>.

²⁸⁰ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P37 to P-85 (Phillips 66 June 2020 Four-Factor Analysis). Note that Phillips 66 originally submitted its four-factor analysis in April of 2020 (also in Appendix P), but it revised the analysis in June 2020 because it claimed that "the burners currently in operation for the alkylation heater (17F-1) and the DHT heater (33F-1) are considered low-NO_x burners," and thus Phillips 66 excluded LNBs as a control to be evaluated for these units. See June 29, 2020 cover letter to Phillips 66 June 2020 Four-Factor Analysis.

²⁸¹ *Id.* at P-43.

²⁸² *Id.*

²⁸³ *Id.* at P-49.

refinery.²⁸⁴ The state should ensure that the emission assumptions are reasonable projections of emissions in 2028.

2. In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate. The current bank prime rate is 3.25%. Yet, much higher interest rates were used in amortizing capital costs of controls evaluated in the four-factor analyses. Phillips 66 used an unreasonably high interest rate of 7%. In a cost effectiveness analyses being done today, an interest rate of 3.25% must be used to be consistent with EPA's Control Cost Manual. Use of a higher interest rate results in significantly higher annualized capital costs.
3. For all units, the Phillips 66 cost effectiveness analyses assumed a 20-year life of controls.²⁸⁵ No justification has been included in Phillip 66's four-factor analysis for only assuming a 20-year life of controls in the cost-effectiveness analyses. As previously stated, in evaluations of BART for natural gas and oil-fired utility boilers, EPA evaluated combustion controls such as low NOx burners and SCR at lifetimes of 30 years.²⁸⁶ EPA's SCR chapter of its Control Cost Manual indicates that the life of SCR at industrial boilers would be 20-25 years. In the four-factor submittals made to Ecology, BP Cherry Point assumed 25 years for LNB/ULNBs as well as SCR. Thus, the State should not consider a useful life of a LNB or an SCR to be less than 25 years in the cost effectiveness analyses for any of the Phillips 66 units.
4. Phillips 66 assumed high NOx rates with LNB in the range of 0.09 to 0.23 lb/MMBtu.²⁸⁷ As was discussed above, NOx emission limits for refinery heaters and boilers reflective of LNB/ULNB are typically set at 0.040 lb/MMBtu or lower.²⁸⁸ In fact, one unit at the Shell Puget Sound refinery, the 95 MMBtu/hour CDHDS Heater in the Hydrotreater Unit #3, which was constructed in 2003, is subject to a NOx limit of 0.035 lb/MMBtu with an LNB for NOx control.²⁸⁹ It is also worth noting that Tesoro evaluated LNB/ULNB to meet NOx emission rates of 0.040 lb/MMBtu in its four-factor analyses.²⁹⁰ Moreover, the #1 boiler, the DHT Heater, and the S-Zorb heater at the Phillips 66 refinery, which all have LNB, have baseline NOx emission rates in the range of 0.031 to 0.042 lb/MMBtu, per Phillips 66 SCR cost effectiveness analysis.²⁹¹

²⁸⁴ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, at 84 (Table 4-8).

²⁸⁵ *Id.* at P-78 (Appendix B of Phillips 66 June 2020 Four-Factor Analysis).

²⁸⁶ *See, e.g.,* EPA's proposed action on Arkansas' Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944, 18953, 18960 (Apr. 8, 2015).

²⁸⁷ *Id.*

²⁸⁸ *See* Stamper, V. & M. Williams, Oil and Gas Sector, Reasonable Progress Four-Factor Analysis of Controls for Five Source Categories: Natural Gas-Fired Engines, Natural Gas-Fired Turbines, Diesel-Fired Engines, Natural Gas-Fired Heaters and Boilers, Flaring and Incineration, at 139-144. (Ex. 10).

²⁸⁹ May 5, 2015 Air Operating Permit AOP 014R1M1 for Shell Puget Sound Refinery at 13 and 127, available at <https://nwcleanairwa.gov/?wpdmdl=6716>.

²⁹⁰ WDOE, Public Review Draft, Regional Haze Plan for Second Implementation Period, October 2021, Appendix P at P-222 to P-291 (Appendix A of Tesoro Four-Factor Analysis).

²⁹¹ *Id.* at P-78 to P-84.

5. Phillips 66 assumed continual operation every hour of the year (i.e., 8,760 hours per year – 100% capacity factor) in assessing reagent and other operational expenses of SCR.²⁹² Unless the company demonstrates that its emitting units operated 8,760 hours per year during the baseline period, this assumption results in overstated operational costs.
6. Phillips 66 included the same dollar amount for construction and management costs, contingencies, and escalation for every SCR cost analysis. Specifically, the company included costs of \$3,841,150 for construction and management, \$1,323,000 for contingencies, and \$168,300 for escalation for each SCR cost analysis.²⁹³ These were all identified as “indirect capital costs.”²⁹⁴ Such costs are typically scaled to the size of the unit, but these costs clearly have not been scaled. For many units, these costs exceed the costs of the SCR and the direct installation costs. In addition, to the extent these costs include owner’s costs, such as the costs for owner activities to oversee the project regarding engineering, management, and procurement, or to fund the project, such costs must be excluded from the cost effectiveness analysis. EPA does not allow owner’s costs to be included in cost effectiveness analyses under the Control Cost Manual.²⁹⁵

In its public review draft regional haze plan, Ecology presented SCR cost effectiveness evaluations for two emission units at Phillips 66 Refinery (Crude Heater 1F-1 and the FCCU/CO Boiler).²⁹⁶ Ecology’s cost effectiveness analyses were based on EPA’s SCR cost spreadsheet, and it appears Ecology relied on the default cost assumptions of the EPA spreadsheet (such as the cost of ammonia and catalyst replacement cost).²⁹⁷ Ecology assumed 90% NO_x reduction with SCR, and Ecology assumed a 25 year life and a 3.25% interest rate in amortizing capital costs of control. The cost differences between Ecology’s cost estimates based on EPA’s Control Cost Manual Spreadsheet and Phillips 66’s cost estimates are significant, as shown in the table below.

Table 9 shows the differences in Phillip 66’s and Ecology’s calculated capital costs and annual maintenance costs for SCRs at the Crude Heater 1F-1, demonstrating how significant the cost differences are between Shell and Ecology. Table 9 also shows Ecology’s cost effectiveness for SCR at the FCCU/CO Boiler. Phillips 66 did not evaluate any additional controls for the FCCU because in 2006, the company modified the unit to install enhanced selective noncatalytic reduction (ESNCR).²⁹⁸ Ecology evaluated SCR for the FCCU because “FCC units are a large

²⁹² *Id.* at P-78 to P-84.

²⁹³ *Id.* at P-81.

²⁹⁴ *Id.*

²⁹⁵ EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 65.

²⁹⁶ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 192-193.

²⁹⁷ Based on a review of the tables with heading “EPA Cost Control Estimates Compared to Refinery Estimates for SCR 8/18/2020, Refineries Regional Haze Review – Phillips 66” in Appendix P of the WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at P-369 to P-375.

²⁹⁸ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, at 193

source of NOx emissions at refineries that have them.”²⁹⁹ Further, the addition of a catalytic reactor would work in concert with the ammonia injection system of the existing SNCR, and thus SCR would not be incompatible with the existing ESNCR system.

Table 9. Comparison of SCR Cost Effectiveness as Calculated by Phillips 66 to SCR Cost Effectiveness Calculated by Ecology for Certain Emission Units at the Phillips 66 Refinery³⁰⁰

Phillips 66 Refinery Emission Unit	Phillips 66’s Cost Effectiveness, \$/ton	WDOE’s Cost Effectiveness, \$/ton	NOx Reduced with SCR, tpy
Crude Heater 1F-1	\$12,225/ton	\$2,640/ton	166 tpy
FCCU/CO Boiler	Not Evaluated	\$3,954/ton	247 tpy

For SCR at Crude Heater 1F-1, Phillips 66’s cost estimates are more than five times as high as the SCR cost estimate for the same unit calculated by Ecology with EPA’s SCR cost spreadsheet. Ecology commented that Phillips 66 did not supply the data they used to scale the SCR cost data.³⁰¹ Thus, Ecology has found BP did not adequately support its SCR cost calculations.

Phillips 66 did not evaluate controls for the FCCU/CO Boiler, but Ecology did and found that SCR at that unit would be cost effective at \$3,954/ton and would reduce NOx by 247 tpy. Ecology’s analysis of SCR cost effectiveness at the Crude Heater 1F-1 also shows that the control is cost effective.

Ecology did not find that the energy and non-air quality impacts of compliance with SCR should be an impediment to implementation of SCR, because the costs for the additional power needed to drive exhaust fans is included in the EPA Control Cost Manual SCR cost estimate.³⁰² Ecology did not indicate that Phillips 66 had stated that any equipment had a limited lifetime.³⁰³ Ecology did state that the time necessary for compliance needed to accommodate installation during a planned shutdown to ensure reasonable costs, and Ecology states that installation of controls would likely occur in the next implementation period.³⁰⁴ However, if Ecology met the requirements of EPA’s regional haze regulations and included final determinations to require SCR in this regional haze plan for the second implementation period, these SCR installations could occur during the second implementation period and be coordinated with maintenance outages at the Phillips 66 refinery. Ecology found that the Phillips 66 Refinery had the fifth highest NOx emissions per 1,000 bpd production of all of the eighty-four refineries nationwide that it evaluated.³⁰⁵ Ecology has found that SCR is cost effective for Crude Heater 1F1 and the

²⁹⁹ *Id.*

³⁰⁰ *Id.* at 192-193.

³⁰¹ *Id.* at 193.

³⁰² *Id.* at 193.

³⁰³ *Id.*

³⁰⁴ *Id.*

³⁰⁵ *Id.* at 185.

FCCU/CO boiler. Ecology should include these control requirements in its regional haze plan for the second implementation period.

6. U.S. Oil & Refining Company – Tacoma Refinery

U.S. Oil & Refining (U.S. Oil) owns a refinery in Tacoma. According to Ecology, the facility has a Q/d value of 3.2.³⁰⁶ U.S. Oil submitted a four-factor analysis of NOx controls for the following emission units:³⁰⁷

- Package Steam Boiler B-4
- Package Steam Boiler B-5
- Process Heater H-11.

U.S. Oil states that Ecology narrowed the request to only LNB/ ULNB and SCR.³⁰⁸ U.S. Oil analyzed the cost effectiveness of LNB/ULNB and SCR for these units and concluded that neither SCR nor LNB are cost-effective control for NOx emissions reductions at the refinery.³⁰⁹

Deficiencies and shortcomings in the U.S. Oil Four-Factor Analyses are as follows:

1. Rather than using a level of baseline emissions based on historical emissions at the emission units of the Tacoma refinery, U.S. Oil states that it is “implementing changes during the refinery’s upcoming turnaround in early 2021 that will add significantly to heat recovery, thereby reducing the fired duties of these sources.”³¹⁰ Specifically, the baseline NOx emissions assumed for the three emission units evaluated are as follows:

Unit B-4 (Package Steam Boiler)	24.96 tpy NOx
Unit B-5 (Package Steam Boiler)	10.39 tpy NOx
Unit H-11 (Process Heater)	31.56 tpy NOx ³¹¹

Ecology should request or make public how U.S. Oil’s projection of future NOx emissions from these units compares to recent annual NOx emissions from these emission units.

EPA’s regional haze guidance states with respect to the baseline control scenario for the control analysis that:

Generally, the estimate of a source’s 2028 emissions is based at least in part on information on the source’s operation and emissions during a representative historical period. However, there may be circumstances under which it is reasonable to project that 2028 operations will differ significantly from historical emissions. Enforceable requirements are one

³⁰⁶ *Id.* at 162 (Table 7-1).

³⁰⁷ *Id.*, Appendix P at P-292 to P-339 (U.S. Oil Four-Factor Analysis).

³⁰⁸ *Id.* at P-297.

³⁰⁹ *Id.* at P-297 to P-298.

³¹⁰ *Id.* at P-303.

³¹¹ *Id.*

reasonable basis for projecting a change in operating parameters and thus emissions; energy efficiency, renewable energy, or other such programs where there is a documented commitment to participate and a verifiable basis for quantifying any change in future emissions due to operational changes may be another.³¹²

Ecology should thus require that U.S. Oil identify the details of its changes, including providing verifiable information to quantify its projection of the future NOx emissions of these units. Further, Ecology must evaluate whether the changes at the refinery should be made into enforceable requirements, so as to ensure the refinery's continued operation at these emission rates throughout the second planning period and beyond.

2. In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate. The current bank prime rate is 3.25%. Yet, much higher interest rates were used in amortizing capital costs of controls evaluated in the four-factor analyses. U.S. Oil used an unreasonably high interest rate of 7%.³¹³ In a cost effectiveness analyses being done today, an interest rate of 3.25% must be used to be consistent with EPA's Control Cost Manual. Use of a higher interest rate results in significantly higher annualized capital costs.
3. For all units, the U.S. Oil cost effectiveness analyses assumed a 20-year life of controls.³¹⁴ No justification has been included in U.S. Oil's four-factor analysis for only assuming a 20-year life of controls in the cost-effectiveness analyses. As previously stated, in evaluations of BART for natural gas and oil-fired utility boilers, EPA evaluated combustion controls such as low NOx burners and SCR at lifetimes of 30 years.³¹⁵ EPA's SCR chapter of its Control Cost Manual indicates that the life of SCR at industrial boilers would be 20-25 years. In the four-factor submittals made to Ecology, BP Cherry Point assumed 25 years for LNB/ULNBs as well as SCR. Thus, the State should not allow the use of a useful life of a LNB or an SCR to be assumed in the cost effectiveness analyses for any of the U.S. Oil units.
4. U.S. Oil assumed NOx rates with LNB in the range of 0.060 to 0.072 lb/MMBtu. As was discussed above, NOx emission limits for refinery heaters and boilers reflective of LNB/ULNB are typically set at 0.040 lb/MMBtu or lower. In fact, one unit at the Shell Puget Sound refinery, the 95 MMBtu/hour CDHDS Heater in the Hydrotreater Unit #3, which was constructed in 2003, is subject to a NOx limit of 0.035 lb/MMBtu with an LNB for NOx control. It is also worth noting that Tesoro evaluated

³¹² EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, at 29.

³¹³ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P at P-337.

³¹⁴ *Id.* at P-308.

³¹⁵ *See, e.g.*, EPA's proposed action on Arkansas' Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944 at 18953, 18960 (Apr. 8, 2015).

LNB/ULNB to meet NOx emission rates of 0.040 lb/MMBtu in its four-factor analyses.

5. U.S. Oil applied a 1.5 retrofit factor to the costs for both ULNB and for SCR.³¹⁶ This is a very high retrofit factor which essentially increases the capital costs of controls by 50%. Yet, U.S. Oil did not provide unit-specific information to justify the 1.5 retrofit factor applied to each ULNB and each SCR evaluation. With respect to SCR, it must be noted that the cost algorithms in EPA's SCR cost spreadsheet are based on the average SCR retrofit costs for utility boilers, which often have retrofit difficulties and additional costs. Thus, some retrofit difficulty is already built into the costs of EPA's SCR cost spreadsheet. Ecology must scrutinize the use of any retrofit factor in U.S. Oil's SCR cost estimates using EPA's SCR cost spreadsheet. EPA's SCR cost spreadsheet already adds a retrofit factor of 20% compared to the cost of SCR installation at a new unit for SCR retrofits at existing units. EPA's Control Cost Manual states that higher retrofit factors than 1 can be used "provided the reasons for using a higher retrofit factor are appropriate and fully documented." No unit-specific documentation of the justification for higher SCR retrofit factors was included in U.S. Oil's four-factor submittal. With respect to the 1.5 retrofit factor applied to the cost effectiveness evaluation of ULNBs, U.S. Oil states this factor was included "to account for the additional challenges of retrofitting a low-NOx burner in an existing heater."³¹⁷ This is not sufficient documentation to justify a retrofit factor, especially such a high retrofit factor.
6. U.S. Oil states that SCR will require flue gas reheating.³¹⁸ However, U.S. Oil did not provide any data on each of the units for which these costs were included in the SCR cost effectiveness to indicate that the current exhaust gas stream would necessitate reheating to accommodate effective SCR operation. Ecology must request further information to justify the inclusion of these costs for reheating the gas stream for each of the emission units at the Tacoma refinery before it takes such costs into consideration.

As it did with the other refineries, Ecology evaluated SCR cost effectiveness using EPA's SCR cost calculation spreadsheet made available with its Control Cost Manual for the Heater H-11. Ecology found that cost effectiveness of SCR would be \$15,612/ton, which was lower than U.S. Oil's calculated cost effectiveness of \$18,649/ton, but Ecology still found that SCR was not cost effective for this heater.³¹⁹ However, as discussed in Comment 1 above, U.S. Oil assumed a lower baseline for its cost analysis because it is "implementing changes during the refinery's upcoming turnaround in early 2021 that will add significantly to heat recovery, thereby reducing the fired duties of these sources."³²⁰ Ecology should require that U.S. Oil identify and verify the details of its changes, and Ecology should determine if it is necessary to make such changes in emissions into enforceable requirements.

³¹⁶ WDOE, Public Review Draft, Second Regional Haze Plan, October 2021, Appendix P at P-307 and at P-337 (Table B-2).

³¹⁷ *Id.* at P-337 (Table B-2).

³¹⁸ *Id.* at P-308.

³¹⁹ *Id.* at 202.

³²⁰ *Id.* at P-303.

B. Four-Factor Analyses for the Pulp and Paper Mills

Ecology requested four-factor controls analyses for seven pulp and paper mills. The Northwest Pulp & Paper Association (NWPPA) submitted four-factor analyses for several emission units associated the following six pulp and paper mills:

- Nippon Dynawave Packaging Company Longview
- Georgia-Pacific Consumer Operations, LLC (GP Camas)
- WestRock Longview, LLC
- WestRock PC, LLC Tacoma
- Port Townsend Paper Corporation
- Packaging Corporation of America (PCA) Wallula.³²¹

Cosmo Specialty Fibers submitted a separate four-factor analysis of controls.³²²

It appears that Ecology did not request or conduct a four-factor analysis for the McKinley Paper Plant which is a pulp and paper plant and for which it identified a Q/d value of 83.1, which was the second highest Q/d value of all facilities evaluated by Ecology.³²³ Ecology must conduct a four-factor analysis of controls for this facility, as it greatly exceeded Ecology's Q/d threshold of 10.

Ecology states in its draft regional haze plan that the pulp and paper mills are a lower priority than refineries because they “are not located as close to each other as the refineries so they do not have as great of a cumulative effect.”³²⁴ Ecology also states that the potential reduction in regional haze emissions from pulp and paper mills is “vastly less than the potential refinery emission reductions.”³²⁵ However, the McKinley Paper Company (for which Ecology inexplicably did not conduct a four-factor analysis of controls) has the second highest Q/d value (83.1) of any facility for which Ecology requested four-factor analyses.³²⁶ Three other pulp and paper mills are in the top ten highest Q/d values as calculated by Ecology – the WestRock Tacoma facility, the Nippon Dynawave Packaging Company in Longview, and the Pt Townshend Paper Corporation.³²⁷ While these facilities may not all be located nearby each other, these four facilities along with Cosmo Specialty Fibers, WestRock Longview, and Georgia Pacific Consumer Operations all have Q/d values that are greater than or equal to the Q/d

³²¹ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, Appendix O at O1 through O-190 (Reasonably Available Control Technology Analysis for Washington Pulp and Paper Mills, December 2019, Northwest Pulp & Paper Association).

³²² *Id.* At O-282 to O-311 (Cosmo Specialty Fibers Four-Factor Analysis, December 2019).

³²³ *Id.* at 162.

³²⁴ WDOE Public Review Draft, Second Regional Haze Plan, October 2021, at 166.

³²⁵ *Id.* at 167.

³²⁶ *Id.* at 161.

³²⁷ *Id.* at 160-161.

threshold of 10 that Ecology set for selecting sources for review. Thus, the decision to defer controls on any of these pulp and paper mills must be based on a four-factor analysis of controls, not a determination that the facilities might not have as great of a cumulative effect on regional haze as the refineries.

1. Comments on Ecology's Determination of Cost Effective Controls for the Pulp and Paper Mills

The pulp and paper mill four-factor analyses submitted by NWPPA and by Cosmo Specialty Fibers did not propose to find that any controls were cost effective. Ecology "evaluated and adjusted" these companies' cost information and provided a summary of its revised costs/ton in Appendix J of the draft regional haze SIP. Ecology's adjustments primarily included using a 3.25% interest rate for amortizing capital costs, adjusting the useful life of controls for some sources, and adjusting SNCR NOx control efficiency to 35% for some sources.³²⁸ As will be discussed further below, further adjustments should have been made to the control cost assessments, but even with these changes, Ecology found the following controls would be cost effective based on Ecology's reasonableness cost thresholds. Ecology is assuming a NOx cost reasonableness threshold of \$6,300/ton and a PM10 cost reasonableness threshold of \$7,800/ton.³²⁹ Ecology must provide justification for its cost reasonableness thresholds. Oregon has adopted a much higher regional haze control cost threshold of \$10,000/ton.³³⁰ Colorado is also using a reasonableness cost threshold of \$10,000/ton.³³¹ New Mexico is using a reasonableness cost effectiveness threshold of \$7,000/ton.³³²

³²⁸ *Id.*, Appendix J at J-1 to J-3.

³²⁹ *Id.* at 182-183.

³³⁰ See Oregon Regional Haze State Implementation Plan for the Period 2018-2028, Aug. 27, 2021 Public Notice Draft, at 35, 45.

³³¹ See Colorado Department of Public Health and Environment, In the Matter of Proposed Revisions to Regulation No. 23, November 17 to 19, 2021 Public Hearing, Prehearing Statement, at 7, available at <https://drive.google.com/drive/u/1/folders/1TK41unOYnMKp5uuakhZiDK0-fuziE58v>.

³³² See NMED and City of Albuquerque, Regional Haze Stakeholder Outreach Webinar #2, at 12, available at https://www.env.nm.gov/air-quality/wp-content/uploads/sites/2/2017/01/NMED_EHD-RH2_8_25_2020.pdf.

Table 9. Ecology’s Identification of Cost Effective Regional Haze Controls at Pulp and Paper Mills³³³

Plant	Emission Unit	Control	Cost Effectiveness, \$/ton	RH Pollution Reduced, tons per year
Nippon Dynawave	Hog Fuel Boiler #11	SCR	\$5,466/ton	NOx -1,025 tpy
Nippon Dynawave	Hog Fuel Boiler #11	SNCR	\$5,413/ton	NOx - 500 tpy
Nippon Dynawave	Boiler #9	SCR	\$6,041/ton	NOx - 175 tpy
Nippon Dynawave	Boiler #9	LNB	\$2,754/ton	NOx - 97 tpy
Packaging Corp. of America (PCA)	Boiler #1	LNB	\$5,893/ton	NOx - 26 tpy
PCA	Boiler #2	LNB	\$4,834/ton	NOx - 30 tpy
West Rock Longview	Hog Fuel Boiler 20	SNCR	\$6,245/ton	NOx – 115 tpy
WestRock Tacoma	Lime Kiln #1	Wet ESP	\$6,964/ton	PM10 – 33 tpy

All of the above-listed emission units and controls were identified as cost effective controls in Ecology’s draft SIP narrative except SNCR at WestRock Longview’s Hog Fuel Boiler 20 at a cost effectiveness of \$6,245/ton based on a 20-year life (which was provided in the Appendix J “snapshot summary” of Ecology’s revised cost calculations of the draft regional haze plan). However, based on Ecology’s \$6,300/ton NOx cost effectiveness reasonable threshold, SNCR at West Rock Longview’s Hog Fuel Boiler 20 should also have been listed as a cost effective control. Assuming, as Ecology has, that SNCR would only reduce NOx emissions by 35%, SNCR at the West Rock Longview Hog Fuel Boiler 20 would reduce NOx by 115 tons per year.³³⁴

A longer life than the 20-year life Ecology assumed for LNBs, SNCR, and wet ESPs should have been used in its revised cost effectiveness analysis. For example, in its proposed regional haze review for SO₂, NO_x, and PM controls at a fuel oil and natural gas-fired boiler at the AECC Carl E. Bailey Generating Station in Arkansas, EPA assumed a 30-year life of combustion controls (including LNB), SNCR, WESPs, and wet scrubbers in the cost effectiveness evaluation for these controls.³³⁵

³³³ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, at 183 and Appendix J at J-1.

³³⁴ Based on a 35% NOx reduction from reported 2017 emissions of 328 tons per year, as identified in WDOE, Public Review Draft, Regional Haze Plan for the Second Implementation Period, Appendix O at O-190.

³³⁵ 80 Fed. Reg. 18944 at 18955 (Apr. 8, 2015).

With respect to SNCR, there is also ample support for assuming a useful life of 25-30 years. While EPA states in the SNCR Control Cost Manual chapter that it is assumed that an SNCR would have a life of 20 years, EPA also states that “[a]s mentioned earlier in this chapter, SNCR control systems began to be installed in Japan the late 1980’s. Based on data EPA collected from electric utility manufacturers, at least 11 of approximately 190 SNCR systems on utility boilers in the U.S. were installed before January 1993. In responses to another ICR, petroleum refiners estimated SNCR life at between 15 and 25 years.”³³⁶ Therefore, based on a 1993 SNCR installation date, these SNCR systems that EPA refers to are at least 28 years old which, all other considerations aside, strongly argues for a 30-year equipment life. Furthermore, an SNCR system is much less complicated than a SCR system, for which EPA clearly indicates the life should be 25 years for industrial units. In an SNCR system, the only parts exposed to the exhaust stream are lances with replaceable nozzles. The injection lances must be regularly checked and serviced, but this can be done relatively quickly, if necessary, is relatively inexpensive, and should be considered a maintenance item. In this regard, the lances are analogous to SCR catalyst, which is not considered when estimating equipment life. All other items, which comprise the vast majority of the SNCR system capital costs, are outside the exhaust stream and should be considered to last the life of the facility or longer. For all of these reasons, Ecology should not have assumed a life of SNCR of any shorter than 25 years, similar to what it assumed for SCR, and a similar lifetime of LNBS should also have been assumed.

In addition, Ecology states that it evaluated SNCR at a removal efficiency of 35% at the Cosmo hog fuel boiler to be consistent with what was assumed for SNCR at the other pulp and paper mills.³³⁷ However, EPA’s Control Cost Manual indicates NOx removal efficiencies for SNCR used at boilers in the pulp and paper industry can achieve a median NOx removal efficiency of 50% with urea used as the reagent with a range of 20-62%, and EPA states that the median NOx removal efficiencies with ammonia-based systems at such boilers range from 61-65%.³³⁸ Ecology should not have assumed any lower NOx removal efficiency than 50% with SNCR, assuming use of urea as a reagent. Assuming only 35% NOx removal with SNCR understates the emission reductions achievable with SNCR at boilers used in the pulp and paper industry.

Had Ecology assumed a 25-year life for SNCR and a NOx removal efficiency 50%, it is very likely that SNCR would be cost effective at the West Rock Tacoma Boiler #6, West Rock Tacoma Hog Fuel Boiler 7, PCA’s Hog Fuel Boiler, and at the Cosmo Hog Fuel Boiler, based on how close Ecology’s SNCR cost effectiveness numbers for these units were to Ecology’s \$6,300/ton reasonableness threshold. Thus, Ecology should revise the SNCR cost effectiveness

³³⁶ EPA Control Cost Manual, Section 4, Chapter 1 Selective Noncatalytic Reduction, revised 4/25/2019, at 1-54, available at <https://www.epa.gov/sites/default/files/2017-12/documents/snrcrcostmanualchapter7thedition20162017revisions.pdf>.

³³⁷ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, Appendix J at J-1.

³³⁸ EPA, Control Cost Manual, Section 4, Chapter 1 Selective Non-Catalytic Reduction, 4/25/2019, at 1-1 to 1-2, available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

analyses for these units to take into account a higher NOx removal efficiency and a longer life of the controls.

With respect to the WestRock Tacoma Hog Fuel Boiler 7, Ecology calculated cost effectiveness of SCR for this boiler at \$6,508/ton and SNCR at \$6,634/ton which is very close to Ecology's \$6,300/ton cost threshold.³³⁹ Ecology stated in its Statement of Basis for the 2011 Air Operating Permit for the facility that the owner of the Tacoma plant requested an increase in the 0.20 lb/MMBtu NOx limit for the boiler and stated that "the 0.20 lb/MMBtu limit was established based on the usage of proper combustion control and previously approved overfire air improvement (OFA) to the power boiler, but the assumptions about the degree of NOx reduction from OFA were wrong."³⁴⁰ The Statement of Basis further states that the boiler could not meet both the carbon monoxide limit and the NOx limit. The owner of the plant at that time apparently requested a higher NOx limit of 0.30 lb/MMBtu and a higher annual NOx limit of 782 tons per year, which would be a significant increase above the 0.20 lb/MMBtu and 522 ton per 12-month NOx limits that currently apply to the unit.³⁴¹ If NOx emissions are going to be allowed to be higher in a subsequent permit action, then both SCR and SNCR would readily be under Ecology's \$6,300/ton NOx threshold using Ecology's assumed 20-year life. Further, just changing the SNCR equipment life to 25 years and the interest rate to 3.25% brings the cost effectiveness of SNCR at 35% control at Hog Fuel Boiler 7 to \$6,269/ton, which is under Ecology's \$6,300/ton cost threshold. For these reasons, Ecology should include the WestRock Tacoma Hog Fuel Boiler 7 in its list of emission units with cost effective NOx controls for at least SNCR. Also, Ecology should disclose the details of the Agreed Order 7688 that was apparently entered into for resolution of the NOx noncompliance issues.³⁴²

With respect to the Georgia Pacific (GP) Camas plant, Ecology states the plant is "no longer operating as a chemical pulp mill and the emissions will change."³⁴³ According to NWPPA's four-factor report, the GP Camas facility still has some units that are operating, such as the No. 5 Power Boiler and the No. 11 Paper Machine, but it has shut down the Kraft mill, bleach plant, No. 4 Lime Kiln and the No. 4 Recovery Furnace.³⁴⁴ To the extent that these changes impact Ecology's review of controls for the facility, Ecology must make these changes into enforceable requirements (which could be accomplished by no longer including the units in the facility's operating permit and making clear that any restart of these units would be permitted as new emission units).

Despite Ecology finding that NOx controls at five units and PM10 controls at one unit would be cost effective, Ecology has not proposed any controls for these facilities. Ecology states that "[a]fter we complete the reasonability analysis and determination for the refinery facilities, we

³³⁹ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, Appendix J at J-1.

³⁴⁰ See WDOE, Statement of Basis, Air Operating Permit 000085-0, December 12, 2011, at 24, available at <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Industrial-facilities-permits/WestRock-Tacoma>.

³⁴¹ *Id.* at 7-8.

³⁴² *Id.* at 24.

³⁴³ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, at 183.

³⁴⁴ *Id.*, Appendix O at page O-14.

plan to conduct a reasonability analysis at pulp and paper facilities. This will be included in a SIP revision or the next implementation period, depending on the timing.”³⁴⁵ Ecology states that it decided that pulp and paper mills are not their first priority for implementation because the pulp and paper mills do not have as much of a cumulative effect on Class I areas as the refineries, because the pulp and paper mills are not in close proximity.³⁴⁶ Unless the close proximity of the refineries makes regional haze controls more cost effective (for example, if emission units might share pollution controls) or otherwise justifies controls under a four-factor analysis, Ecology’s proposed approach is not consistent with the regional haze rules or guidance.

Ecology also lists two other reasons for prioritizing the oil refineries for controls over the pulp and paper mills for controls, including that the potential reduction in regional haze emissions from the pulp and paper mills is much lower than the potential reduction in refinery emissions from controls and that the PCA Wallula mill is generally downwind from the nearest Class I areas.³⁴⁷ However, the four-factor analysis of the regional haze does not include visibility impacts of a source or source category. For the pulp and paper mills, Ecology is essentially using visibility impacts to reject otherwise cost effective emission controls, by claiming a lower cumulative impact from the pulp and paper industry and/or by claiming the emission reductions (and thus regional haze improvement) won’t be as significant as it could be with controls at the refineries. Yet, Ecology decided to evaluate regional haze controls for all sources with a Q/d value greater than or equal to 10. All of the pulp and paper mills evaluated by Ecology have Q/d values that range between 15.6 (West Rock Longview) to 27.9 (WestRock Tacoma),³⁴⁸ thus the facilities all have Q/d values well over Ecology’s threshold level. Further, according to NPCA’s analysis, the Nippon Dynawave facility likely affects regional haze in 21 Class I areas, the West Rock Tacoma and West Rock Longview facilities each potentially affect regional haze in 10 Class I areas, and the Port Townshend facility and Cosmo Specialty Fibers facility each likely affect regional haze in 5 Class I areas.³⁴⁹ Thus, from a regional haze perspective, the decision to evaluate controls for these pulp and paper mills is justified and warranted.

Ecology did not evaluate the other three factors of the four-factor analysis for the sources and emission units for which it found cost effective controls, and thus that analysis is presented here. In terms of energy and non-air environmental impacts, the main issue raised by NWPPA is the cost of power to run the controls,³⁵⁰ which is taken into account in the cost effectiveness analysis (including for SNCR and SCR) and thus has been addressed. NWPPA stated that all boilers and lime kilns have a remaining useful life of 20 years or more,³⁵¹ so the remaining life would not be reason to exclude controls from the regional haze plan. In terms of the time necessary for compliance, NWPPA states that it would take at least four years for compliance if additional

³⁴⁵ *Id.* at 184.

³⁴⁶ *Id.*

³⁴⁷ *Id.*

³⁴⁸ *Id.* at 161.

³⁴⁹ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOLPyFmp/view>.

³⁵⁰ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period, Appendix O-58 to O-62.

³⁵¹ *Id.* at O-63.

controls were ultimately required.³⁵² NWPPA discusses the need to stagger installation of controls if multiple units at a facility required controls,³⁵³ but that does not need to be considered an impediment to for implementing the controls that Ecology has found to be cost effective for the pulp and paper mills. Ecology has found that SCR is cost effective at Hog Fuel Boiler #11 and at Boiler #9 of the Nippon Dynawave facility,³⁵⁴ LNB is cost effective at PCA Boilers #1 and #2, and that a wet ESP is cost effective at West Rock Tacoma Lime Kiln #1. In addition, Ecology also should have identified SNCR as cost effective WestRock Longview's Hog Fuel Boiler 20, for which it calculated revised cost effectiveness of \$6,245/ton. At the minimum, Ecology should include these emission units control requirements in its regional haze plan for the second implementation period. Ecology should also re-evaluate costs of SNCR to take into account at least a 50% NOx removal efficiency and a 25-year life, which more realistically reflects the useful life of an SNCR system and which reflects the capabilities of an SNCR system at a pulp and paper mill unit. That analysis will likely result in SNCR being cost effective at additional emission units.

In the following sections, more specific comments on the four-factor analyses submitted for each pulp and paper mill are provided.

2. *Deficiencies that Appear in All of the NWPPA Pulp and Paper Mill Four-Factor Analyses*

The following provides general comments on the control evaluations and cost-effectiveness analyses that appear to apply to all of the NWPPA four-factor analyses.

NWPPA used an interest rate of 4.8% in amortizing capital costs of most of the controls evaluated.³⁵⁵ For the evaluation of low NOx burners at the power boilers, NWPPA assumed a much higher interest rate of 7%.³⁵⁶ In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate.³⁵⁷ The current bank prime rate is 3.25%.³⁵⁸ In a cost effectiveness analyses being done today, interest rates in the range of 4.8% to 7% are unreasonably high, given the current bank prime lending rate of 3.25%. Use of a higher interest rate results in higher annualized capital costs.

1. NWPPA assumed too short of a life of pollution controls in amortizing capital costs of controls. For example, NWPPA assumed 20 years for the life of particulate matter (PM) and NOx controls, such as a WESP, improvements to existing ESPs, and combustion

³⁵² *Id.* at O262.

³⁵³ *Id.* at O-62 to O-63.

³⁵⁴ Ecology also found that SNCR is cost effective at these emission units, but SCR will result in much greater NOx reductions and has a similar cost effectiveness value as SNCR. See Table 9 above.

³⁵⁵ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-86 to O-116 (Tables B-1 through Table B-31).

³⁵⁶ *Id.*, Appendix O at O-159 to O-163 (Tables B-57 through Table B-61).

³⁵⁷ EPA, Control Cost Manual, Section 1, Chapter 2 (November 2016) at 16, available at:

https://www.epa.gov/sites/production/files/2017-12/documents/epacmcostestimationmethodchapter_7thedition_2017.pdf.

³⁵⁸ <https://fred.stlouisfed.org/series/DPRIME>.

control upgrades. Further, NWPPA only assumed a 15-year life for the SO₂ control of the addition of a caustic scrubber at lime kilns and for the addition of a wet scrubber to boilers. NWPPA only assumed a 10-year life for LNBS. ESPs, WESPs, scrubbers, LNBS and other combustion controls should all be considered to have a life of at least 25 years. For example, in its proposed regional haze review for SO₂, NO_x, and PM controls at a fuel oil and natural gas-fired boiler at the AECC Carl E. Bailey Generating Station in Arkansas, EPA assumed a 30-year life of combustion controls, SNCR, WESPs, and wet scrubbers in the cost effectiveness evaluation for these controls.³⁵⁹ One just needs to evaluate how long existing controls have been in place at some of the emission units at the pulp and paper mills to know that a 25-30 year life (or more) is a much more reasonable assumption than a 15-20 year life. For example, in the Statement of Basis for the WestRock Longview Tacoma Mill, Ecology states as a description of a 2007 permitting action for replacement of a wet scrubber that the “[e]xisting scrubber is 30 years old and nearing end of service life.”³⁶⁰ As another example, Recovery Furnace 22 at the WestRock Longview Tacoma Mill was constructed in approximately 1990 and equipped with an ESP, which was about 30 years ago.³⁶¹ In addition, the Georgia Pacific Camas Mill installed an ESP at Power Boiler #3 in 1992, approximately 29 years ago,³⁶² which is still in operation although NWPPA has indicated that the Camas Mill “does not plan to operate Boiler No. 3 going forward.”³⁶³ Thus, there are several examples of pollution controls having useful lives in the range of 25-30 years at pulp and paper mills. It is important for Ecology to require use of a realistic cost of pollution controls in amortizing capital costs of controls because the life of controls assumed has a significant impact on the annualized costs of controls, as does the interest rate.

2. NWPPA appears to use a \$3,400/ton threshold to define whether pollution controls were cost-effective.³⁶⁴ However, no justification has been provided for use of this cost threshold or any cost threshold for defining measures necessary to make reasonable progress, other than that NWPPA cites to the \$3,400/ton cost threshold used in the Cross State Air Pollution Rule (CSAPR) for non-electrical generating units.³⁶⁵ For any cost threshold selected by a state, EPA’s regional haze guidance requires that the State Implementation Plan (SIP) “explain why the selected threshold is appropriate for that purpose and consistent with the requirements to make reasonable progress.”³⁶⁶ With respect to determining whether a pollution control is cost effective for a recovery furnace,

³⁵⁹ 80 Fed. Reg. 18944 at 18955 (Apr. 8, 2015).

³⁶⁰ See Washington Department of Ecology, Statement of Basis, Air Operating Permit 0000078, WestRock Longview, LLN, December 15, 2020, at 12, available at <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Industrial-facilities-permits/WestRock-Longview>.

³⁶¹ *Id.* at 10.

³⁶² See Southwest Clean Air Agency, Title V Basis Statement, SW20-24-R0-A, Georgia-Pacific Consumer Operations LLC, December 17, 2020, at 7, available at <https://www.swcleanair.gov/docs/permits/TitleV/SW20-24-R0-ABAS.PDF>.

³⁶³ See December 2019 NWPPA Report at 1-5.

³⁶⁴ *Id.* at 2-12 and at 3-16.

³⁶⁵ *Id.*

³⁶⁶ EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period at 39.

lime kiln, or power boiler, it is important to consider the costs that similar sources have had to bear to meet Clean Air Act requirements.

The NWPPA Four-Factor Report identifies several examples of pollution controls being installed at the pulp and paper mills evaluated in its report. For example, the burner at the lime kiln at Nippon Dynawave Packaging Company was replaced with a staged combustion natural gas burner in 2017 and the kiln no longer fires fuel oil.³⁶⁷ As another example, an SNCR system was installed at Power Boiler No. 20 of the WestRock Longview Mill in 2012.³⁶⁸ At the WestRock Tacoma Mill, Power Boiler No. 7 has a spray tower wet scrubber installed on Power Boiler No. 7 in 2017 and low-NOx burners were installed on Power Boiler No. 6 in 2018.³⁶⁹ The package boiler at Pt Townshend Paper was converted to fire only natural gas using a low-NOx burner in 2016.³⁷⁰ The hogged fuel boiler at the PCA Wallula Mill had an overfire air system and a WESP installed in 2016.³⁷¹ Regardless of the reasons that these controls were installed, the fact that the controls were installed by the companies is indicative of the cost-effectiveness of the controls.

3. NWPPA estimated costs for certain controls based on a report from 2003. Specifically, NWPPA used cost information from the May 1, 2003 report from the National Economic Research Associates (NERA) entitled “Evaluation of Air Pollution Control Costs for the Pulp and Paper Industry.”³⁷² NWPPA used the cost estimates from this report to develop scaled capital cost estimates for WESPs, upgrades to ESPs, and for wet scrubbers.³⁷³ NWPPA escalated costs from the 2003 cost basis of the NERA report to 2018 dollars using the Chemical Engineering Plant Index (CEPCI).³⁷⁴ However, EPA’s Control Cost Manual cautions against attempting to escalate costs more than five years from the original cost analysis.³⁷⁵ EPA states that “[e]scalation with a time horizon of more than five years is typically not considered appropriate as such escalation does not yield a reasonably accurate estimate.”³⁷⁶ Further, the cost of an air pollution control does not always rise at the same level as price inflation rates. As an air pollution control is required to be implemented more frequently over time, the costs of the air pollution control often decrease due to improvements in the manufacturing of the parts used for the control or different, less expensive materials used, etc.

³⁶⁷ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-12 to O-13.

³⁶⁸ *Id.* at O-13.

³⁶⁹ *Id.*

³⁷⁰ *Id.*

³⁷¹ *Id.* at O-14.

³⁷² *Id.* at O-164 through O-189.

³⁷³ *Id.*

³⁷⁴ *Id.*, at O-86 through O-90, O-110 through O-113, O-116 (Appendix B at Tables B-1 through B-5, B-8, B-25 through B-28, and B-31).

³⁷⁵ EPA Control Cost Manual, Section 1, Chapter 2 Cost Estimation: Concepts and Methodology, November 2017, at 19.

³⁷⁶ *Id.*

4. NWPPA included costs for sales taxes, property taxes and insurance in its capital costs of controls for several controls evaluated.³⁷⁷ Yet, in many cases, property taxes do not apply to capital improvements made such as air pollutant controls, and pollution controls are not necessarily considered as increasing risks to necessitate higher insurance costs.³⁷⁸ In addition, it appears that air pollution controls would be exempt from Washington sales taxes.³⁷⁹ Ecology must not allow NWPPA to artificially inflate costs by items that likely would not apply to pollution control installations and upgrades.
5. NWPPA somewhat readily dismissed switching/converting to less polluting fuels, stating such fuel switches were too costly without providing sufficient detail for the assumptions of its cost analyses. Specifically, for SO₂ control at recovery furnaces, NWPPA stated that the cost of switching to low sulfur No. 2 fuel oil was \$12,000/ton based on a 10% capacity factor.³⁸⁰ It is not clear why the assumption of only a 10% capacity factor is justified for all recovery furnaces that could switch to lower polluting fuels. NWPPA did state that “some recovery furnaces are limited by their air permit to an annual heat input of less than 10% fossil fuel...for avoidance of additional NSPS requirements.”³⁸¹ However, NWPPA did not identify which of those recovery furnaces had capacity factor limitations, nor did NWPPA explain how those NSPS requirements that the facilities were avoiding with capacity factor limitations might differ if the units utilized a less polluting fuel. Yet, several units have switched from No. 6 fuel oil to No. 2 fuel or from fuel oil to natural gas, as discussed in the NWPPA report in Section 1.2.1 “Summary of Recent Emissions Reductions.” Switching to lower sulfur fuel provides the least capital-intensive approach to significantly lowering SO₂ emissions, and thus Ecology should not allow such fuel switches to be so readily dismissed as not cost effective without adequate documentation and justification. Indeed, other benefits of switching to less polluting fuels should also be considered in the four-factor analysis. For example, burning of natural gas requires less maintenance than the burning of fuel oil. Thus, Ecology must require that switching to less polluting fuels be more thoroughly evaluated and that any cost effectiveness evaluations be documented with data specific to each furnace or boiler for which this control is evaluated.

In addition to these general concerns that apply to NWPPA’s cost effectiveness analyses, the following provides more specific comments to the cost effectiveness evaluations for lime kilns and for power boilers.

³⁷⁷ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-86 to O-116 (Appendix B at Table B-1 through B-31).

³⁷⁸ See, e.g., EPA Control Cost Manual, Section 4, Chapter 2, at pdf page 80 (Equation 2.69). See also EPA Control Cost Manual, Section 4, Chapter 1 (SNCR), at 1-54.

³⁷⁹ WAC 458-20-242A.

³⁸⁰ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-23.

³⁸¹ *Id.*

3. Comments on SO₂ Controls for Lime Kilns

NWPPA states that all lime kiln SO₂ emissions are low, “meaning that installing additional SO₂ controls would not be cost effective.”³⁸² The emissions presented to make this argument for each facility’s lime kilns are from 2017, but NWPPA has not provided any analysis to indicate that operations and SO₂ emissions from the lime kilns in 2017 are indicative of typical operating emissions. EPA’s regional haze guidance for the second implementation period provides that the cost effectiveness analyses for pollution controls evaluated in four-factor analyses should be based on current emissions or projected 2028 emissions.³⁸³ Ecology should obtain more information to ensure that these emissions are reflective of typical operations.

EPA stated in a 2014 document that nearly 70% of lime kilns in the pulp and paper industry are equipped with wet scrubbers.³⁸⁴ Of the lime kilns that NWPPA evaluated, the WestRock Longview Mill Lime Kiln 5 had the highest SO₂ emissions in 2017 and is not equipped with a wet scrubber, according to NWPPA’s Four-Factor Report. Ecology should evaluate whether this lime kiln’s emissions are properly characterized by 2017 data and consider evaluating the addition of a wet scrubber for SO₂ control and also PM control.

4. Comments on of NO_x Controls Evaluations for Power Boilers

NWPPA evaluated NO_x controls for several power boilers at the six pulp and paper mills. The controls to be evaluated differed based on the fuel utilized and presumably the boiler type and existing controls. Generally, SNCR and SCR were evaluated for all boilers, and LNB were evaluated for several boilers. The following provides comments on deficiencies noted in NWPPA’s NO_x cost effectiveness analyses.

1. For SNCR cost evaluations, NWPPA assumed 35% control of NO_x, regardless of the NO_x inlet rate to the SNCR system.³⁸⁵ NWPPA did not provide any justification for that assumption. EPA’s Control Cost Manual indicates NO_x removal efficiencies for SNCR used at boilers in the pulp and paper industry as achieving a median NO_x removal efficiency of 50% with urea used as the reagent with a range of 20-62%.³⁸⁶ EPA also stated that median NO_x reductions with ammonia-based SNCR systems are 61-65% and that most boilers with ammonia-based SNCR systems that are solid fuel-fired are fired

³⁸² *Id.* at O-24.

³⁸³ EPA, Guidance on Regional Haze State Implementation Plans for the Second Implementation Period, at 29.

³⁸⁴ U.S. EPA, Universal Industrial Sectors Integrated Solutions Model for Pulp and Paper Manufacturing Industry – Universal ISIS-PNP, November 2014, at 2-40, available at https://cfpub.epa.gov/si/si_public_record_report.cfm?Lab=NRMRL&dirEntryId=311359.

³⁸⁵ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-43 and O-45.

³⁸⁶ EPA, Control Cost Manual, Section 4, Chapter 1 Selective Non-Catalytic Reduction, 4/25/2019, at 1-2, available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

with wood or municipal solid waste.³⁸⁷ Thus, NWPPA has greatly underestimated the NOx reduction capabilities and cost effectiveness of SNCR by only assuming 35% NOx control. Ecology should consider SNCR to achieve at least 50% NOx control at power boilers used in the pulp and paper industry if urea is the reagent.

2. NWPPA used EPA's SNCR cost calculation spreadsheet made available with its Control Cost Manual.³⁸⁸ For the SNCR control evaluations, NWPPA assumed a 1.5 retrofit factor, which essentially increases capital costs by a factor of 1.5. NWPPA states that "the costs algorithms [of EPA's cost spreadsheet] were developed based on project costs for large coal-fired utility boilers" and assumed, without providing any further justification that EPA's cost algorithms "likely underestimate costs for smaller industrial boilers." Thus, NWPPA applied a retrofit factor of 1.5 "to account for the need to add multiple levels of injectors and perform additional tuning of the system across loads."³⁸⁹ This was not a justified cost increase. EPA's Control Cost Manual chapter on SNCR costs states there is very little difference in the costs to retrofit SNCR to existing boilers compared to new boilers.³⁹⁰ EPA's SCNR cost spreadsheet states that it can be used for industrial boilers with maximum heat input capacities of 250 MMBtu/hour or greater and, while EPA has acknowledged that capital costs increase for smaller boilers, the costs do not increase by 50% except for very small boilers.³⁹¹ Thus, Ecology should not allow use of any retrofit factor for SNCR costs at any of the power boilers without sufficient documentation from NWPPA or the facility owners to justify the use of a retrofit factor.
3. NWPPA used EPA's SCR cost calculation spreadsheet made available with its Control Cost Manual.³⁹² EPA's SCR cost spreadsheet already provides a 20% retrofit factor for SCR retrofits as compared to SCR installation costs on a new facility.³⁹³ In addition, the cost algorithms in EPA's SCR cost spreadsheet are based on the average SCR retrofit costs for utility boilers, which often have retrofit difficulties and additional costs, especially due to the large sizes of the SCR reactors and the need for specialized cranes to maneuver large SCR reactors into tight or elevated spaces. Thus, some retrofit difficulty is already built into the costs of EPA's SCR cost spreadsheet. NWPPA did not provide adequate justification for its application of a 1.5 retrofit factor to SCR cost analyses for power boilers. NWPPA simply said "[a] retrofit factor of 1.5 was applied to all industrial boilers since the EPA cost equations were developed based on utility boiler applications and to account for space constraints, additional ductwork, and the likelihood of needing a

³⁸⁷ *Id.* at 1-1.

³⁸⁸ Available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

³⁸⁹ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-55.

³⁹⁰ EPA, Control Cost Manual, Section 4, Chapter 1 Selective Non-Catalytic Reduction, 4/25/2019, at 1-6.

³⁹¹ *Id.* at 1-7 (Figure 1.2).

³⁹² Available at <https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution>.

³⁹³ This is evident by the fact that if one enters in the Data Inputs tab that the SCR is for a new boiler, the retrofit factor drops from 1 to 0.8.

new ID fan to account for increased pressure drop.”³⁹⁴ Ecology must not allow use of retrofit factors in the SCR cost analyses unless justified based on the specific situation for a particular power boiler.

4. NWPPA did not provide data on the assumptions that went into the cost effectiveness of SCR or SNCR for the power boilers. For example, NWPPA’s four-factor submittal does not identify the baseline NO_x emissions and emission rates of each boiler in tons per year and lb/MMBtu. It also did not identify the operating hours and/or operating capacity factor of each power boiler used in estimating the operational expenses of these controls. In addition, NWPPA did not identify specific costs assumed for the SNCR and SCR reagent (including what type of reagent was assumed) or the electricity costs. It also is not clear what unit characteristics and fuel characteristics were assumed in the cost spreadsheets for each boiler. Had NWPPA provided a printout of all pages of EPA’s SNCR and SCR spreadsheets in its four-factor report, this information could be evaluated. Ecology must ask NWPPA to make all of the pages of the SNCR and SCR spreadsheets available for review for the power boilers.

It must be noted that the calculated NO_x emission reductions for SNCR and SCR seem inconsistent with the baseline emissions assumed for the boilers evaluated for LNB control. Specifically, one can back-calculate the assumed uncontrolled emissions for a boiler by dividing the NO_x reductions presented in the spreadsheet printouts for SNCR and SCR by the assumed 35% (for SNCR) and 90% (for SCR) NO_x removal efficiency. When we back-calculated those uncontrolled NO_x emission rates for the five power boilers that were evaluated for LNB controls (i.e., Nippon Dynawave Boilers 6, 7, and 9 and PCA Wallula Boilers 1 and 2), we found the resulting “uncontrolled NO_x emissions” assumed in the SNCR and SCR analyses for these boilers were about 55% higher than the uncontrolled NO_x emissions assumed for these units in the LNB cost analyses.³⁹⁵ Ecology should further evaluate these emission calculations to ensure consistency across all analyses, and to ensure that the baseline NO_x emissions truly reflect actual baseline emissions for the power boilers. Having NWPPA submit the entire spreadsheets for these cost calculations would greatly help in ensuring consistency and accuracy of the cost effectiveness calculations.

5. For the analysis of LNBs, NWPPA used a John Zink cost analysis from 2016 for a 99 MMBtu/hr gas-fired boiler.³⁹⁶ For this analysis, NWPPA inexplicably assumed a 7% interest rate rather than the 4.7% interest rate it assumed for its other cost analyses.³⁹⁷ As discussed above, there is no justification for such a high interest rate, and Ecology should make sure the current prime rate be used in cost analyses, to be consistent with EPA’s

³⁹⁴ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-57.

³⁹⁵ *Id.*, Appendix O at O-159 to O-163 (Tables B-57 through Table B-61). The LNB cost analyses for these power boilers identify baseline NO_x emissions.

³⁹⁶ *Id.* at O-57.

³⁹⁷ *Id.* At O-159 to O-163 (Tables B-57 through Table B-61).

Control Cost Manual. In addition, NWPPA's cost effectiveness analyses of LNB for power boilers assumed LNBS would only have a life of 10 years.³⁹⁸ Low NOx burners should have a useful life of 25-30 years or more. In evaluations of BART for natural gas and oil-fired utility boilers, EPA evaluated combustion controls such as low NOx burners and SCR at lifetimes of 30 years.³⁹⁹ Thus, NWPPA was not justified in assuming such a short lifetime of LNB and such a high interest rate, and these invalid assumptions improperly made LNB appear to be less cost effective.

It is also questionable whether NWPPA's assumption of only 50% NOx reductions with LNB is a reasonable estimate of achievable emission reductions with LNB. EPA states that NOx emission reductions of 40 to 85% are achievable with low NOx burners.⁴⁰⁰ In addition, NWPPA did not evaluate flue gas recirculation (FGR) in combination with LNB. EPA states that these controls are normally used together to reduce NOx, and emission reductions of 60 to 90% are achievable.⁴⁰¹ Indeed, the No. 5 Power Boiler at the Georgia Pacific Camas Mill is equipped with these controls.⁴⁰² Ecology must ensure that NWPPA evaluates the most effective combustion controls for the power boilers.

It is important to note that just revising the annualized capital costs of LNBS using NWPPA's cost numbers but using a capital recovery factor reflective of a 3.25% interest rate and a 25-year life makes a significant difference in the cost effectiveness of LNBS at the power boilers, as the table below demonstrates.

³⁹⁸ *Id.*

³⁹⁹ *See, e.g.,* EPA's proposed action on Arkansas' Regional Haze Implementation Plan in which EPA assumed a 30-year life for combustion controls including LNB, SNCR, and SCR at a 30-year life for a natural gas- and oil-fired power plant, Bailey Unit 1, and the natural gas- and oil-fired McClellan power plant. 80 Fed. Reg. 18944 at 18953, 18960 (Apr. 8, 2015).

⁴⁰⁰ EPA, AP-42 Emission Factor Documentations, Section 1.4 Natural Gas Combustion, at Section 1.4.4, available at <https://www.epa.gov/air-emissions-factors-and-quantification/ap-42-fifth-edition-volume-i-chapter-1-external-0>.

⁴⁰¹ *Id.*

⁴⁰² WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-48.

Table 10. Revisions to NWPAA’s Cost Effectiveness of LNBs at Power Boilers to Use a Lower Interest Rate and a More Realistic Life of LNB Controls (3.25% Interest Rate, 25-Year Life of LNB)

Plant-Unit	Total Annualized Costs (at 3.25% Interest and 25 Year Life)	NOx reductions (per NWPAA), tpy	Revised Cost Effectiveness (at 3.25% Interest Rate and 25-Year Life)	NWPAA’s Cost Effectiveness (at 7% Interest Rate and 10-Year Life)
Nippon Dynawave Boiler 6	\$141,708	18.55	\$7,639	\$12,093
Nippon Dynawave Boiler 7	\$168,795	28	\$6,028	\$9,543
Nippon Dynawave Boiler 9	\$250,813	97.3	\$2,578	\$4,081
PCA Wallula Boiler 1	\$142,579	25.85	\$5,516	\$8,732
PCA Wallula Boiler 2	\$136,856	30.3	\$4,517	\$7,162

As the Table 10 demonstrates, the use of an unreasonably high interest rate and an unreasonably low useful life of controls can greatly distort the cost effectiveness of controls. Not only do revisions to the cost effectiveness analyses to reflect appropriate interest rates and life of controls improve the cost effectiveness of LNB, but such revisions would also improve the cost effectiveness of SNCR and SCR for the power boilers. Moreover, if more realistic levels of NOx reduction were assumed with LNB and also with SNCR, those controls would likely be more cost effective. Further, as previously stated, no retrofit factor was justified to the SNCR costs or the SCR costs and revising the costs to eliminate the retrofit factor applied would also make those controls more cost effective. Indeed, with these revisions made, it is likely that LNB and/or SNCR would be considered very cost effective for several of the power boilers at the pulp and paper mills. Further, a review of the cost inputs used in the SCR cost analyses is imperative to ensure that costs for items such as reagent, electricity, or catalysts were not overstated in those analyses.

5. Comments on Four-Factor Analyses for the Cosmo Specialty Fibers Mill

Cosmo Specialty Fibers (Cosmo) operates a sulfite pulp mill located in Cosmopolis, Washington. A four-factor analysis was submitted for controls at one emissions unit at the plant: the hog fuel

boiler at the facility.⁴⁰³ Cosmo did not provide four-factor analyses for the recovery boilers at the facility (Recovery Boiler 1, 2, and 3), nor did Cosmo provide four-factor analyses for the hogged fuel dryer at the facility.

Cosmo relied on Ecology's 2016 analysis entitled "Washington Regional Haze Reasonably Available Control Technology Analysis for Pulp and Paper Mills" dated November 2016 to justify no additional regional haze controls for its recovery boilers.⁴⁰⁴ However, the November 2016 Ecology RACT analyses was focused on whether the visibility benefits of pollution controls evaluated justified the costs of the pollution controls. As previously discussed, the visibility benefits of controls are not part of the Clean Air Act's four-factor analysis; thus, Ecology's determination should not add an additional factor to the four statutory factors. It must also be pointed out that Ecology's 2016 RACT analysis was based on emission inventories between 2003 to 2011 and, as noted in the 2016 RACT analysis, Cosmo did not operate from 2007-2010.⁴⁰⁵ In fact, a support document for a Title V permit for the Cosmo facility states that when the Cosmo mill restarted in 2011, it had eliminated two processes (cellophane and paper grade production) and only produced dissolving pulp.⁴⁰⁶ That basis statement also stated that "[p]roduction varies upon market demand."⁴⁰⁷ Thus, Ecology's 2016 report did not have much emissions data reflective of the new operations at the Cosmo facility to base a cost effectiveness analysis of pollution controls on, and a revised analysis of pollution controls must be done for these emission units reflective of current emissions that reflect expected operations in 2028. For these reasons, Ecology's 2016 RACT analysis must not exempt a facility from evaluating pollution controls for any part of its facility.

Cosmo evaluated SCR and SNCR for NO_x controls at the hog fuel boiler and evaluated use of an ESP to reduce PM emissions from the hog fuel boiler. Cosmo determined that no additional controls are required at the hog fuel boiler to address regional haze requirements.⁴⁰⁸

Deficiencies in Cosmo's cost effectiveness analyses

1. Cosmo assumed a 4.75% interest rate in amortizing capital costs of the controls evaluated.⁴⁰⁹ In its Control Cost Manual, EPA states that the interest rate used in cost effectiveness analyses should be the bank prime interest rate.⁴¹⁰ The current bank prime

⁴⁰³ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-278 to O-312 (December 2019 Four-Factor Analysis for Cosmo Specialty Fibers).

⁴⁰⁴ *Id.* At O-288.

⁴⁰⁵ Washington Department of Ecology, Washington Regional Haze Reasonably Available Control Technology Analysis for Pulp and Paper Mills, November 2016, at 34.

⁴⁰⁶ Support Document for the Air Operating Permit issued to Cosmo Specialty Fibers, [undated], at 4, available at <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Industrial-facilities-permits/Cosmo-Specialty-Fibers>.

⁴⁰⁷ *Id.*

⁴⁰⁸ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-285.

⁴⁰⁹ *Id.* at O-306 to O-308 (Appendix B, Tables 1b, 2b, and 3b).

⁴¹⁰ EPA, Control Cost Manual, Section 1, Chapter 2 (November 2016) at 16, available at: https://www.epa.gov/sites/production/files/2017-12/documents/epacmcostestimationmethodchapter_7thedition_2017.pdf.

rate is 3.25%.⁴¹¹ In a cost effectiveness analyses being done today, an interest rate of 4.75% is unreasonably high, given the current bank prime lending rate of 3.25%. Use of a higher interest rate results in higher annualized capital costs.

2. Cosmo assumed too short of a life of pollution controls in amortizing capital costs of controls. Cosmo only assumed a 20-year life in its cost effectiveness evaluations for SCR, SNCR, and ESP.⁴¹² EPA's SCR chapter of its Control Cost Manual indicates that the life of SCR at industrial boilers would be 20-25 years.⁴¹³ As stated above in the comments on the NWPPA facilities, a simple review of pollution controls at existing boilers and furnaces in the pulp and paper industry shows that pollution controls like ESPs are in place for 25 to 30 years or more. For example, Recovery Furnace 22 at the WestRock Longview Tacoma Mill was constructed in approximately 1990 and equipped with an ESP, which was about 30 years ago.⁴¹⁴ Further, the Georgia Pacific Camas Mill installed an ESP at Power Boiler #3 in 1992, approximately 29 years ago.⁴¹⁵ Thus, a 25-30 year life is likely a more appropriate life of controls to use in amortizing capital costs of a pollution control for the hog fuel boiler. In its proposed regional haze review for SO₂, NO_x, and PM controls at a fuel oil and natural gas-fired boiler at the AECC Carl E. Bailey Generating Station in Arkansas, EPA assumed a 30-year life of combustion controls, SNCR, WESPs and wet scrubbers.⁴¹⁶ It is important for Ecology to use of a realistic life of pollution controls in amortizing capital costs of controls, because the life of controls assumed has a significant impact on the annualized costs of controls, as does the interest rate.
3. In the evaluation of SNCR for NO_x control, Cosmo only assumed 25% NO_x control would be achieved.⁴¹⁷ Cosmo stated this lower NO_x control efficiency was applied due to the "load-swing nature of the Hog Fuel Boiler as well as low NO_x concentration...."⁴¹⁸ Ecology should request more information from Cosmo on the load-swing nature of the boiler and how that could impact NO_x removal efficiency with SNCR. The hog fuel boiler does appear to run throughout the year, as Cosmo stated the typical operating level of the unit was 357 days per year at 24 hours per day.⁴¹⁹

⁴¹¹ <https://fred.stlouisfed.org/series/DPRIME>.

⁴¹² WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-306 to O-308 (Appendix B, Tables 1b, 2b, and 3b).

⁴¹³ EPA Control Cost Manual, Chapter 2, Selective Catalytic Reduction, June 2019, at pdf page 82.

⁴¹⁴ U.S. Geological Survey, Minerals Commodities Summaries 2020, at 80.

⁴¹⁵ *Id.* at 10.

⁴¹⁶ See Southwest Clean Air Agency, Title V Basis Statement, SW20-24-R0-A, Georgia-Pacific Consumer Operations LLC, December 17, 2020, at 7, available at <https://www.swcleanair.gov/docs/permits/TitleV/SW20-24-R0-ABAS.PDF>.

⁴¹⁷ 80 Fed. Reg. 18944 at 18955 (Apr. 8, 2015).

⁴¹⁸ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-295.

⁴¹⁹ *Id.*

⁴¹⁹ *Id.* at O-295 (Table 4-2).

4. In the evaluation of SCR for the hog fuel boiler, Cosmo assumed that the flue gas would need to be reheated and Cosmo took into account estimated costs to reheat the flue gas in the SCR cost effectiveness analysis.⁴²⁰ The cost for reheating the flue gas reflects 85 to 88% of Cosmo's total annual costs of SCR.⁴²¹ Cosmo did not provide the detailed calculations to verify the costs for reheating the flue gas stream, and Ecology must request that data.
5. Cosmo did not evaluate the cost effectiveness of a high dust SCR system which would eliminate any need for flue gas reheating, thus reducing Cosmo's annual cost estimates of SCR significantly. Cosmo's justification for not evaluating a high dust SCR was concerns about particulate emissions poisoning the SCR catalyst.⁴²² However, there are options to reduce or slow down catalyst deactivation that should have been considered. One study on this issue states that SCR catalyst deactivation in biomass fired plants is mostly due to high potassium content in biomass and that one method to deal with that is potassium removal by adsorption.⁴²³ This paper states that addition of alumino silicates, in the form of coal fly ash, is an "industry proven method of removing [potassium] aerosols from flue gases."⁴²⁴ Other options to address this concern (aside from tail-end SCR that requires reheating of the flue gas) include the coating SCR monoliths with a protective layer and the use of potassium tolerant SCR catalysts.⁴²⁵ Ecology must evaluate these other options to accommodate a high dust SCR configuration, which could ultimately end up being a very cost effective and highly effective NOx control.
6. For the ESP evaluated by Cosmo for the hog fuel boiler, Cosmo included costs for property taxes and insurance.⁴²⁶ Yet, as discussed above, in many cases, property taxes do not apply to capital improvements made such as air pollutant controls, and pollution controls are not necessarily considered as increasing risks to necessitate higher insurance costs.⁴²⁷ Ecology must not allow NWPPA to artificially inflate costs by items that likely would not apply to pollution control installations and upgrades.

There are examples of similar emission units in the pulp and paper industry in Washington that have installed both NOx and PM controls. For example, the hogged fuel boiler at the PCA

⁴²⁰ *Id.* at O-295.

⁴²¹ *Id.*

⁴²² *Id.*

⁴²³ See Schill, Leonhard and Rasmus Fehrmann, Strategies of Coping with Deactivation of NH₃-SCR Catalysts Due to Biomass Firing, March 30, 2018, available at <https://www.mdpi.com/2073-4344/8/4/135/htm> and attached as Ex. 12.

⁴²⁴ *Id.*

⁴²⁵ *Id.*

⁴²⁶ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-310 (Appendix B, Table 3a).

⁴²⁷ See, e.g., EPA Control Cost Manual, Section 4, Chapter 2, at pdf page 80 (Equation 2.69). See also EPA Control Cost Manual, Section 4, Chapter 1 (SNCR), at 1-54.

Wallula Mill had a WESP installed in 2016.⁴²⁸ In addition, an SNCR was installed at the WestRock Longview Power Boiler 20,⁴²⁹ which appears to be a similar boiler to the hog fuel boiler at the Cosmo plant, in that the WestRock Longview Power Boiler 20 burns wood fuels (hog fuel, forest biomass, urban wood) and oil (including reprocessed fuel oil), as well as burning paper recycling residuals, primary/secondary sludge from the process wastewater treatment plant, and natural gas.⁴³⁰ WestRock Power Boiler 20 is described as a “hybrid suspension grate boiler designed to fire wet biomass...”⁴³¹ Ecology should further evaluate the SNCR installed at the WestRock Longview Power Boiler 20 to determine the percent NOx removal being achieved at that unit to assess SNCR NOx removal capabilities for the hog fuel boiler at the Cosmo facility. Because a similar source has found it cost effective to install SNCR to reduce NOx emissions, that provides a strong basis to consider SNCR as a cost-effective control for the Cosmo hog fuel boiler. Note that the Title V statement of basis for the WestRock Longview plant indicates that the SNCR was installed at the WestRock Longview Power Boiler 20 to reduce NOx emissions as part of Order 8429 which allowed for higher solid fuel firing rate.⁴³² Thus, the SNCR was likely installed to allow the increased solid fuel firing rate at WestRock Longview Boiler 20 to “net out” of major source permitting requirements. Controls installed to net out of major source permitting requirements should be considered controls required under the Clean Air Act. Such controls provide a relevant example of a source determining it was cost-effective to install the pollution control, even if the reasoning was to avoid a more substantive Clean Air Act requirement.

IV. Additional Facility that Ecology Should Evaluate for Regional Haze Controls

One additional facility that Ecology should evaluate for regional haze controls is the Ardagh Glass plant in Seattle, Washington. According to NPCA analysis, the Ardagh Glass facility potentially affects regional haze in 2 Class I areas.⁴³³ NPCA previously submitted to Ecology a four-factor analysis of regional haze controls for the Ardagh Glass Plant with its February 16, 2021 comment letter to Ecology for the informal comment period,⁴³⁴ but Ecology has not responded to those comments in the public review draft regional haze plan for the second implementation period.

⁴²⁸ WDOE, Public Review Draft, Washington Regional Haze Plan for the Second Implementation Period Appendix O at O-14.

⁴²⁹ *Id.*

⁴³⁰ Washington Department of Ecology, Statement of Basis for Air Operating Permit 0000078, WestRock Longview, December 15, 2020, at 42, available at <https://ecology.wa.gov/Regulations-Permits/Permits-certifications/Industrial-facilities-permits/WestRock-Longview>.

⁴³¹ *Id.*

⁴³² *Id.* at 43.

⁴³³ NPCA, Clear Solutions for Parks, Regional Haze Fact Sheet, Washington, available at <https://drive.google.com/file/d/1TKDIvvNwQ6LnVIVjzq4FYoQIOOLPyFmp/view>.

⁴³⁴ See NPCA, Comments Submitted for Informal comment period: Regional Haze SIP Revision - 2nd 10-Year Plan, February 16, 2021, at 11.

Ecology’s air emissions inventory for the Ardagh Glass Plant identifies the following emissions for 2014-2019 at the plant.

Table 11. Ardagh Glass Plant Emissions, 2014 to 2019⁴³⁵

Year	NOx, tpy	SO2, tpy	PM10, tpy
2014	172.1	105.9	73.2
2015	Not reported	Not Reported	Not Reported
2016	153.7	98.7	95.3
2017	153.3	98.7	88.2
2018	167.6	89.9	82.2
2019	172.7	56.7	66.5

The largest sources of emissions at a glass plant are the fossil fuel-fired furnaces which melt glass. At the Ardagh plant, there are five furnaces. No. 1 is an all-electric furnace; No. 2, No. 3 and No. 5 furnaces are oxy-fuel fired; and No. 4 is an end-port regenerative furnace. The Furnace No. 1 does not have reported emissions. Furnaces Nos. 2, 3 and 5 are oxy-fuel fired. This combustion technique should reduce the formation of NOx. Furnace No. 5 is equipped with a Tri-Mer Cloud Mist Scrubber, which should capture the SO2 and PM emissions.

At the request of NPCA, Steve Klafka of Wingra Engineering, evaluated the use of ceramic catalytic filtration systems at Furnaces 2, 3, 4, and 5 of the Ardagh Glass Plant.⁴³⁶ This is the same pollutant control technology discussed in Section II.C. above for the Ash Grove Cement Plant. The Klafka Report discusses how ceramic catalytic filtration systems have been used at existing glass plants as a highly effective multi-pollutant control technology.⁴³⁷ The Klafka Report included a cost analysis for ceramic catalytic filtration systems at the Ardagh Glass Plant furnaces to reduce NOx and also SO2 and PM10. Table 12 below summarizes the results of his analysis.

⁴³⁵ Data from Ecology’s Point Source Emissions Inventory available at <https://ecology.wa.gov/Air-Climate/Air-quality/Air-quality-targets/Air-emissions-inventory>.

⁴³⁶ See January 27, 2021 Four-Factor Reasonable Progress Analysis for the Ardagh Glass plant in Seattle, Washington, done by Wingra Engineering, S.C., attached as Ex. 9.

⁴³⁷ *Id.* at 9.

Table 12 - Cost Effectiveness for a Catalytic Ceramic Filter System to Control Actual and Potential Emissions from the Ardagh Glass Plant Furnaces⁴³⁸

Basis	Based on 2014 Actual Emissions	Based on Potential Emissions
Capital Costs	\$11,866,967	\$16,468,204
Annual Operating Costs	\$330,980	\$700,622
Annual Capital and Operating Costs	\$1,451,222	\$2,255,220
NOx Removed (tpy)	155	618
SO2 Removed (tpy)	79	217
PM Removed (tpy)	70	173
Total NOx, SO2 and PM Removed (tpy)	304	1,008
Cost Effectiveness (\$ per Total Tons Removed)	\$4,766	\$2,238

The Klafka Report indicated that it would take twelve months to construct and install a ceramic catalytic filtration system at Ardagh Glass.⁴³⁹ The Klafka Report did not identify issues with energy or non-air environmental impacts of the control because the cost analysis took into account the costs of electricity, assumed use of aqueous ammonia, and the cost for 100% of the dust due to the use of hydrated lime for SO2 control.⁴⁴⁰ The Klafka report did discuss how glass furnaces need to be rebuilt every 10-20 years, but it did not find such a rebuilding of the furnace would limit the remaining useful life of the glass plant because it has been in that location since 1931.⁴⁴¹ The Klafka Report concluded that it is technically feasible to add a catalytic ceramic filtration system to the glass furnaces at Ardagh Glass and that it would be very cost effective to do so, at a cost per total tons of pollutant removed of \$4,766/ton based on emission reductions from 2014 actual emissions and at a cost of \$2,238/ton based on emission reductions from potential emissions.⁴⁴²

Thus, a ceramic catalytic filtration system is a very cost effective control that can significantly reduce emissions from the Ardagh Glass Plant, and Ecology should strongly consider this control at Ardagh Glass as part of its regional haze control strategy.

⁴³⁸ *Id.* at 11.

⁴³⁹ *Id.* at 10.

⁴⁴⁰ *Id.* at 11.

⁴⁴¹ *Id.* at 11-12.

⁴⁴² *Id.* at 12. Note that the narrative discussion of the Klafka report indicates lower cost effectiveness numbers of \$3,768/ton for reductions from 2014 emissions and \$1,819/ton from reductions in potential emissions, but Table 5 of the report indicates a higher cost per ton of pollutants removed. The Table 5 data of the Klafka Report is included in Table 12 of this report as the data are assumed to be the more accurate numbers.