



April 18, 2016

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Sent Via Email

Re: Comments on the Port of Kalama and Cowlitz County's Draft Environmental Impact Statement for Northwest Innovation Works' Methanol Refinery and Export Terminal.

Greetings:

Columbia Riverkeeper, Center for Biological Diversity, Sierra Club, Oregon Physicians for Social Responsibility, Landowners and Citizens for a Safe Community, Save Our Wild Salmon, Wahkiakum Friends of the River, and Northwest Environmental Defense Center (collectively "Commenters") have reviewed the Draft Environmental Impact Statement ("DEIS") and supporting materials for the proposed Kalama methanol refinery and export terminal (the "Project"), and submit the following comments. The DEIS must be revised to address several fundamental deficiencies, set forth in detail below. Correcting the DEIS's many flaws will also require the Port and the Cowlitz County to reevaluate the unjustifiable yet oft-repeated conclusion that this Project does not present significant, adverse environmental and public health harms and risks. Rather, it is evident that this Project has the potential to cause adverse, though as of yet unstudied, impacts to the environment. The DEIS fails to adequately account for these impacts, rendering it entirely inadequate. Further, the Port and County should use SEPA's substantive authority, as well as separate authority from other applicable statutes and regulations, to deny the Project.

Incorporated by reference are Columbia Riverkeeper’s comments on the Clean Water Act §§ 404¹ and 401² permits for the pipeline and dock, and Washington Department of Fish and Wildlife’s³ comments on the pipeline, which contain additional relevant information about the impacts of NWIW’s Project. Also incorporated by reference is Citizens for a Healthy Bay’s technical memo reviewing the Kalama Methanol Refinery’s DEIS.

STATE ENVIRONMENTAL POLICY ACT

The State Environmental Policy Act (“SEPA”) is Washington’s core environmental policy and review statute. Like its federal counterpart, the National Environmental Policy Act (“NEPA”), SEPA broadly serves two purposes: first, to ensure that government decision-makers are fully apprised of the environmental consequences of their actions and, second, to encourage public participation in the consideration of environmental impacts. *Norway Hill Preservation and Prot. Ass’n v. King Co*, 87 Wn.2d 267, 279 (1976). For decades, SEPA has served these purposes effectively, requiring full environmental reviews for projects with significant environmental impacts.

In adopting SEPA, the Washington legislature declared the protection of the environment to be a core state priority. RCW 43.21C.010. SEPA declares that “[t]he legislature recognizes that each person has a fundamental and inalienable right to a healthful environment and that each person has a responsibility to contribute to the preservation and enhancement of the environment.” RCW 43.21C.020(3). This policy statement, which is stronger than a similar statement in the federal counterpart of NEPA, “indicates in the strongest possible terms the basic importance of environmental concerns to the people of the state.” *Leschi v. Highway Comm’n*, 84 Wn.2d 271, 279–80 (1974).

SEPA is more than a purely “procedural” statute that encourages informed and politically accountable decision-making. In enacting SEPA, the state legislature gave decision-makers the affirmative authority to deny projects where environmental impacts are significant, cannot be mitigated, and collide with local rules or policies. SEPA provides substantive authority for government agencies to condition or even deny proposed actions—even where they meet all other requirements of the law—based on their environmental impacts. RCW 43.21C.060. As one treatise points out, when this premise was challenged by project proponents early in SEPA’s history, “the courts consistently and emphatically responded that even if the action previously had been ministerial, it became *environmentally discretionary* with the enactment of SEPA.”⁴

¹ Exhibit 1, Comment of Columbia Riverkeeper to U.S. Army Corps of Engineers on CWA §404 Permit for NWIW’s Proposal (2015).

² Exhibit 2, Comment of Columbia Riverkeeper to Washington Department of Ecology on CWA §401 Certification for NWIW’s Proposal (2015).

³ Exhibit 3, Comments of WDFW to FERC on the Kalama Lateral Pipeline (2015).

⁴ Richard Settle, *SEPA: A Legal and Policy Analysis*, §18.01[2] (2014) (emphasis added).

Decision-makers have denied permits under this authority in a number of other contexts, many of which are similar to those of NWIW's proposed refinery and terminal.⁵

I. REASONABLE ALTERNATIVES

SEPA requires that an EIS contain a detailed discussion of alternatives to the proposed action. RCW 43.21C.030(c)(iii). SEPA's regulations provide that an EIS must consider as alternatives those "actions that could feasibly attain or approximate a proposal's objectives, but at a lower environmental cost or decreased level of environmental degradation." WAC § 197-11-440(5)(b). The discussion of alternatives in an EIS need not be exhaustive, but the EIS must present sufficient information for a reasoned choice among alternatives. *Toandos Peninsula Ass'n v. Jefferson Cy.*, 32 Wash. App. 473, 483 (1982).

A. Reasonable Alternatives not Considered

- The DEIS did not evaluate the possibility of using the existing deepwater berth and dock next to the Project site. The FEIS should analyze the possibility of using the existing dock for the Project. Personal communications with Steelscape employees indicated that this dock is used relatively infrequently to offload steel from deep draft vessels, and the berth is therefore probably not at capacity. There is no obvious reason why Northwest Innovation Works' ("NWIW") operations could not use the existing dock with minimal modifications. Using the existing dock would achieve the Project's objectives while reducing or eliminating environmentally harmful in-water work and reduce the need for additional over-water structure.
- The DEIS does not analyze the reasonable possibility of taking two seasons to complete the proposed in-water construction, so as to avoid in-water construction during late summer (when juvenile salmonids are present) and early spring (when eulachon are present).

II. SCOPE OF REVIEW

SEPA requires an environmental impact statement ("EIS") for any action that has a "probable significant, adverse environmental impact." RCW 43.21C.031(1). Significance means

⁵ *Polygon Corp. v. City of Seattle*, 90 Wn.2d 59, 69-70 (1978) (upholding denial of high-rise project based on aesthetic, property values, and noise impacts); *Victoria Tower P'ship v. City of Seattle*, 59 Wash. App. 592, 602 (1990) (upholding denial of 16-floor tower and mitigation to 8-floors); *State v. Lake Lawrence Pub. Lands Prot. Ass'n*, 92 Wn.2d 656, 659 (1979) (upholding denial of development of 14-acre parcel because of effects on bald eagles); *Cook v. Clallam Cnty.*, 27 Wash. App. 410, 414 (1980) (upholding permit denial of commercial development in rural area); *W. Main Associates v. City of Bellevue*, 49 Wash. App. 513, 521-23 (1987) (upholding denial of permits based on historic/cultural impacts, view impacts, shadow impacts, traffic impacts, and air impacts).

a reasonable likelihood of more than a moderate adverse impact on environmental quality.” WAC 197-11-794.

“A proposal’s effects include direct and indirect impacts caused by the proposal. Impacts include those effects resulting from growth caused by a proposal, as well as the likelihood that the present proposal will serve as precedent for future actions.” WAC 197-11-060(4)(d). The scope of impacts includes direct, indirect, and cumulative impacts. WAC 197-11-792. “The range of impacts to be analyzed in an EIS (direct, indirect, and cumulative impacts, WAC 197-11-792) may be wider than the impacts for which mitigation measures are required of applicants.” WAC 197-11-060(4)(e). It is implicit in SEPA that an “agency cannot close its eyes to the ultimate probable environmental consequences of its current action.” *Cheney v. City of Mountlake Terrace*, 87 Wn.2d 338, 344 (1976).

Importantly, the regulations specifically direct that an “agency shall not limit its consideration of a proposal’s impacts only to those aspects within its jurisdiction, including local or state boundaries.” WAC 197-11-060(4)(b). Indeed, SEPA constitutes a ringing affirmation of the connectedness of Washington with the rest of the planet. It speaks of “humankind” and “human beings” rather than just citizens of this state. RCW 43.21C.010. SEPA explicitly calls on responsible agencies to “recognize the world-wide and long-range character of environmental problems” and take steps to cooperate in “anticipating and preventing a decline in the quality of the world environment.” RCW 43.21C.030(f); *Eastlake Comm. Coun. v. Roanoke Assoc.*, 82 Wn.2d 475, 487 (1973) (observing “unusually vigorous statement of legislature purpose...to consider the total environmental and ecological factors to their fullest in deciding major matters”) (emphasis added). Those regulations also recognize that environmental impacts do not end at the state’s borders, and explicitly require consideration of the impacts of projects outside of the state’s jurisdiction. WAC 197-11-060(c); *Cathcart-Maltby-Clearview Comm. Council v. Snohomish Cty.*, 96 Wn.2d 201, 209 (1981) (SEPA “also mandates that extra-jurisdictional effects be addressed and mitigated, when possible.”).

Washington’s courts and hearings bodies are only starting to grapple with these important issues, but the conclusions so far are consistent: indirect impacts of fossil fuel transportation projects, including transportation of the fossil fuels to and from proposed terminals, must be considered in the SEPA process. For example, the Washington Shorelines Hearings Board recently invalidated a SEPA document for two proposed crude oil terminals for failing to adequately consider the cumulative and indirect impacts of rail and vessel traffic.⁶

A. Scope of Upstream Analysis

The natural gas that NWIW would consume does not magically appear at the end of a pipeline. Ecology and other agencies have been clear that the scope of EISs must include indirect impacts, some of which may appear distant from a project itself. The DEIS by and large ignores the impacts of extracting and transporting the raw material—natural gas—that the Project will consume. This does not satisfy SEPA.

⁶ *Quinault Indian Nation v. Hoquiam*, 2013 WL 6062377 (Nov. 12, 2013).

B. Scope of Downstream Analysis

First, the scope of review for marine impacts is illegally truncated, ending the analysis at the mouth of the Columbia.⁷ Methanol tankers servicing NWIW's proposed facility would not magically disappear and re-appear at the mouth of the Columbia. This limited scope of review for marine impacts illegally omits impacts to the Pacific ecosystem and along the route taken by vessels transporting methanol to identified customers in China.

Second, the DEIS contains no analysis of the impacts of methanol use in China. If NWIW's unsupported assertions that the methanol will all be converted into olefins to make plastic are true, the FEIS should analyze the environmental impacts of that process and assess the consequences of creating the amount of plastics that NWIW's methanol will facilitate and induce. The FEIS should also examine the likelihood that NWIW's methanol will be used as a gasoline additive in China. The world's "widest adoption of methanol-gasoline blending has occurred in China," and methanol accounts for more than five percent of China's national gasoline consumption.⁸

C. Cumulative Impacts

SEPA requires consideration of cumulative effects. WAC 197-110060(4)(e); WAC 197-11-330(3)(c) ("Several marginal impacts when considered together may result in a significant adverse impact."); *White v. Kitsap Cnty.*, SHB No. 09-019 at 17 (2009) (cumulative impacts of a proposed action together with the impacts of pending and future actions should be considered when making a threshold determination). In *Quinault Indian Nation v. Hoquiam*, the Shorelines Hearing Board overturned SEPA documents for two crude-by-rail facilities explicitly because they failed to consider the cumulative effects of increased rail and marine vessel traffic from each other, and a third crude-by-rail project.⁹

The DEIS fails to take the requisite "hard look" at the cumulative impacts of this and other projects with similar or overlapping impacts. The DEIS lists several other projects with similar impacts to aspects of NWIW's methanol refinery and export project and explains, in very general and qualitative terms, that the impacts of all of these projects together would be worse than the impacts of NWIW's project alone.¹⁰ This does not constitute a "reasonably thorough discussion" of the probable environmental consequences. *Weyerhaeuser v. Pierce Cnty.*, 124 Wn.2d 26, 38 (1994) (citations omitted).

⁷ See DEIS, p.6-12; see also DEIS, Appx. D, p.58.

⁸ Oil and Gas Journal, *Methanol proves low-cost, sustainable option for gasoline blending* (March 2, 2015) (online at: <http://www.ogj.com/articles/print/volume-113/issue-3/processing/methanol-proves-low-cost-sustainable-option-for-gasoline-blending.html>).

⁹ *Quinault Indian Nation v. Hoquiam*, SHB No. 13-012c, Order on Summary Judgment, p.18 (Dec. 9, 2013) ("agencies are required to consider the effects of a proposal's probable impacts combined with the cumulative impacts from other proposals").

¹⁰ See DEIS, pp.15-8-23.

To satisfy SEPA, and to assist a decision-maker or the public, the cumulative impacts analysis must go further. It must explain—in a meaningful, tangible way—how the Columbia River and the human environment in the study area would look and function if the proposed growth in fossil-fuel shipping and other related projects come to pass. The Washington Energy Facility Site Evaluation Council—the agency normally responsible for reviewing large fossil fuel export projects like this one—explained that:

cumulative effects analys[e]s should be conducted within the context of resource, ecosystem, and human community thresholds—levels of stress beyond which the desired condition degrades.¹¹

The cumulative impact assessment in the DEIS does not even attempt to meet this standard. It does not provide readers with any sense of whether impacts will cumulatively cross acceptable “resource, ecosystem, and human community thresholds.”¹² Nor does it disclose whether the “desired condition[s]” in Kalama, the Columbia River and estuary, or the Pacific Northwest will survive the cumulative effect of all the proposed fossil-fuel export projects. These failures prevent the DEIS from presenting the “reasonably thorough discussion” of environmental impacts that SEPA requires. *PT Air Watchers v. State, Dep’t of Ecology*, 179 Wash. 2d 919, 927 (2014).

This analytical failing permeates the entire cumulative impacts section of the DEIS. For purposes of illustration only, the FEIS should analyze whether the cumulative impacts of this and other projects would cross the following “resource, ecosystem, and community thresholds:”

- The threshold at which estuary habitat degradation caused by dredging, dock building, and vessel wake impacts causes perceptible, or unacceptable, impacts to salmon populations and to the tribal, commercial, and recreational fisheries that depend on them;
- The threshold at which ambient PM2.5 and toxic air pollution levels result in perceptible, or unacceptable, health outcomes for people working and living in the project vicinity;
- Threshold at which deep draft vessel traffic presents an unacceptable impediment to commercial and recreational fishing in the lower Columbia River and estuary;
- The threshold at which background noise levels caused by vessel traffic in the near-shore ocean will compromise cetacean survival and communication;
- The threshold at which GHG emissions will cause unacceptable impacts to local and regional climate and natural resources.

¹¹ Washington Energy Facility Site Evaluation Council (“EFSEC”), *DEIS for the Vancouver Energy Distribution Terminal*, p.5-1 (quoting guidance written by the Council on Environmental Quality, the federal agency responsible for interpreting NEPA).

¹² *Id.*

III. PURPOSE AND NEED

The DEIS makes no compelling case for this Project's need, and severely distorts the Project's purpose. The EIS must "specify[] the purpose and need to which the proposal is responding" WAC 197-11-440(4). First, the EIS repeatedly misstates the Project's purpose as "finding a cleaner alternative to methanol made from coal and oil." Besides never providing any actual information about whether gas-based methanol is actually cleaner, the real purpose of the Project is to make methanol from natural gas. Second, it is not clear that the "need" for this Project that was perceived to exist when it was first proposed still exists today. The price of methanol has declined significantly since NWIW proposed this Project, and the FEIS should address this market collapse and explain why the Project is still needed.

IV. TIMING OF COMMENT PERIOD

The timing of the release of the DEIS and the comment period undermines the quality and content of the DEIS. The Port and County closed the DEIS comment period before important information about the impacts of the Project could be made public through the County's land use and shorelines permitting processes, the Clean Air Act, and Clean Water Act permitting processes, the Federal Energy Regulatory Commission's process, and through the ongoing federal Endangered Species Act and National Environmental Policy Act processes. Because the final EIS would undoubtedly benefit from the information generated in these review and permitting processes, Commenters requests that the Port and County incorporate all information and documents from these processes into the Draft EIS and reopen it for public comment.

ADEQUACY OF DEIS ENVIRONMENTAL REVIEW

An EIS must evaluate the likely impacts related to the project. WAC 197-11-060(4). Decision makers must provide a "detailed statement" of environmental impacts. RCW 43.21C.030(2)(c). SEPA requires full disclosure and "detailed" consideration of all affected environmental values. At its heart, SEPA is an "environmental full disclosure law." *Norway Hill Preservation and Protection Association v. King Cnty. Council*, 87 Wn.2d 267 (1976). The *Norway Hill* court also highlighted the legislature's intent that "environmental values be given full consideration in government decision making," and its decision to implement this policy through the procedural provisions of SEPA which "specify the nature and extent of the information that must be provided, and which require its consideration, before a decision is made." *Id.* at 277-78.

Environmental reviews under SEPA must identify significant impacts on the natural and built environment. WAC 197-11-440(6)(e). Such reviews must use sufficient information and disclose areas where information is speculative or unknown. WAC 197-11-080(1), (2). Where there is scientific uncertainty, Washington courts have required agencies to disclose responsible opposing views and resolve differences. These requirements feed into the ultimate standard of review for EISs: adequacy is based on a rule of reason. *Cheney v. Mountlake Terrace*, 87 Wn.2d 338, 344 (1976). Courts require reasonably thorough information disclosure and discussion, good data and analysis to support conclusions, and sufficient information to make a reasoned decision.

Klickitat County Citizens Against Imported Waste v. Klickitat County, 122 Wn.2d 619, 633 (1993). Sufficiency of the data is also assessed under the “rule of reason,” which requires a “‘reasonably thorough discussion of the significant aspects of the probable environmental consequences’ of the agency’s decision.” *Weyerhaeuser v. Pierce Cnty.*, 124 Wn.2d 26, 38 (1994) (citations omitted).

In making the similar assessment under NEPA, federal courts require agencies to take a “hard look” at environmental impacts. More specifically, for review of the NEPA claims, the Court must “ensure that an agency has taken the requisite hard look at the environmental consequences of its proposed action, carefully reviewing the record to ascertain whether the agency decision is founded on a reasoned evaluation of the relevant factors.” *Te-Moak Tribe v. Interior*, 608 F.3d 592, 599 (9th Cir. 2010) (quoting *Greenpeace Action v. Franklin*, 14 F.3d 1324, 1332 (9th Cir. 1992) (internal quotation marks and citations omitted)). This review must be “searching and careful.” *Ocean Advocates v. U.S. Army Corps of Engineers*, 402 F.3d 846, 858 (9th Cir. 2005).

Washington Courts have employed the “hard look” doctrine directly or in other cases have required full disclosure and consideration of environmental values. *See Pub. Util. Dist. No. 1 of Clark Cnty. v. Pollution Control Hearings Bd.*, 137 Wash. App. 150, 158, 151 P.3d 1067, 1070 (2007); *Toward Responsible Dev. v. City of Black Diamond*, 179 Wash. App. 1012 review denied, 180 Wash. 2d 1017, 327 P.3d 54 (2014) (unpublished opinion) (“Courts review an EIS as a whole and examine all of the various components of [the] agency’s environmental analysis ... to determine, on the whole, whether the agency has conducted the required ‘hard look.’”); *see also Coalition for a Sustainable 520 v. U.S. Department of Transportation*, 881 F. Supp. 2d 1243, 1259 (W.D. Wash. 2012) (holding implicitly that “hard look” under NEPA sufficient for SEPA review). Where “hard look” is not discussed or employed directly, courts have required a “reasonably thorough discussion” of environmental impacts. *See Toward Responsible Dev. v. City of Black Diamond*, 179 Wash. App. (2014); *PT Air Watchers v. State, Dep’t of Ecology*, 179 Wash. 2d 919, 927, 319 P.3d 23, 27 (2014) (citing *Norway Hill*, 87 Wn.2d at 275) (requiring “full disclosure and consideration of environmental values”).

As discussed in the sections below, the DEIS fails to provide the necessary hard look and reasonably thorough discussion of environmental impacts throughout its many pages. This is an overarching failure.

I. THE DEIS DOES NOT ADEQUATELY ADDRESS THE LIKELIHOOD OR IMPACTS OF A METHANOL SPILL FROM A TANKER IN THE LOWER COLUMBIA RIVER OR ESTUARY.

A. No Meaningful Numeric Analysis of Spill Risk

The FEIS should contain a quantitative analysis of the likelihood of methanol spills in the Columbia River from vessel loading and transit. The FEIS could use, as a starting point for such

analysis, the spill risk analysis produced for the Vancouver Energy Distribution Terminal.¹³ The Kalama Methanol FEIS should also account for the fact that the level of vessel traffic in the Columbia River during the study period for that analysis was significantly less than the future level of vessel traffic in the Columbia River projected in the cumulative impacts analysis. Accordingly, the spill risk assessment for the Vancouver Energy Distribution Terminal underestimates the likelihood of vessel accidents because accidents occur more frequently when vessel traffic increases. Nevertheless, the EIS for the proposed methanol refinery can and should make numerical predictions about the frequency and severity of methanol spills caused by NWIW's Kalama project, and the cumulative number of methanol spills projected in the Columbia River from NWIW's Kalama and Port Westward refinery proposals. This analysis should be made available for public review and comment prior to a Final EIS.

B. No Meaningful Analysis of the Behavior of a Large Methanol Spill from Vessel into the Columbia River.

The DEIS does not contain any meaningful discussion of how a spill of methanol that might be reasonably expected to result from a tanker accident would behave and disperse in the Columbia River. The vessels servicing NWIW's refinery could carry up to 14 million gallons of methanol, and would use segmented compartments of 3 million gallons in volume to reduce spill volume. Accordingly, the DEIS should at least analyze the behavior and consequences of a 3 million gallon methanol spill into the Columbia River. Instead, the DEIS focuses on the consequences of a spill ten times smaller—apparently because another author had already prepared that analysis.

The DEIS does discuss modeling of a 3.3 million gallon spill *into the ocean*, but provides no real explanation or authority for the assertion that, for a spill into the Columbia River, the “dilution rate would be similarly rapid and the biodegradation rate similar to that shown for the open-sea release.”¹⁴ However, chemicals in water, including spilled methanol as well as dispersants and dispersed fuel, may behave differently depending on the degree of salinity. The degree of salinity in the lower Columbia River may not be predictable at any given time and at any given location. It is vital to know how methanol and the different substances used in spill response will behave in water depending on the degree of salinity, and how this, in turn, may affect habitats and species.

The EIS should model the dispersion and dilution of a 3 million gallon methanol spill into the Columbia River, and this analysis should be made available for public review and comment prior to a Final EIS.

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¹³ EFSEC, *Appendix J to DEIS for Vancouver Energy Distribution Terminal* (2015).

¹⁴ DEIS, p.8-16.

C. No Discussion of Ecological Damage Caused by a Methanol Spill from a Vessel into the Columbia River.

The DIES focuses on the safe drinking water threshold when describing the risks and impacts of a methanol spill, but ignores the possibility that a large spill could cause oxygen depletion leading to the death of fish and other aquatic life.

Methanol spills deplete oxygen in the water when aquatic microbes consume oxygen while metabolizing methanol. While this process degrades methanol, the oxygen depletion caused by biodegradation of a large methanol spill “could deplete the surface water of oxygen required to sustain aquatic life.”¹⁵ In fact, large spills of ethanol—which similarly consume oxygen during biodegradation—have been observed to result in large fish kills in two rivers.¹⁶ Again, the FEIS should model the release of a 3 million gallon methanol spill, explain the level of oxygen depletion that would result from the biodegradation of that methanol, and explain whether such oxygen depletion could be expected to impact aquatic life in the Columbia River.

D. No Discussion of Ecological Damage from Actions Taken in Response to Spills

The complex geography, hydrology, and ecology of the Columbia River make it an especially difficult environment in which to administer an emergency spill response that avoids causing further harm to sensitive habitats and species. It is vital to know how the complexities of the spill environment may interact with different spill response strategies, including specific mechanical, chemical, and biological applications, which could affect species in different ways.

The shifting current in the Columbia are of concern with regard to direction of flow. Installation of booms to protect sensitive areas from spilled methanol may be more or less effective, or even harmful, depending on location, timing, tidal cycle, and direction and volume of flow in the river. It is important to know whether habitat could actually be harmed by deployment of booms, especially if deployment occurs without regard to the dynamic nature of the river and bay environment.

Fuel oil spills near the mouth of the Columbia River, Puget Sound, or farther out from the coast may occur due to a tanker accident, or oil may be carried out to sea on river and tidal currents. Spill response, in addition to the spills themselves, may prove harmful to species such as whales, including species protected under the Endangered Species Act (see below), if the marine mammals swim through waters contaminated with either harmful dispersants or dispersed oil.

Use of dispersants is an important example of a spill response measure that might do more harm than good. Dispersants are used to break oils into smaller droplets that can break down more readily than oil in slicks. The use of dispersants involves a complex calculation of

¹⁵ DEIS, Appx. G2, p.8.

¹⁶ Exhibit 4, Massachusetts Department of Environmental Protection, *Large Volume Ethanol Spills—Environmental Impacts and Response Options*, p.4-9 (2011).

impacts as methanol, dispersants, and dispersed oil can all have toxic effects on aquatic species from plankton to fish to whales. Effects include direct mortality from ingestion, impacts on marine mammals from breathing dispersants, and impacts from the coating of birds' feathers with dispersants or dispersed oil. Moreover, the toxicity of many chemical agents, such as dispersants, that may be used during a spill response have not yet been evaluated by the EPA or National Marine Fisheries Service ("NMFS") for their impacts on listed species.

The use of chemical countermeasures in response to a spill event introduces substances into the environment that are potentially toxic to species. In-situ burning, dredging, field testing of spill response methods, and field training exercises all involve actions that might have adverse impacts on species, depending on the manner in which they are implemented. While federal, state, and local responses to spills often lessen the impacts of spills to wildlife, poorly planned or poorly implemented spill response activities can adversely affect wildlife and essential habitat. The DEIS makes no mention of the impacts that spill response measures from a spill of methanol might have on the environment. This renders the DEIS inadequate.

II. IMPACTS TO THE COLUMBIA RIVER, ESTUARY, AND COASTAL WATERS FROM NWIW'S PROPOSAL.

NWIW's proposal jeopardizes the lower Columbia River and estuary, an area at the center of a regional and national effort to restore both vibrant fisheries and endangered and threatened species. The Columbia River estuary is a federally-designated Estuary of National Significance under the Clean Water Act's National Estuary Program.¹⁷ The U.S. Environmental Protection Agency has designated the Columbia River as one of seven Priority Large Aquatic Ecosystems.¹⁸ The federal government, and public and private entities, have invested billions of dollars to restore endangered and threatened salmon in the Columbia River Basin.¹⁹

NWIW's project will degrade an ecosystem that is a local and regional treasure, a national priority for watershed health and salmon recovery. NMFS has described the ecological value of the Columbia River estuary, stating:

"The lower Columbia River estuary provides vital habitat for anadromous salmonids throughout the Columbia River basin, and is of particular importance from a threatened and endangered species recovery perspective. The estuary is designated as critical habitat for 17 species of ESA-listed fish and EFH [Essential Fish Habitat] for Pacific salmon."

¹⁷ EPA, National Estuary Program in Region 10 (online at: <http://yosemite.epa.gov/R10/ECOCOMM.NSF/6da048b9966d22518825662d00729a35/c7a2ab5e252f309688256fb600779ea6!OpenDocument>).

¹⁸ EPA, *Columbia River Basin: State of the River Report for Toxics* (Jan. 2009) (online at: http://www2.epa.gov/sites/production/files/documents/columbia_state_of_the_river_report_jan2009.pdf).

¹⁹ See Exhibit 5, Thom, R. *et al.*, *Columbia River Estuary Ecosystem Restoration Program, 2012 Synthesis Memorandum* (2013).

The federal government has funded—and will continue to fund for the foreseeable future—a significant portion of the salmon restoration efforts in the Columbia River estuary. NWIW’s project would compromise this investment in order to ship fracked North American natural gas overseas as methanol. This ignores one of the key tenets of SEPA: “the basic importance of environmental concerns to the people of the state.” *Leschi v. Highway Comm’n*, 84 Wn.2d 271, 279–80 (1974).

The lower Columbia River and estuary provides vital habitat for salmon originating throughout the Columbia River Basin, and is particularly important for threatened and endangered species recovery. There are numerous species in the area that would be affected by this Project.²⁰ Species protected under the Endangered Species Act include populations of salmon, bull trout, lamprey, eulachon, and green sturgeon.

The estuary is designated as critical habitat for 17 species of ESA-listed fish and Essential Fish Habitat for Pacific salmon. A growing body of evidence, much of it quite recent, explains the important role that shallow water estuarine habitats in the lower Columbia River estuary play in stabilizing production of Columbia River salmon and steelhead.²¹ Estuarine habitats provide high growth opportunities for out-migrating juvenile salmon and also provide protection from predators.

The lower Columbia River and estuary supports vibrant traditions of subsistence, commercial, and sport fishing for salmon, sturgeon, and other fish.²² The Buoy 10 fishery, spanning the mouth of the Columbia River, is one of the Pacific Northwest’s most renowned fisheries. Throughout the lower Columbia, an estimated 507,080 sport fishing trips for salmon and steelhead trips take place each year.²³ Despite significant declines in the salmon fishery, commercial fishing in the Columbia River estuary remains an important local cultural and economic practice. In addition to commercial and sport fishing on the Columbia River, a number of fishing vessels access ocean fisheries via the mouth of the Columbia River.²⁴ The DEIS fails to adequately consider impacts from the Project on these fisheries and the habitats they rely on.

²⁰ See DEIS, p.6-21.

²¹ Bottom *et al.*, *Estuarine habitat and juvenile salmon: current and historical linkages in the lower Columbia River and estuary* (2011); Roegner *et al.*, *Distribution, size, and origin of juvenile chinook salmon in shallow-water habitats of the lower Columbia River and estuary, 2002–2007*, 4 *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 450–472 (2012); Weitkamp *et al.*, *Seasonal and interannual variation in juvenile salmonids and associated fish assemblage in open waters of the lower Columbia River estuary*, 10 *Fishery Bulletin* 4 (2012).

²² Oregon Department of Fish and Wildlife and Washington Department of Fish and Wildlife, *2014 Joint Staff Report: Stock Status and Fisheries for Spring Chinook, Summer Chinook, Sockeye, Steelhead, and Other Species, and Miscellaneous Regulations* (Jan. 22, 2014).

²³ EFSEC, *DEIS for the Vancouver Energy Distribution Terminal*, pp.3-12–17 (2015).

²⁴ *Id.* at 2-18.

A. The DEIS Ignores the Project's Impacts on the Pacific Ocean.

By constricting the vessel study area, the DEIS gives readers the impression that the impacts of ship traffic on marine fauna will be insignificant or non-existent. Like the Columbia River and estuary, the marine route is home to many species that would be put at risk by this project. The nearshore Pacific ocean is critical habitat for species listed under the ESA, including leatherback sea turtle, green sturgeon, and eulachon. It is essential fish habitat for West Coast salmon, ground fish, forage fish, and coastal pelagic sharks. Many ESA-listed whale species live near or offshore the mouth of the Columbia River, including blue, fin, and sei whales, sperm whales, orcas, and humpbacks. Other whale species like the pygmy sperm whale and the common minke also live in the area. A NMFS Biological Opinion for one Columbia River crude oil terminal concluded that oil tankers exiting from the Columbia River are “substantially certain” to collide with, and acoustically disturb, threatened and endangered marine mammals and leatherback sea turtles.²⁵ Stopping the study area at the mouth of the Columbia obscures the risks and impacts of allowing up to 144 large tanker vessel transits per year in coastal waters and significantly under-sells the consequences of NWIW's proposed facility. The risks and impacts of such ship traffic are reasonably foreseeable and must be addressed in the FEIS.

1. The Applicant must analyze the impacts to marine mammals

The proposed project would increase the amount of tanker traffic moving through the mouth of the Columbia River and offshore of Oregon and Washington. The increase in tanker traffic associated with the proposed Project (up to 72 round trip ships per year) poses risks to marine mammals in several ways, including through elevated risk of ship strike, increased noise in the aquatic environment, elevated risk of exposure to toxic contaminants through spills, and the introduction of invasive species in ballast water. Several of the species put at risk by the proposed Project are protected under the Endangered Species Act (“ESA”) and/or Marine Mammal Protection Act (“MMPA”). Allowing activities that may harm these species opens up both the agency and private actors to liability under these acts. *See* 16 U.S.C. § 1538(a)(1)(B); 16 U.S.C. § 1362.

i. Elevated risk of ship strike.

Ship strikes involving large vessels are the “principal source of severe injuries to whales.”²⁶ Most ship strikes to large whales result in death.²⁷ Ship strike-related mortality is a documented threat to endangered Pacific coast populations of endangered fin, humpback, blue, sperm, and killer whales. In recent years, ship strikes have become an increasing problem for these critically endangered species along the Pacific Coast. For example, between 2001 and

²⁵ *See* Exhibit 6, NMFS, *Final Biological Opinion for Columbia Pacific Bio-Refinery Dock Expansion*, p.7 (June 8, 2015).

²⁶ Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M., 2001, Collisions between ships and whales, *Marine Mammal Science*, 17(1): 35-75.

²⁷ Jensen, A.S. and Silber, G.K., 2004, Large Whale Ship Strike Database. U.S. Department of Commerce, *NOAA Technical Memorandum*. NMFS-OPR-25.

2010, 12 blue whales were reported stranded due to vessel collisions.²⁸ In 1998, NMFS identified ship strikes as one of the primary threats to the endangered blue whale in the Pacific.²⁹

Fin whales, which are routinely sighted in waters off the U.S. Pacific coast, were the most frequently struck species in the analysis conducted by Jensen and Silber (75 confirmed strikes, 26 percent of total strikes).³⁰ At least 18 fin whale mortalities and injuries due to ship strikes were conclusively documented off the coasts of California, Oregon, and Washington between 1993 and 2008.³¹ An examination of 130 whale strandings in Washington State from 1980 to 2006, similarly found fin whales to be very susceptible to ship strikes.³² The final NMFS recovery plan for fin whales ranks the threat posed by ship strikes as “potentially high,”³³

A spatial risk assessment was conducted in 2004 to identify areas where fin, humpback, and killer whales encounter areas of high shipping intensity.³⁴ The study found that relative risk was highest in confined areas (geographic bottlenecks), such as the mouth of the Columbia River where vessels would have to enter to reach the proposed facility. The study further found that the few known cases of collisions involving fin whales suggest that mortality due to ship strike for this species may already be approaching or even exceeding mortality limits under the most risk-averse management objectives.³⁵

Other species, however, are also facing increased risk of harm from ship strikes. For example, the NMFS draft recovery plan for southern resident killer whales documents rare but increasing cases of collisions between ships and individuals of that distinct population segment,³⁶ which was listed as endangered in 2005.³⁷

²⁸ National Marine Fisheries Service. 2010. Southwest Regional Office, California Marine Mammal Stranding Network Database.

²⁹ National Marine Fisheries Service. 1998. Recovery plan for the blue whale (*Balaenoptera musculus*). Prepared by Reeves R.R., P.J. Clapham, R.L. Brownell, Jr., and G.K. Silber for the National Marine Fisheries Service, Silver Spring, MD.

³⁰ Jensen, A.S. and G.K. Silber. 2004. Large Whale Ship Strike Database. U.S. Department of Commerce, NOAA Technical Memorandum. NMFS-OPR-25.

³¹ National Marine Fisheries Service. 2010. Recovery plan for the fin whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD.

³² Douglas, Annie B., *et al.*, 2008, Incidence of ship strikes of large whales in Washington State, *Journal of the Marine Biological Association of the United Kingdom*.

doi:10.1017/S0025315408000295 (available at <http://www.cascadiaresearch.org/reports/Douglas%20et%20al%202008-Incidence%20of%20ship%20strikes%20of%20large%20whales.pdf>).

³³ National Marine Fisheries Service. 2010. Recovery plan for the fin whale (*Balaenoptera physalus*). National Marine Fisheries Service, Silver Spring, MD. at I-26.

³⁴ Williams, R, O’Hara, P.J., 2010, Modelling ship strike risk to fin, humpback and killer whales in British Columbia, Canada, *Journal of Cetacean Research and Management*, 11:1-8.

³⁵ *Id.*

³⁶ NMFS, Recovery Plan for Southern Resident Killer Whales (*Orcinus orca*) (2008).

³⁷ 70 Fed. Reg. 69903 (Nov. 18, 2005).

Given the foregoing, there can be no doubt that the significant increase in deep draft vessel traffic from the proposed Project will increase the risk of vessel strikes of marine mammals (as well as turtles). The Applicant, however, has failed to address this issue. The DEIS acknowledges that “[t]he additional 36 to 72 vessel transits per year on the Lower Columbia River have the potential to result in collisions of ships with marine mammals that occur within the vessel shipping route on the Lower Columbia River.” Yet, the DEIS claims, with reference only to the FERC 2008 FEIS for Bradwood Landing, that:

Propeller or collision injuries to marine mammals are most frequently caused by small, fast-moving vessels (FERC 2008). In contrast, the ships that would dock at the proposed project produce a bow wave because of their design and large displacement tonnage. This wave pushes in-water objects (including animals in the water) away from the vessel. Therefore, the proposed project would not result in significant adverse impacts to aquatic species as a result of ship strikes.³⁸

This conclusion is entirely illogical and without support. In fact, the 2008 Bradwood Landing FEIS that the Applicant cites provides no supporting citation for the claim that fast moving vessels are most typically associated with whale strikes, rendering that claim uncorroborated. That FEIS actually states that “[b]ecause the blockage ratio of the LNG carriers would be greater than that of most of the deep-draft ships currently traveling the Columbia River, the LNG carriers could potentially produce larger waves than most of the current ships operating at the same speed,” completely undermining the Applicant’s claim.³⁹

Moreover, the actual quote from the Bradwood FEIS is “[t]he ship strike database indicates that large and fast moving vessels (**greater than 12 knots**) are most typically associated with whale strikes.”⁴⁰ The Applicant conveniently left off the “12 knot” defining characteristic, which is quite telling, since the Bradwood FEIS goes on to state that:

Within the Columbia River navigation channel (CRM -3 to CRM 100) and in the marine waters approaching the entrance/exit of the navigation channel (at least out to CRM -8) the Columbia River Bar and River Pilots would determine the ship speed.... LNG carrier speeds would accordingly vary depending on current conditions, but would be limited to approximately **12 knots**. *Id.* (emphasis added).

This suggests that the tanker ships for this Project would likewise travel at a speed where ship strikes are indeed possible. The Bradwood FEIS provides no support for the claim made here that ships with a bow wave are unlikely to cause marine mammal strikes. In fact, that FEIS concluded that “statistically, LNG carriers associated with the Bradwood Landing Project would strike 1.25 fin whales. The likelihood of an LNG carrier striking a blue, sei, or humpback whale

³⁸ DEIS at 6-40.

³⁹ Bradwood Landing FEIS at 4-5.

⁴⁰ Bradwood Landing FEIS at 4-246 (emphasis added).

would be about 20 percent;” however, it conceded that “the actual number of whale strikes is undoubtedly much greater than reported.”⁴¹

Unlike the project proponent in Bradwood, the Applicant here has failed entirely to estimate or analyze the harm from whale strikes, rendering the DEIS entirely incomplete. Further, changing sea conditions, in part due to global climate change, may drastically increase the number of whale strikes that will occur in the future. This has already been documented in several studies. For example, in 2010, there were an unusually large number of blue whale sightings off of the coast of California due to abundant krill.⁴² Whale mortalities spiked as foraging whales gathered in busy shipping lanes off the coast. Changing ocean conditions can influence the productivity in the current system off the Pacific coast and change the abundance of prey for whales. Therefore, more whales may be at risk due to changing ocean conditions. The estimate of potential whale strikes must take this into account, and these impacts must be analyzed in the EIS.

ii. *Increasing chronic ocean noise levels in important marine habitats.*

The proposed Project would substantially increase the amount of ship-related noise in the water, posing a risk of harm to marine mammals. Sound is the key sense for dolphins and whales to find their way around, detect predators, find food and communicate. The sound frequency range within which whales communicate and echolocate corresponds to the frequency range of ship noise. Ships hundreds and even thousands of miles away interfere with the acoustic space of these animals. With more ship traffic, the ability for whales and dolphins to communicate, search for prey, and avoid predators will be compromised. These impacts were not even mentioned in the DEIS, which only discussed construction noise from pile driving.

Oceans are much louder today than they were a century ago, primarily due to increased anthropogenic noise.⁴³ Ocean noise pollution, predominantly from large shipping vessels, has created an “omnipresent hum” in our ocean.⁴⁴ Large commercial shipping vessels are the primary source of anthropogenic low-frequency sound contributing to ambient (background) noise in the ocean. Because very loud low-frequency sound can travel great distances in the deep

⁴¹ *Id.* at 4-247.

⁴² Sahagun, Louis. 2010. Marine mammal enthusiasts getting a show from blue whales. *Los Angeles Times* (Sept. 3, 2010); Zito, Kelly. 2010. Whale deaths blamed on busy ship traffic, krill. *San Francisco Chronicle* (Oct. 10, 2010).

⁴³ *Phase 1-CetSound*, NOAA, <http://cetsound.noaa.gov/cetsound>.

⁴⁴ For example, tests conducted near San Nicolas Island, one of the Channel Islands just south of the Channel Islands NMS, indicate that ambient noise pollution in that area has increased by 10-12 decibels over the past 40 years. McDonald *et al.* suggest that this increase, potentially reflected throughout the Northeast Pacific, is most likely due to changes in commercial shipping. McDonald, M.A., Hildebrand, J. and Wiggins, S.M., 2006, Increases in deep ocean ambient noise in the Northeast Pacific west of San Nicolas Island, California, *Journal of the Acoustical Society America*, 120(2): 711-718.

ocean, increasing noise impacts areas far beyond the source of the noise.⁴⁵ This poses a severe threat to marine mammals.

NOAA has recently begun mapping marine noise levels using its SoundMap and CetMap mapping tools.⁴⁶ These maps show that human-caused cumulative and ambient ocean noise pollution has increased ambient sound levels to over 100 decibels (dB) over the majority of the Pacific and Atlantic oceans.⁴⁷ This sound level is equivalent to attending a live rock concert or standing next to a running chainsaw.⁴⁸

Marine mammals use different song, chirp, and whistle frequencies for a variety of purposes, including echolocation for feeding, long-distance communication, environmental imaging, individual identification, and breeding.⁴⁹ Odontocetes, or toothed mammals such as dolphins and killer whales, produce broad-spectrum clicks and whistles that can range between 1 and 200 kilohertz (kHz).⁵⁰ Mysticetes, or baleen whales such as blue and right whales, have much lower-frequency calls, ranging between 0.2 and 10 kHz.⁵¹

⁴⁵ Hildebrand, J. 2005. Impacts of anthropogenic sound, *In: Marine Mammal Research: Conservation Beyond Crisis*. Edited by: J.E. Reynolds III, W.F. Perrin, R.R. Reeves, S. Montgomery and T.J. Ragen. Johns Hopkins University Press, Baltimore, Maryland, pp. 101-124.

⁴⁶ See <http://cetsound.noaa.gov/>

⁴⁷ *Summed Outputs—Sound Field Data Availability*, NOAA, http://cetsound.noaa.gov/SoundMaps/NorthAtlantic/Basin/Chronic/NA_OceanBasin_Chronic_Sum/NorthAtlantic_Sum_ThirdOctave/Atl_Sum_0050Hz_0005m_ThrdOct.png (last accessed Oct. 29, 2014) (Atlantic Ocean noise pollution levels); *Summed Outputs—Sound Field Data Availability*, NOAA, http://cetsound.noaa.gov/SoundMaps/NorthPacific/Basin/Chronic/NP_OceanBasin_Chronic_Sum/NorthPacific_Sum_ThirdOctave/Pac_Sum_0050Hz_0005m_ThrdOct.png (last accessed Oct. 29, 2014) (Pacific Ocean noise pollution levels).

⁴⁸ *Comparative Examples of Noise Levels*, INDUSTRIAL NOISE CONTROL, INC. (Feb. 2000), <http://www.industrialnoisecontrol.com/comparative-noise-examples.htm>.

⁴⁹ *Id.* at 42-44; Jason Gedamke, *Ocean Sound & Ocean Noise: Increasing Knowledge Through Research Partnerships*, NOAA 2 (2014), available at <http://cetsound.noaa.gov/Assets/cetsound/documents/MMC%20Annual%20Meeting%20Intro.pdf>; Clark, C.W. et al., *Acoustic Masking in Marine Ecosystems as a Function of Anthropogenic Sound Sources*, available at https://www.academia.edu/5100506/Acoustic_Masking_in_Marine_Ecosystems_as_a_Function_of_Anthropogenic_Sound_Sources.

⁵⁰ OCEAN NOISE AND MARINE MAMMALS, NAT'L RES. COUNCIL 41-42 (2003), available at http://www.nap.edu/openbook.php?record_id=10564&page=R1.

⁵¹ *Id.* at 42.

Anthropogenic noise pollution can mask marine mammal communications at almost all frequencies these mammals use.⁵² “Masking” is a “reduction in an animal’s ability to detect relevant sounds in the presence of other sounds.”⁵³ Ambient ship noise can cover important frequencies these animals use for more complex communications.⁵⁴ Some species, such as the highly endangered right whale, are especially vulnerable to masking.⁵⁵ Ship noise can completely and continuously mask right whale sounds at all frequencies.⁵⁶ NOAA has recognized that this masking may affect marine mammal survival and reproduction by decreasing these animals’ ability to “[a]ttract mates, [d]efend territories or resources, [e]stablish social relationships, [c]oordinate feeding, [i]nteract with parents, or offspring, [and] [a]void predators or threats.”⁵⁷ Studies have also found that chronic exposure to boat traffic and noise can cause whales to reduce their time spent feeding.⁵⁸

In addition to masking effects, marine mammals have displayed a suite of stress-related responses from increased ambient and local noise levels. These include “rapid swimming away from [] ship[s] for distances up to 80 km; changes in surfacing, breathing, and diving patterns; changes in group composition; and changes in vocalizations.”⁵⁹ Some avoidance responses to localized marine sounds may even lead to individual or mass strandings.⁶⁰ Louder anthropogenic sounds may also lead to permanent hearing loss in marine mammals.⁶¹

⁵² See, e.g., Hildebrand, J.A., *Impacts of Anthropogenic Sound, in MARINE MAMMAL RESEARCH: CONSERVATION BEYOND CRISIS* (Reynolds, J.E. III et al., eds. 2006); Weilgart, L., 2007, *The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management*, 85 *CANADIAN J. ZOOLOGY* 1091-1116 (2007).

⁵³ *OCEAN NOISE AND MARINE MAMMALS*, *supra* note 51, at 96.

⁵⁴ *Id.* at 42, 100 (“An even higher level, an understanding threshold” may be necessary for an animal to glean all information from complex signals”).

⁵⁵ Clark, C.W. et al., *Acoustic Masking in Marine Ecosystems: Intuitions, Analysis, and Implication*, 395 *MARINE ECOLOGY PROGRESS SERIES* 201, 218-19 (2009), available at <http://www.int-res.com/articles/theme/m395p201.pdf>; Clark *et al.*, *supra* note 50, at *17, fig. 8.

⁵⁶ *Id.* (showing anthropogenic noise masking 100 percent of the frequencies right whales used over the majority of a six-hour study).

⁵⁷ Jason Gedamke, *supra* note 50, at 2; Clark, C.W., *et al.*, *supra* note 56, at *3.

⁵⁸ See *i.e.* Williams, R. D., et al., 2006, *Estimating relative energetic costs of human disturbance to killer whales (Orcinus orca)*, *Biological Conservation*, 133: 301-311.

⁵⁹ *OCEAN NOISE AND MARINE MAMMALS*, *supra* note 51, at 94.

⁶⁰ *Id.* at 132; BRANDON L. SOUTHALL ET AL., *FINAL REPORT OF THE INDEPENDENT SCIENTIFIC REVIEW PANEL INVESTIGATING POTENTIAL CONTRIBUTING FACTORS TO A 2008 MASS STRANDING OF MELON-HEADED WHALES 3 (PEPONOCEPHALA ELECTRA) IN ANTSOHIHY, MADAGASCAR*, *INT’L WHALING COMM’N* 4 (2013), available at <http://iwc.int/private/downloads/4b0mkc030sg0gogkg8kog4o4w/Madagascar%20ISRP%20FINAL%20REPORT.pdf>.

⁶¹ Kastak, D. et al., 2008, *Noise-Induced Permanent Threshold Shift in a Harbor Seal*, 123 *J. ACOUSTICAL SOC’Y OF AM.* 2986; Kujawa, S.G. & Liberman, M.C., 2009, *Adding Insult to Injury: Cochlear Nerve Degeneration After “Temporary” Noise-Induced Hearing Loss*, 29 *J. NEUROSCIENCE* 14,077.

NOAA and legislative leaders have recognized the threat to ocean species posed by increased anthropogenic ocean noise levels.⁶² On the issue of ocean noise, NOAA has stated:

Rising noise levels can negatively impact ocean animals and ecosystems in complex ways. Higher noise levels can reduce the ability of animals to communicate with potential mates, other group members, their offspring, or feeding partners. Noise can reduce an ocean animal's ability to hear environmental cues that are vital for survival, including those key to avoiding predators, finding food, and navigation among preferred habitats.

NOAA's approach to managing ocean noise aims to reduce negative physical and behavioral impacts to trust species, as well as conserve the quality of acoustic habitats.⁶³

Though difficult to detect, noise-induced stress is a serious threat for cetaceans.⁶⁴ In a noise exposure study using a captive beluga whale, increased levels of stress hormones were documented.⁶⁵ Stress due to noise can lead to long-term health problems, and may pose increased health risks for populations by weakening the immune system and potentially affecting fertility, growth rates and mortality.⁶⁶

Many species are already threatened by increasing ocean noise. The NMFS recovery plan for Southern resident killer whales (*Orcinus orca*) describes the disturbance from vessel traffic and the associated noise pollution as a potential threat to the species in Washington State and British Columbia, where population numbers have fallen to below 100 individuals.⁶⁷ The recovery plan identifies "sound and disturbance from vessel traffic" as factors that currently pose a risk for this population of Southern resident killer whales.⁶⁸ Killer whales rely on their highly developed acoustic sensory system for navigating, locating prey, and communicating with other individuals. Increased levels of anthropogenic sound have the potential to mask echolocation and other signals used by the species, as well as to temporarily or permanently damage hearing

⁶² See *Phase 2-NOAA's Ocean Noise Strategy* (<http://cetsound.noaa.gov/cetsound>); *Congressional Briefing on Marine Mammal Health and Stranding* (Sept. 24, 2014), http://www.mmc.gov/special_events/capitolhill_briefing/capitolhill_briefing_summary.shtml; see generally Jason Gedamke, *Supra Note 50*.

⁶³ *Underwater Noise and Marine Life*, NOAA, <http://cetsound.noaa.gov/index>.

⁶⁴ Weilgart, L., 2007, *The Impacts of Anthropogenic Ocean Noise on Cetaceans and Implications for Management*, 85 *CANADIAN J. ZOOLOGY* 1091-1116 (2007).

⁶⁵ Romano, T.A. *et al.*, 2004, *Anthropogenic sound and marine mammal health: measures of the nervous and immune systems before and after intense sound exposure*, *Canadian Journal of Aquatic Science*, 61: 1124-1134.

⁶⁶ *Id.*

⁶⁷ National Marine Fisheries Service (NMFS). 2008. *Recovery Plan for Southern Resident Killer Whales (Orcinus orca)*. National Marine Fisheries Service, Northwest Region, Protected Resources Division, Seattle, Washington.

⁶⁸ *Id.*

sensitivity. Exposure to sound may therefore be detrimental to survival by impairing foraging and other behavior.⁶⁹

Other species that communicate over vast distances in the ocean, such as blue and fin whales, will increasingly have trouble hearing one another as the ambient noise level continues to rise. The masking of reproductive calls may prevent widely distributed mates from finding each other and reproduction rates may fall as a consequence.⁷⁰ This could have a significant impact on the survival of species such as Southern resident killer whales and blue whales, which are listed as endangered species.

Hearing loss, classified as either “temporary threshold shift” or “permanent threshold shift,” is also a concern for animals exposed to the intense noise pollution produced by human activities. Hearing loss reduces the range in which communication can occur, interferes with foraging efforts and increases vulnerability to predators. Hearing loss may also change behaviors with respect to migration and mating and it may cause animals to strand, which is often fatal. For marine mammals such as whales and dolphins that rely heavily on their acoustic senses, both permanent and temporary hearing loss should be regarded as a serious threat.⁷¹

Furthermore, noise impacts to marine mammals are predicted to increase with global climate change, wherein the absorption of carbon dioxide by the ocean could create noisier oceans.⁷² When greenhouse gas reacts in the ocean, it lowers pH, creating more acidic waters. The more acidic the water, the less that sound waves are absorbed. Keith Hester, a researcher with the Monterey Bay Aquarium Research Institute, predicts sounds will travel 70% further by 2050 because of increased carbon dioxide acidifying our oceans.⁷³ A louder ocean will negatively affect cetaceans that rely on sound to navigate, communicate, find food, and avoid predators.

⁶⁹ *Id.*

⁷⁰ Weilgart, L., 2007, The impacts of anthropogenic ocean noise on cetaceans and implication for management. *Canadian Journal of Zoology*, 85 CANADIAN J. ZOOLOGY 1091-1116.

⁷¹ Hildebrand, J., 2005, Impacts of anthropogenic sound, *In: Marine Mammal Research: Conservation Beyond Crisis*. Edited by: J.E. Reynolds III, W.F. Perrin, R.R. Reeves, S. Montgomery and T.J. Ragen. Johns Hopkins University Press, Baltimore, Maryland, pp. 101-124.

⁷² Hester, K. C., *et al.*, 2008, Unanticipated consequences of ocean acidification: A noisier ocean at lower pH. *Geophysical Research Letters*, 35:31.

⁷³ *Id.*

The greatest source of human-caused marine noise by far is ship propeller cavitation—the sound poorly designed propellers make as they spin through the water.⁷⁴ Cavitation accounts for as much as 85 percent of human caused noise in the world’s oceans.⁷⁵ Cavitation may also increase due to hull designs that create non-homogenous wake fields behind ships.⁷⁶ And even well-designed propellers and hulls may begin to cavitate if they are not regularly cleaned and smoothed.⁷⁷

Another significant source of anthropogenic marine noise is on-board machinery, especially diesel engines.⁷⁸ Other onboard machines may also cause vibrations that migrate underwater.⁷⁹ Finally, ship noise increases at higher speeds, as this increases the degree and volume of cavitation and onboard machine sounds.⁸⁰ The Applicant has failed to discuss any of these sources of marine noise or the impacts to marine mammals in the DEIS, rendering it entirely incomplete.

iii. *If the Project is approved, the speed of tanker ships must be limited to reduce ship strikes and noise impacts.*

Reducing ship speed would mitigate several of the impacts of the proposed Project on marine mammals, since ships traveling at lower speeds will reduce significant threats due to ship strikes, noise pollution, air pollution, and greenhouse gas emissions.

Speed plays a significant role in risk of ship strikes.⁸¹ If a whale is swimming at mid-depth and hears an approaching ship, it will have difficulty in locating the direction of the ship because of the echoes off the bottom and surface. The loudness will not necessarily indicate how far away the ship is. If the whale then swims toward the surface directly ahead of the ship, the sound levels of that particular ship will become lower because of the downward diffraction, the Lloyd-mirror effect, near-field effects, and possible shielding from the hull. Thus, in terms of the acoustic stimulus associated with an approaching vessel, the quietest location will likely be at the surface, directly ahead of the ship.⁸²

⁷⁴ Joseph J. Cox, *Evolving Noise Reduction Requirements in the Marine Environment*, MARINE MAMMAL COMM’N: CONGRESSIONAL BRIEFING ON OCEAN NOISE, at 12 (2014), available at http://www.mmc.gov/special_events/capitalhill_briefing/cox_capitalhill_briefing_0914.pdf; GUIDELINES FOR THE REDUCTION OF UNDERWATER NOISE FROM COMMERCIAL SHIPPING TO ADDRESS ADVERSE IMPACTS ON MARINE LIFE, INT’L MARITIME ORGANIZATION 1-2 (2014) (definition of cavitation) [hereinafter GUIDELINES].

⁷⁵ Joseph J. Cox, *supra* note 75, at 12.

⁷⁶ GUIDELINES, *supra* note 75, at 4.

⁷⁷ GUIDELINES, *supra* note 75, at 5.

⁷⁸ GUIDELINES, *supra* note 75, at 4.

⁷⁹ *Id.*

⁸⁰ GUIDELINES, *supra* note 75, at 5.

⁸¹ *See generally*, Conn, P. B., and G. K. Silber, 2013, Vessel speed restrictions reduce risk of collision-related mortality for North Atlantic right whales, *Ecosphere*, 4(4):43.

⁸² Terhune, J.M. and Verboom, W.C., 1999, Right whales and ship noise, *Marine Mammal Science*, 15: 256-258.

The Applicant's DEIS fails to specify the speed at which tankers would be restricted to for this Project. Scientific research has shown that there is a direct correlation between vessel speed and ship strikes resulting in whale mortality,⁸³ and that slower speeds are necessary for avoiding harm to marine mammals.

Ship speed affects the likelihood of whale mortality in two ways. First, slower ship speeds provide whales with a greater opportunity to detect the approaching ship and avoid being hit by it. "To the extent that increasing vessel speed significantly increases accelerations experienced by a whale, limits on vessel speed will reduce the magnitude of the acceleration; may increase response time for a whale attempting to maneuver away from a vessel; and appear to be reasonable actions to consider in policy decisions aimed at reducing the overall threat of ship strikes."⁸⁴

Second, research shows that while slower speeds may not avoid all collisions between whales and ships, collisions at slower speeds are less likely to result in serious injury or death of the whale that has been struck.⁸⁵ Laist *et al.* (2001) reported in a historical analysis of ship strikes involving large cetaceans that "[a]mong collisions causing lethal or severe injuries, 89% (25 of 28) involved vessels moving at 14kn or faster and the remaining 11% (3 of 28) involved vessels moving at 10-14 kn; none occurred at speeds below 10 kn."⁸⁶

Similarly, Vanderlaan and Taggart (2007) report that "as vessel speed falls below 15 knots, there is a substantial decrease in the probability that a vessel strike to a large whale will prove lethal," but that only at speeds slower than 11.8 knots does the chance of a fatal injury to a large whale drop below 50 percent.⁸⁷ Pace and Silber (2005) noted that they found "clear evidence of a sharp rise in mortality and serious injury rate with increasing vessel speed."⁸⁸ Specifically, they found that probability of serious injury or mortality increased from 45 percent at 10 knots to 75 percent at 14 knots, exceeding 90 percent at 17 knots.

⁸³ Laist, D.W., Knowlton, A.R., Mead, J.G., Collet, A.S. and Podesta, M., 2001, Collisions between ships and whales, *Marine Mammal Science*, 17(1): 35-75; Pace, R.M. and Silber, G.K., 2005, Abstract: Simple Analyses of ship and large whale collisions: Does speed kill?, *Sixteenth Biennial Conference on the Biology of Marine Mammals*, San Diego (Dec. 2005); Vanderlaan, A.S.M. and Taggart, C.T., 2007, Vessel Collisions with Whales: The probability of lethal injury based on vessel speed, *Marine Mammal Science*, 23(1): 144-156; Panigada, S., et al., 2006, Mediterranean fin whales at risk from fatal ship strikes, *Marine Pollution Bulletin*, 52: 1287-1298; Silber, G.K., Slutsky, J., and Bettridge, S., 2010, Hydrodynamics of a ship/whale collision, *Journal of Experimental Marine Biology and Ecology*, 391:10-19.

⁸⁴ Silber, G.K., Slutsky, J., and Bettridge, S., 2010, Hydrodynamics of a ship/whale collision, *Journal of Experimental Marine Biology and Ecology*, 391: 10-19.

⁸⁵ Laist, *supra* note 84.

⁸⁶ *Id.*

⁸⁷ Vanderlaan, A.S.M. and Taggart, C.T., 2007, Vessel Collisions with Whales: The probability of lethal injury based on vessel speed, *Marine Mammal Science*, 23(1): 144-156.

⁸⁸ Pace, *supra* note 84.

Terhune and Verboom recommended that to avoid striking whales, ship operators need to take evasive actions to avoid collisions.⁸⁹ Since successfully avoiding a collision depends in part on accurately predicting a whale's movement, the ship operator may not be able to maneuver a large vessel in such a way that a collision is successfully avoided. Slower moving vessels may provide more time for a whale to avoid being struck. Laist *et al.* (2001) report situations in which a last-second flight response on the whale's part may serve to avoid collisions. Studies suggest that slower moving vessels are easier for whales to avoid, even if acoustic signals were missed.⁹⁰

NMFS has found that no other measure was as essential or effective as the establishment of a mandatory 10-knot speed limit to reduce and prevent whale strikes.⁹¹ NMFS has found that instituting this speed limit would benefit humpback, fin, sperm, and sei whales, as well as sea turtles.⁹² Therefore, should this project be approved, a 10-knot speed limit should be included, along with reporting and monitoring mechanisms to ensure that the Applicant's ships adhere to this limitation.

Limiting the speed of tankers will also reduce noise impacts to marine mammals. As discussed above, vessel traffic is the largest source of noise pollution in the marine environment.⁹³ The intense, low frequency noise pollution generated by ships can travel great distances through the water.⁹⁴ Noise pollution from shipping results primarily from the formation and collapse of air bubbles as the propeller turns. This process, known as cavitation, creates very loud acoustic pollution in the same lower-frequency range used for communication by whales, dolphins and other marine animals.⁹⁵ Cavitation is the primary source of noise at high speeds.⁹⁶ As a result, one of the most efficient ways to reduce noise from cavitation is to reduce the speed of the vessel. For these reasons, is approved the proposed Project should include a mandatory speed limit to mitigate the noise impacts associated with tanker ships.

B. Impacts of Dock Construction and Operation.

Either of the proposed "action" alternatives would require the construction and dredging of a massive new dock in the lower Columbia River. This type of construction and structure is detrimental to various aquatic species, many of which are protected by federal or state law. In addition to the following comments on dock construction and Project operation, Commenters incorporate by reference the Comments of Columbia Riverkeeper on the Clean Water Act § 404

⁸⁹ *Id.*

⁹⁰ National Marine Fisheries Service (NMFS). 2008. FEIS to Implement Operational Measures to Reduce Ship Strikes to North Atlantic Right Whales (August 2008).

⁹¹ *Id.*

⁹² *Id.* at 4-19, 4-23.

⁹³ *Id.*

⁹⁴ *Id.*

⁹⁵ *Id.*

⁹⁶ Arveson, P. T., and Vendittis, D. J., 2000, Radiated noise characteristics of a modern cargo ship, *Journal of the Acoustical Society of America*, 107 (1): 118-129.

and § 401 permits by the U.S. Army Corps of Engineers and the Washington Department of Ecology, respectively.⁹⁷

1. Noise impacts from construction at the terminal site.

The proposed dock renovation work (and upland construction) could cause noise-induced behavior impacts, including indirect mortality, on Columbia River fish species. The DEIS explains that pile installation and removal would be accomplished using vibratory and impact hammers. Pile driving can have substantial adverse impact on underwater organisms; however, the DEIS fails to adequately assess those impacts.

NWIW's proposed terminal would require the installation of approximately 320 24-inch concrete piles, 12 12-inch steel pipe piles, and 4 18-inch steel pipe piles.⁹⁸ These piles will be installed by impact hammer or by vibratory hammer.⁹⁹ The U.S. Army Corps' Joint Public Notice of Application for a Department of the Army Permit and a Washington Department of Ecology Water Quality Certification for the project (hereinafter, "JPN") fails to show that harm will not occur to organisms in the vicinity, especially pinnipeds and salmonids. Specifically, the JPN does not discuss using bubble curtains or other methods to mitigate or attenuate acoustic impacts on aquatic organisms. Given that the pile driving is estimated to last for approximately 120 days,¹⁰⁰ many endangered fish and other animals could be killed, or at the very least harmed, by this activity.

As NMFS described:¹⁰¹

"Acoustic disturbances associated with pile driving are likely to disrupt the foraging behavior and reduce forage efficiency of juvenile salmonids. * * * Fishes with swimbladders (including salmonids) are sensitive to underwater impulsive sounds, i.e., sounds with a sharp sound pressure peak occurring in a short interval of time." (Caltrans 2001). As the pressure wave passes through a fish, the swimbladder is rapidly squeezed due to the high pressure, and then rapidly expanded as the under pressure component of the wave passes through the fish. The pneumatic pounding may rupture capillaries in the internal organs as indicated by observed blood in the abdominal cavity, and maceration of the kidney tissues (Caltrans 2001). The injuries caused by such pressure waves are known as barotraumas, and include hemorrhage and rupture of internal organs, as described above, and damage to the auditory system. Death can be instantaneous, can occur within minutes after exposure, or can occur several days later. A multi-agency work group determined that to protect listed species, sound pressure waves should be within a single

⁹⁷ Exhibits 1 and 2.

⁹⁸ Exhibit 7, U.S. Army Corps of Engineers, *Joint Public Notice of Application for a Department of the Army Permit and a Washington Department of Ecology Water Quality Certification for NWIW's Methanol Refinery and Export Terminal*, p.2 (October 9, 2015).

⁹⁹ JPN at 3.

¹⁰⁰ JPN at 4.

¹⁰¹ Exhibit 6, pp.82–83.

strike threshold of 206 decibels (dB), and for cumulative strikes either 187 dB sound exposure level (SEL) where fish are larger than 2 grams or 183 dB SEL where fish are smaller than 2 grams.

Deployment of a bubble curtain is likely to attenuate the peak sound pressure levels by approximately 10 to 20 dB. However, a bubble curtain may not bring the sound pressure levels below biological thresholds, and some death or injuries of ESA-listed salmonids are still likely to occur. Even with the use of the bubble curtain, adverse effects to salmonids are expected in the vicinity of the pile driving. Yelverton et al. (1975) found a direct correlation between smaller body mass and the magnitude of injuries and mortalities from underwater blasts. Large juvenile and adult fishes are likely to be present during the summer in-water work window, rather than small juvenile fishes. Based on conservative estimates of sound exposure level and number of pile strikes per day, injury to juvenile listed salmonids could occur up to 368 feet from the pile driving (NMFS 2008). There may also be effects to salmonid behavior due to underwater noise up to 7,067 feet upstream and downstream from the pile driving (NMFS 2008).”

2. Impact of overwater structures on juvenile salmonids.

The DEIS ignores the impacts of over-water structure on juvenile salmonid survival. Overwater structures like NWIW’s proposed dock degrade habitat for, and directly increase the mortality of, juvenile salmonids. NWIW’s terminal will result in 44,943 square feet of new solid overwater coverage.¹⁰² NMFS has explained that: “[a]n effect of overwater structures is the creation of a light/dark interface that allows ambush predators to remain in a darkened area (barely visible to prey) and watch for prey to swim by against a bright background (high visibility). Prey species moving around the structure are unable to see predators in the dark area under the structure and are more susceptible to predation.”¹⁰³ These impacts are significant and measurable: “Predation on ESA-listed salmon and steelhead is reasonably certain to increase with the addition of structures. Juvenile fish abundance has also been found to be reduced under piers and overwater structures when compared to open water or areas with piles but no overwater structures (Able *et al.* 1998), likely due to limitations in prey abundance and increased predation under structures.”¹⁰⁴ An Army Corps of Engineers-sponsored literature review similarly concluded that:

Over-water structures may increase predation of juvenile Chinook salmon in several ways. First, piers and docks can provide cover and preferred habitat for ambush predators such as smallmouth bass. Second, they create shaded areas that can increase a predator’s capture efficiency of prey. Third, they interrupt migration routes and timing of migrating salmonids. The additional time spent navigating around these structures increase exposure to predators in these areas. Finally, changes in substrate, aquatic vegetation, and ambient light caused by

¹⁰² JPN at 3.

¹⁰³ NMFS, *SLOPES IV In-water and Over-water Structures BiOp*, p.85 (April 5, 2012).

¹⁰⁴ *Id.* at 86.

overwater structures may indirectly increase predation through complex ecological pathways.¹⁰⁵

The DEIS must consider the effect of constructing a new dock on juvenile salmonid survival, in addition to the cumulative impacts of the numerous existing and proposed overwater structures in the Columbia.

3. Proposed ‘fish window’ would not protect juvenile salmonids.

The existing in-water work window approved by WDFW begins on November 1, in order to avoid impacts to juvenile salmonids that migrate through the Columbia River in the summer. Apparently because NWIW wants to take 6 entire months to dredge the berth and build the dock, NWIW proposes an in-water work window stretching from August 1 to December 31.¹⁰⁶ The FEIS should contain a thorough discussion of the benefits and rationale for the existing in-water work window (beginning Nov. 1), and a detailed explanation for the environmental costs of working outside that window.

C. Impacts of Vessel Traffic in the Estuary and Lower River

Between 36 and 72 large tanker vessels would call at Tesoro-Savage’s proposed facility each year. This increase in deep-draft vessel traffic would exacerbate the impacts of wake stranding of juvenile salmonids, erosion of wetlands and shoreline areas, potential to introduce invasive species, and the entrainment and impingement of native juvenile fish. Unfortunately, the DEIS does not provide sufficient detail about the significance or extent of these impacts to meaningfully inform the public or a decision-maker.

1. Wake stranding of juvenile salmonids

Vessel wakes from deep-draft tankers calling at NWIW’s proposed facility would kill and injure juvenile salmon and steelhead in the Columbia River and estuary. Wake stranding occurs when a wave caused by a vessel wake lifts an aquatic organism onto the shoreline. NMFS identifies ship wake stranding as a limiting factor for recovery of Lower Columbia River (“LCR”) Chinook salmon, Columbia River chum, LCR coho salmon, and LCR steelhead, with juvenile ocean-type Chinook originating from LCR tributaries and CR chum being particularly vulnerable.¹⁰⁷

The DEIS acknowledges that wake stranding will occur, but provides no concrete details about the extent of the problem. Some quantitative data exists about wake stranding: in 2004 and 2005, researchers monitored 126 deep-draft vessel transits at three beaches along the Lower

¹⁰⁵ Rondorf *et al.*, *Minimizing Effects of Over-Water Docks on Federally Listed Fish Stocks in McNary Reservoir: A Literature Review for Criteria*, p.10 (2010).

¹⁰⁶ DEIS, p. 2-41.

¹⁰⁷ Exh. 6, p.86.

Columbia River.¹⁰⁸ Along a 300-meter stretch of shoreline at Barlow Point (just downstream from Longview, Washington), researchers observed 26 different deep-draft vessel transits, which resulted in the total wake stranding of 351 juvenile chinook salmon (an average of 13.5 juvenile chinook stranded per deep-draft vessel transit).¹⁰⁹ Assuming that NWIW's deep-draft tankers are equally efficient at wake-stranding juvenile chinook salmon, the *minimum* projected 72 yearly one-way trips through the lower Columbia River generated by NWIW's proposal could strand 972 juvenile chinook every year—**on that 300-meter stretch of shoreline alone**. Not all shoreline areas are equally susceptible to wake stranding and directly extrapolating the Barlow Point numbers would probably not accurately predict total wake stranding in the Lower Columbia River. However, a verified model¹¹⁰ exists that could help estimate—even roughly—the impacts of wake stranding from NWIW's proposal, at least upstream of Rivermile 50. Because the data to perform this type of analysis is available, the FEIS should contain a quantitative estimate of the number of juvenile salmonids that would suffer wake stranding as a result of NWIW's project.

2. Entrainment and impingement of aquatic organisms in vessel water intakes.

The DEIS ignores the risk of impingement and entrainment of aquatic organisms in the water intakes of vessels calling on NWIW's facility. Entrainment is the direct uptake of aquatic organisms by the suction field generated by water intakes on vessels, while impingement refers to organisms becoming trapped against an intake screen. The FEIS should describe the water intake structures on the tanker vessels, explain the rate and amount of water taken in by each ship, and explain (through literature review or actual sampling) the densities at which larval fish and fish eggs (especially eulachon) are likely to be present in the Lower Columbia River and therefore susceptible to entrainment or impingement. None of these figures would be particularly difficult to ascertain, but without them, readers of the DEIS have very little information on the impacts of entrainment resulting from the Project.

III. PUBLIC HEALTH

The Port and County should prepare a Health Impact Assessment (“HIA”) for this Project. An HIA can evaluate the significant public health impacts of: diesel exhaust; passenger vehicle emissions; greenhouse gas emissions; noise; and spills and drinking water systems and supplies. Some of these impacts were not analyzed at all in the DEIS, and others were incompletely analyzed.

¹⁰⁸ Pearson *et al.*, *A study of stranding of juvenile salmon by ship wakes along the lower Columbia River using a before-and-after design—before-phase results* (2006).

¹⁰⁹ *Id.* at 9, 48.

¹¹⁰ See, e.g., Pearson and Skalski, *Factors affecting stranding of juvenile salmonids by wakes from ship passage in the Lower Columbia River*, 27 *River Research and Applications* 926–936 (2011); see also Kock *et al.*, *Review of a model to assess stranding of juvenile salmon by ship wakes along the Lower Columbia River, Oregon and Washington* (2013).

A. Air Quality

A key health impact of NWIW's Project is the direct and cumulative impact of small airborne particulate matter—largely from diesel exhaust—on people who live and work near the proposed refinery, and the people who would use the DEIS's oft-touted recreational access directly downstream from the project. According to Physicians for Social Responsibility¹¹¹:

The fine and ultrafine particles less than 2.5 microns (PM2.5) are particularly important in triggering disease because they penetrate deeply into the alveoli of the lungs. Diesel particulate matter, submicronic in size, has particularly damaging potential (Li). Some inhaled particles are taken up by macrophages, resulting in lung inflammation. The final common pathway of the pathologic effects of exposure to particulate matter, as well as gas phase pollutants, appears to be inflammation. The effects of inflammation on various body organ systems are complex, but increased levels of particulate matter are associated with a number of ill health effects including: increased cancer rates, especially lung and breast, congenital lung, heart and immune system anomalies in children, increased rates of asthma, worsening of preexisting asthma and chronic obstructive pulmonary disease (COPD), higher rates of heart attacks and strokes, and higher rates in children (exposed prenatally) of neurodevelopmental disorders such as autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), lowered IQ, and adverse behaviors. Not surprisingly, the most vulnerable populations are pregnant women, children, people that already have pulmonary diseases like COPD or asthma, and the elderly.

(internal citations omitted).

The DEIS essentially dismisses the health risks of diesel particulate matter ("DPM") associated with the Project by attempting to discredit Washington's Acceptable Source Impact Level ("ASIL") standard for DPM as overly-protective.¹¹² However, according to the American Heart Association, there is *no* completely safe level of exposure to diesel particulate matter.¹¹³ And the World Health Organization ("WHO") reports that there is not a threshold below which no damage to human health is observed as a result of exposure to fine particulate matter.¹¹⁴ The fact that *any* amount of DPM harms human health undercuts the DEIS's attempt to discredit and trivialize Washington's ASIL.

The DEIS begrudgingly admits that background concentrations for PM2.5—which would be largely composed of DPM—at the Project site are *already* more than 1,500 times higher than Washington's Acceptable Source Impact Level for DPM.¹¹⁵ The DEIS, however, never explains

¹¹¹ Exhibit 8, Oregon Physicians for Social Responsibility, *Airborne Particulate Matter and Public Health* (2015).

¹¹² See DEIS, pp.4-8 and 4-9.

¹¹³ *Id.* at 3; see also Exhibit 9, American Heart Association, *Danger in the Air: Air Pollution and Cardiovascular Disease* (2014).

¹¹⁴ *Id.* at 1.

¹¹⁵ DEIS, p.4-9.

by how much DPM levels will exceed the ASIL once NWIW's refinery begins operating, or by how much ambient DPM levels will exceed the ASIL once other proposed fossil-fuel export proposals on the Columbia begin operating. The ASIL is a relevant benchmark for human health in Washington, and the DEIS should at least describe the Project's direct and cumulative contributions to DPM with respect to the ASIL.

Even if the public and decision-makers accepted the DEIS's inappropriate invitation to ignore Washington's ASIL, the PM_{2.5} levels that would exist once NWIW's Project begins operating would be near or above other relevant benchmarks for human health. The WHO recommends that PM_{2.5} should not exceed an average of 25 micrograms per cubic meter of air (25 µg/m³) in a 24-hour period, and not exceed an average annual exposure of 10 µg/m³.¹¹⁶ The DEIS predicts that the existing background PM_{2.5} levels plus the PM_{2.5} from NWIW's operations, using the ULE technology, would reach 23 µg/m³ in a 24-hour period and average at least 7 µg/m³ annually.¹¹⁷ These projected levels come dangerously close to the levels that WHO found threaten human health. Unfortunately, the Appendix D of the DEIS does not model the PM emissions (or any emissions) for the CR alternative. This prevents decision-makers from accurately comparing the consequences of the two technological approaches.

Moreover, the DEIS completely fails to address the likely future contributions of DPM and PM_{2.5} from the many fossil fuel export projects that are currently proposed along and through the Lower Columbia River.¹¹⁸ These projects will increase DPM and other PM emissions at the Project site, which is sandwiched directly between BNSF's main rail line and the Columbia River shipping channel. Of particular concern is the proposed Millennium Bulk Terminals coal export proposal, which would bring four open-topped coal trains within a few hundred feet of the Project site each day. Diesel locomotives hauling coal can significantly contribute to ambient PM_{2.5} concentrations.¹¹⁹ The FEIS should model the DPM and PM_{2.5} levels at the Project site that would result from the operation of all proposed fossil fuel export terminals along the Lower Columbia, and compare the results to WHO and NAAQS standards for human health. Failure to do so would constitute a failure to take a hard look at the cumulative impacts of this project.

B. Drinking Water

The EIS should evaluate the risk posed to Kalama's drinking water wells by a major spill of methanol, fuel oil, or other chemical to the Columbia River near the project site. Kalama's drinking water comes from a Ranney well adjacent to the Kalama River, about two miles

¹¹⁶ See <http://www.who.int/mediacentre/factsheets/fs313/en/#>. The WHO-recommended levels—which reduce but do not eliminate health impacts from airborne particulate matter—are slightly lower than the applicable Clean Air Act standards cited in on page 4-3 of the DEIS.

¹¹⁷ DEIS, Appx. D, p.42.

¹¹⁸ See, e.g., DEIS, pp.15-2 through 15-7.

¹¹⁹ Exhibit 10, Jaffe *et al.*, *Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA*, Atmospheric Pollution Research (2015)

upstream of the confluence with the Columbia.¹²⁰ Both the Columbia River at the project site, and the site of Kalama's Ranney well, appear to be within areas that are tidally influenced.¹²¹ Accordingly, a strong incoming tide could potentially carry spilled methanol or other pollutants upstream and into the City of Kalama's drinking water intake system. The DEIS and the HIA should evaluate the possibility and consequences of a spill near the refinery site contaminating Kalama's drinking water.

C. Noise

Construction and operation of this facility would be noisy. Regarding noise impacts from construction, intermittent and unpredictable pile driving noise could negatively impact the surrounding community. Intermittent noise produces a more adverse reaction than continuous noise, and unpredictable noise results in even more adverse reactions than intermittent noise. The DEIS fails to propose mitigation for noise impacts due to pile drivers, for example, because construction noise is "exempt" from regulations. But this does not reduce the health and safety risks associated with these predicted high noise levels for Port employees and community members. How will these impacts be mitigated?

The DEIS's model calculated hourly Leqs as high as 58 dBA and Lmax levels as high as 82 dBA at residences in Prescott, Oregon, when impact pile driving occurs. Discrete impact levels would be much higher than hourly Leqs. If the Lmax level reaches 82 dBA, there will likely be serious impacts and angry neighbors. How will the negative impacts of this noise on human health and well-being be mitigated?

The next most affected group of residences may be those on the hillside northeast of the project site. These residents are predicted to experience pile driving hourly Leqs in the low 50s dBA and Lmax levels in the upper 70s dBA, exceeding the 70 dBA WAC limit.

Regarding noise impacts from operations, the DEIS lists options for mitigating noise impacts from cooling water pumps and the methanol loading pump, but does not say how the listed options would actually work. For example, one mitigation measure meant to decrease harm to Oregonians across the river is to move the cooling water pumps to the east side of the cooling tower, but this "would result in higher sound levels on the hillside to the northeast" of the plant (in Washington), resulting in increases over existing levels up to 10 dBA. This would result in "moderate" noise impacts to three receptors on that Washington hillside.¹²²

Noise from increased vessel transport is assumed in the DEIS to be the same as current noise levels. How can this be? More ships—both from NWIW's project and the cumulative increase in vessel traffic from other proposed fossil fuel terminals—necessarily means more noise from ships.

¹²⁰ City of Kalama, *Drinking Water Quality Annual Report* (2014) (online at: <http://www.cityofkalama.com/home/showdocument?id=521>).

¹²¹ <http://www.nwcouncil.org:81/fw/lf/Overview.asp?Report=Overview&SubbasinID=39>

¹²² DEIS, p.14-25.

Regarding compliance with Washington's 70 dBA noise limit for industrial noise sources, it appears that both the CR and the ULE alternatives would exceed this limit. The DEIS shifts responsibility to the Port of Kalama to work with NWIW and other industrial tenants to address noise levels in the event that an adjacent tenant raises concerns about noise impacts. If Washington's 70 dBA noise limit is exceeded, this raises concerns about the ability of people working nearby to perform work requiring concentration. Further, this raises concerns about the construction and operating company's workers and their hearing conservation program, not mentioned in the DEIS.

D. Fires and Explosions

The DEIS downplays the very real possibility of a serious accident involving gas or methanol, which—contrary to the overall impression given in the DEIS—is highly flammable and toxic. For instance:

- In November, 2012, at the NEXEO Solutions Chemical Plant Garland Texas, methanol was being unloaded from a rail car when an explosion occurred. 10,000 gallons of methanol burned. The area ¼ mile around the facility was evacuated due to the possibility that the fire could spread and cause more explosions.
- In June, 2013, in Geismar, Louisiana, an explosion and fire at the Williams Olefin Plant killed two and injured 70.
- In August, 2015, multiple explosions and fires destroyed the Tianjin Fuel Refinery and many nearby buildings in Rizhao, Shandong Province.
- In January, 2016, a methanol tank explosion and fire killed two employees and critically injured another at the Bethune Point Wastewater Treatment Plant in Florida.

IV. DIRECT IMPACTS FROM CONSTRUCTING THE REFINERY AND PIPELINE

A. Habitat impacts from Project construction.

According to the DEIS, the proposed pipeline route would “cross seven waterbodies (five of which are intermittent and non-fish-bearing), and four wetlands. The pipeline would traverse several forest types including conifer, deciduous, and mixed conifer-deciduous forest as well as Oregon white oak woodlands.”¹²³ It further asserts that “[h]abitats within the proposed pipeline alignment support the foraging, breeding, and resting activities of a variety of commonly occurring amphibians, reptiles, birds, and mammals.”

¹²³ DEIS, p.6-13.

The DEIS then goes on to describe, quite accurately, the potential for harm to habitat areas from constructing the Project. The DEIS describes¹²⁴ a litany of expected impacts, among them:

- “Clearing and grading of stream banks, removal of riparian vegetation, in-stream trenching, trench dewatering, and backfilling could result in modification of aquatic habitat, increased sedimentation and turbidity, increases in temperature, decreased dissolved oxygen concentrations, releases of chemical and nutrient pollutants from sediments, and introduction of chemical contaminants such as fuel and lubricants.”
- “Human activity and noise could result in temporary displacement from habitats on and adjacent to the construction right-of-way.”
- “Inadvertent release of drilling fluid to surface waters could also negatively affect fish resources.”
- “Construction and operation of the pipeline project would result in permanent and temporary impacts to vegetation. Forested vegetation (including the forested component of riparian vegetation) on lands used for operation would be permanently lost and converted to herbaceous vegetation.”
- “The permanent and long-term loss and conversion of forested vegetation would impact wildlife by altering habitat characteristics, and could impact soil characteristics, contours, surface water flow, and rates of erosion.”
- “The permanent and long-term loss of forest would also result in forest fragmentation, the creation of ‘edge effects,’ and an increase in the potential for the establishment and proliferation of noxious weeds.”
- “By using a HDD to place the pipeline below the waterbodies, most impacts on these waterbodies and the fisheries contained within them would be avoided. However, the use of a HDD could result in an inadvertent release of drilling fluids (bentonite and other inert/non-toxic additives), commonly referred to as a ‘frac-out.’ A frac-out into a waterbody could temporarily impact water quality (turbidity), fish habitat (sedimentation), and the rates of stress, injury, and mortality experienced by fish and other aquatic wildlife (FERC 2015).”
- “Constructing and operating the pipeline project would temporarily and permanently impact wildlife and wildlife habitat. Project related activities, including clearing and trenching and the general use of construction equipment, would temporarily decrease and permanently alter available wildlife habitat, change the characteristics of adjacent wildlife habitat, displace wildlife, and alter wildlife behavior, and could increase the rates of mortality, injury, and stress experienced by wildlife.”
- “Operating the project would permanently alter some habitats and could periodically disturb wildlife, which could also increase wildlife mortality, injury, and stress.”
- “Constructing and operating the project through the Carrolls Bluff Oaks priority habitat area would result in the loss of wildlife habitat (oaks). Similar to the loss of forested habitat on other lands, the rates of mortality, injury, and stress experienced by wildlife

¹²⁴ DEIS, pp.6-41–42.

could increase; however, this impact could be measurably greater because of the unique characteristics of the oak woodlands.”

There is, however, almost no analysis provided as to the actual harm that constructing and maintaining the pipeline would have on these habitat areas. For example, while the DEIS acknowledges that a frac-out during HDD is possible (which would harm aquatic habitat), there is no attempt to quantify the likelihood of frac-out occurrence, and only a general explanation of the potential impacts (i.e. fish injury and mortality) with no specifics as to the potential extent of harm, or details on how the Proponent would respond and resolve those impacts.

The Applicant has merely claimed that by using “standard construction BMPs for pipeline construction” it will “reduce impacts to plants and animals.”¹²⁵ This entirely unsupported statement is insufficient to meet the requirements of environmental analysis under Washington’s SEPA. BMPs may help reduce some impacts, such as sediment runoff, but they will do little or nothing to mitigate the temporary loss/disturbance and permanent loss of habitat that even the Applicant acknowledges would occur. Rather, the Applicant claims that “habitat for several terrestrial and avian wildlife species would be permanently and temporarily affected by the pipeline project; however, given the mobility of species concerned and the availability of similar habitat nearby, this impact should be minimal (FERC 2015).”¹²⁶ To suggest that the impacts of a large-scale construction project such as this would be “minimal” simply because species – including imperiled species protected under state and federal law – can merely move out of the way, is preposterous, and acceptance of this as an “analysis” of the impacts of the Project would render environmental review under SEPA meaningless.

Constructing the Project would have adverse impacts on habitat. The DEIS makes it clear that the Project would affect currently forested areas that support the foraging, breeding, and resting activities of a variety of commonly occurring amphibians, reptiles, birds, and mammals. Linear corridors created by buried pipelines like the proposed Project permanently fragment areas of continuous forest, decrease critical interior forest, and increase forest edge. Fragmentation of habitat has been recognized as “one of the most pervasive threats to native ecosystems”—indeed, roads and pipelines have a greater impact on fragmentation than well pads themselves.¹²⁷ As a result, the U.S. Geological Survey has acknowledged that “[f]ragmentation of forest and habitat is a primary concern resulting from current gas development.”¹²⁸

¹²⁵ DEIS, p.6-41.

¹²⁶ DEIS, p.6-42.

¹²⁷ Brittingham, M.C., *et al.*, *Ecological Risks of Shale Oil and Gas Development to Wildlife, Aquatic Resources and their Habitats*, Environmental Science & Technology, 11037 (Sept. 4, 2014) (citing E.T. Slonecket, *et al.*, U.S. Geological Survey, *Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pa., 2004-2010*, 9 (2012) (in Bradford and Washington counties, “forests became more fragmented primarily as a result of the new roads and pipelines associated with shale development, and development resulted in more and smaller forest patches with loss of core forest ... at twice the rate of overall forest loss.”)); *see also Pennsylvania Energy Impacts Assessment Report 1: Marcellus Shale Natural Gas and*

Forest fragmentation and habitat loss “are closely intertwined, with loss of habitat frequently associated with fragmentation of the remaining habitat, and fragmentation often associated with additional losses of interior or core habitats.”¹²⁹ Fragmentation is also associated with various ecological changes—including “changes in patch size and isolation, light, moisture, and temperature”—that directly and indirectly affect populations and communities.¹³⁰ The resulting smaller patches have a decreased ability to support viable populations of individual species.¹³¹ As a result, habitat loss and forest fragmentation can be major threats to biodiversity.¹³²

Constructing the proposed Project and related infrastructure would involve clearing and bulldozing a 100-foot-wide construction corridor and permanent maintenance of a cleared right of way for the pipeline. It would also presumably involve construction of access roads for pipeline construction and maintenance and clearing and excavation of staging areas somewhere within or in proximity to the proposed corridors. There will be unavoidable, but thus far unstudied and unquantified, impacts to forested areas.

Because the specific impacts of habitat loss and fragmentation depend on the needs and attributes of specific species and communities, Applicants must fully evaluate the significant, long-term impacts that fragmentation from the proposed pipeline corridor may have on each species and community, both within and adjacent to the proposed pipeline corridor.¹³³ Avoidance, minimization, or mitigation of these impacts is critical to ecological sustainability. Moreover, the EIS must assess whether mitigation measures fully account for and address the impacts that constructing and maintaining the facility and pipeline and related infrastructure will have with respect to these ecological disruptions. The EIS must disclose and assess all direct, indirect, and cumulative impacts of this disturbance and fragmentation of forests.

The EIS must further consider the potential impacts of increasing forest edge, including but not limited to potential impacts on terrestrial and avian species, as well as vegetation and soil dynamics (including loss of native soil integrity) associated with an increase in forest edge. In

Wind; E.T. Slonecket, *et al.*, U.S. Geological Survey, *Landscape Consequences of Natural Gas Extraction in Fayette and Lycoming Counties, Pennsylvania, 2004-2010* (2013).

¹²⁸ *Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004-2010* at 9.

¹²⁹ *Ecological Risks of Shale Oil and Gas Development to Wildlife, Aquatic Resources and their Habitats* at 11037.

¹³⁰ *Id.* (citing K. Harper, *et al.*, *Edge influence on forest structure and composition in fragmented landscapes*, *Conserv. Biol.* 2005, 19 (3), 768-82; S.K. Collinge, *Ecology of Fragmented Landscapes*, p. 340, The Johns Hopkins University Press: Baltimore, Md. (2009)).

¹³¹ *Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004-2010* at 9.

¹³² *Id.* (citations omitted).

¹³³ *See Landscape Consequences of Natural Gas Extraction in Bradford and Washington Counties, Pennsylvania, 2004-2010* at 10.

order to assess fully the potential impacts of the edge effect, the EIS must properly account for the geographic extent and temporal frame of forest edge impacts. The EIS must evaluate any beneficial impacts of edge creation for certain species in conjunction with the negative impacts on other species.

The EIS must also disclose and analyze the geographic extent, including total acreage of interior forest habitat that would be impacted, by edge effect. Because expanding edges into natural ecosystems can affect the natural ecosystem for some distance in from the edge, the EIS must evaluate an impact area that extends at least 300 feet into adjacent forest; examining only the pipeline corridor and other areas in which soil may be moved or vegetation may be cleared grossly underestimates the area of impact. This analysis should include spatial data detailing interior forest resources along the proposed route and alternatives, as well as forest connectivity and riparian corridors. In addition, the EIS must acknowledge the current declining levels of interior forest habitat and the increase of forest edge conditions. The EIS must also acknowledge and deal with the reality that while interior forest requires decades to create, edge forest can be created overnight.

B. Wildlife impacts, including protected species.

The EIS must also examine impacts that the Project could have on native wildlife populations and communities—directly by habitat loss or indirectly through changes on adjacent habitats and land uses associated with them.¹³⁴ In the FERC EA for the pipeline portion of the Project, it states that:

The proposed pipeline would be located across two State of Washington priority habitats; the Carrolls Bluff Oaks (oak woodlands) and the Kalama Flats (wetlands). According to the WDFW, Oak Woodlands are distinct ecosystems that provide valuable habitat contributing to wildlife diversity. The Carroll Bluff Oaks (MP 2.1 – 2.4) site contains vernal streams, exposed rock outcroppings, unique plant communities, and supports concentrations of bandtailed pigeons. The Kalama Flats (MP 2.4 – 3.1) site supports cavity nesting ducks, small concentrations of swans, ducks, geese, and bandtailed pigeons. Additionally, four priority wildlife species may occur in the Project area, the bald eagle (*Haliaeetus leucocephalus*), eastern wild turkey (*Meleagris gallopavo silvestris*) Canada goose (*Branta Canadensis*), and elk (*Cervus elaphus*). Bald eagles have not been documented within 0.5 mile of Project workspace. Wild turkeys, Canadian geese, and elk have high recreational value both for consumptive and nonconsumptive purposes. Lastly, priority areas of breeding habitat for Canada goose and cavity nesting ducks; regular concentrations of elk; and a management buffer for the northern spotted owl would be crossed by the Project.¹³⁵

¹³⁴ See *Ecological Risks of Shale Oil and Gas Development to Wildlife, Aquatic Resources and their Habitats* at 11037.

¹³⁵ FERC, Kalama Lateral Project Environmental Assessment (July, 2015) at 42.

The DEIS, however, fails to adequately examine impacts to these species. For example, even though the FERC EA clearly states that a management buffer for spotted owl (a threatened species) would be crossed by the Project, the Applicant's DEIS never even mentions that fact, but rather fails entirely to discuss any impacts to spotted owls, claiming only in Table 6-2 that the potential for occurrence is "Low – no suitable habitat on site." According to the Washington Forest Protection Association, buffer zones are intended to "develop into old-forest habitat over time," and to be important for "connecting landscapes of forests for spotted owls alongside stream corridors."¹³⁶ The DEIS admits that construction and operation activities for the Project will result in long-term and permanent loss of forested vegetation, resulting in forest fragmentation.¹³⁷ The lack of any discussion of such impacts to the spotted owl management buffer, and how those impacts may affect the spotted owl in the future, renders the DEIS entirely incomplete.

Similarly, the Applicant has failed to address potential impacts to bald eagles. While the DEIS acknowledges that the Bald and Golden Eagle Protection Act ("BGEPA") prohibits the taking of a bald eagle,¹³⁸ and that several bald eagle breeding sites are within 1 mile of the project site – and the site contains suitable perching and feeding habitat¹³⁹ – there is no discussion of how the Project would actually impact bald eagles. According to the DEIS, noise from pile-driving would not reduce to background level until a distance of 13,770 feet, or approximately 2.6 miles.¹⁴⁰ Since bald eagles are known to nest within a mile of the Project site, there is clearly potential for noise-related impacts. However, no attempt has been made to quantify or even discuss those impacts, or to show how the Project will not violate the BGEPA. Once again, the lack of any actual analysis renders the DEIS incomplete.

The Project has the potential to harm owls and eagles. A variety of human activities can potentially interfere with eagles and owls, affecting their ability to forage, nest, roost, breed, or raise young. If agitated by human activities, these species may inadequately construct or repair their nest, may expend energy defending the nest rather than tending to their young, or may abandon the nest altogether. Activities that cause prolonged absences of adults from their nests

¹³⁶ Washington Forest Protection Association, Northern Spotted Owl Conservation (available at <http://www.northernspottedowl.org/jurisdictions/sosea.html>).

¹³⁷ DEIS at 6-41. The DEIS further acknowledges that "Project related activities, including clearing and trenching and the general use of construction equipment, would temporarily decrease and permanently alter available wildlife habitat, change the characteristics of adjacent wildlife habitat, displace wildlife, and alter wildlife behavior, and could increase the rates of mortality, injury, and stress experienced by wildlife (FERC 2015)." DEIS at 6-42.

¹³⁸ The BGEPA defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb." This includes impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that injures an eagle or substantially interferes with normal breeding, feeding, or sheltering habits and causes a loss of productivity or nest abandonment.

¹³⁹ DEIS at 6-14.

¹⁴⁰ DEIS at 6-26.

can jeopardize eggs or young. If food delivery schedules are interrupted, the young may not develop healthy plumage, which can affect their survival. In addition, adults startled while incubating or brooding young may damage eggs or injure their young as they abruptly leave the nest. Older nestlings no longer require constant attention from the adults, but they may be startled by loud or intrusive human activities and prematurely jump from the nest before they are able to fly or care for themselves.¹⁴¹

Disruption, destruction, or obstruction of roosting and foraging areas (such as the Project site) can also negatively affect these species. Disruptive activities in or near owl or eagle foraging areas can interfere with feeding, reducing chances of survival. For example, human activities near or within communal roost sites may prevent eagles from feeding or taking shelter, especially if there are not other undisturbed and productive feeding and roosting sites available. Activities that permanently alter communal roost sites and important foraging areas can altogether eliminate the elements that are essential for feeding and sheltering eagles.

The Applicant admits in the DEIS that construction activities are expected to result in “temporary avoidance of the site or vicinity” by special-status species.¹⁴² The DEIS provides no analysis of these impacts, claiming without support that the impacts would not be significant.¹⁴³ However, as discussed above there are known bald eagle nests within a mile of the proposed Project, and noise from pile-driving will travel 2.6 miles. There will further be other sources of noise and disturbance from construction activities. Where a human activity, such as the construction of the proposed Project, agitates or bothers roosting or foraging birds to the degree that causes injury or substantially interferes with breeding, feeding, or sheltering behavior and causes, or is likely to cause, a loss of productivity or nest abandonment, the conduct of the activity constitutes a violation of the ESA and/or BGEPA. The EIS must fully evaluate the Project for potential impacts to owl and eagle individuals and habitat. The Project has the potential to harm these birds through habitat loss, fragmentation, climate disruption and construction related impacts (i.e. noise), which may directly harm owls and eagles as well as the habitat areas they rely on for food sources.

The Project also has the potential to harm the ESA-listed streaked horned lark (threatened). In fact, the DEIS states that the potential for impacts to this species are high, since it breeds and winters in the Project vicinity.¹⁴⁴ The streaked horned lark has been extirpated throughout much of its range, including all of its former range in British Columbia, Canada, the San Juan Islands, the northern Puget lowlands, the Washington coast north of Grays Harbor, the Oregon coast, and the Rogue and Umpqua Valleys in southwestern Oregon. The current range of the streaked horned lark can be divided in to three regions: (1) the Puget lowlands in Washington, (2) the Washington coast and lower Columbia River islands (including dredge spoil deposition sites near the Columbia River in Portland, Oregon), and (3) the Willamette Valley in Oregon. Any further impacts to this species, and the habitat it depends on, could have dire consequences for this imperiled species.

¹⁴¹ See the US Fish and Wildlife Service, National Bald Eagle Management Guidelines (May, 2007) (available at <http://digitalmedia.fws.gov/cdm/ref/collection/document/id/1982>).

¹⁴² DEIS at 6-28.

¹⁴³ *Id.*

¹⁴⁴ DEIS at Table 6-2.

The DEIS, however, never fully addresses the loss of lark habitat. The Applicant claims that the current habitat for larks (3 acres of dredge spoils) will only remain suitable through the end of the 2015 nesting season as ground cover increases to render the area non-habitat, and that streaked horned larks currently nesting there “would be expected to find suitable habitat on islands in the vicinity.”¹⁴⁵ This, however, fails to assess the actual impacts to the species.

The Applicant appears to incorrectly assume that no dredge spoil deposits would take place in the vicinity of the Project after 2015. The Army Corps BA that is referenced states that no such activity is currently taking place because 3 pairs of streaked horned larks were detected in 2013 during surveys, and the site is expected to become unsuitable after the 2015 nesting season due to vegetation succession.¹⁴⁶ Rather than implying that the site would become useless as habitat in 2015, this suggests that depositing dredge spoils at this site will once again become viable after 2015. While no plans currently exist for such activities through 2019 (the Corps BA states that five-year placement plan does not include this area), that does not mean that no rehabilitation of nesting habitat for the larks will take place during the long life of the proposed Project. Indeed, according to the Corps, the Northport dredge deposit site “will remain in the Corps’ planning for long-term placement.”¹⁴⁷ The EIS must evaluate the Project’s impacts on future dredge deposits that would create habitat for the species.

Further, the Applicant has failed to provide any information on whether habitat for larks exists on or near the Project site other than what has been analyzed by the Army Corps. The Army Corps BA only covers dredge spoil sites created during navigational dredging; however, other land uses in the vicinity of the Project may have created additional habitat that would be impacted by the Project. It does not appear that any surveys have been conducted, so the actual impacts to the species have not been fully assessed. The DEIS also fails to mention the potential for increased predation from rats and mice due to the Project, which is a major factor in the species’ decline.¹⁴⁸ Moreover, rather than writing off the existing habitat as useless after 2015, the Applicant should consider how to maintain habitat for this listed species.

The EIS must also consider the impacts it would have on wildlife from climate change. As discussed above increased greenhouse gas emissions associated with the Project would exacerbate global climate change, leading to loss of sea ice and the species that depend on it,¹⁴⁹ sea level rise,¹⁵⁰ extreme weather events,¹⁵¹ ocean acidification,¹⁵² and loss of habitat and species

¹⁴⁵ DEIS at 6-18.

¹⁴⁶ U.S. Army Corps, Biological Assessment for the Continued Operations and Maintenance Dredging Program for the Columbia River Federal Navigation Channel (March 2014) at 49.

¹⁴⁷ *Id.* at 24.

¹⁴⁸ 78 Fed. Reg. at 61,482.

¹⁴⁹ A. Robinson, et al., *Multistability and critical thresholds of the Greenland ice sheet*, 2 NATURE CLIMATE CHANGE 429 (2012).

¹⁵⁰ S. Rahmstorf et al., *Recent climate observations compared to projections*, 316 SCIENCE 709 (2007).

¹⁵¹ Intergovernmental Panel on Climate Change (IPCC), *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)* (2012) (available at <http://ipcc-wg2.gov/SREX/>); U.S. Global Change Research Program, *Global Climate Change Impacts in the US: Global Climate Change* (2009); Dim Coumou & Stefan Rahmstorf, *A Decade of Weather*

(such as the streaked horned lark).¹⁵³ The EIS must disclose specific impacts to species and habitat areas resulting from climate change, including changes in precipitation, increased severity of storms, increase in heat waves, drought, ozone formation, and wildfires -- all of which have the potential to adversely impact species, including protected species.

Finally, the EIS must consider the impacts of pesticide and herbicide use from the Project. These dangerous products, if used to remove invasive species or maintain rights-of-way, can have devastating impacts on sensitive species. The DEIS notes that “[w]eeds would be controlled by annual manual removal (hand pulling, cutting, and/or mowing). Appropriate herbicide treatments may also be applied if they are determined to be necessary by the project proponent. The invasive species management strategy would be an informal and evolving program....”¹⁵⁴ The decision to use these toxic substances should not be left to the discretion of the Project proponent, and the impacts of using herbicides – especially in wetland areas – must be fully analyzed in the EIS.

V. IMPACTS OF NATURAL GAS SUPPLY AND PRODUCTION

The project will require at least 270,000 dekatherms, or roughly 270,000 MMBtu, of natural gas per day.¹⁵⁵ The impacts of drilling, processing, and delivering this gas to the Project

Extremes, 2 NATURE CLIMATE CHANGE 491 (2012); National Oceanic and Atmospheric Administration, *Extreme Weather 2011* (available at <http://www.noaa.gov/extreme2011/>).

¹⁵² See, e.g., O. Hoegh-Guldberg et al., *Coral reefs under rapid climate change and ocean acidification*, 318 SCIENCE 1737 (2007); K. Caldeira and M.E. Wickett, *Ocean model predictions of chemistry changes from carbon dioxide emissions to the atmosphere and ocean*, 110 J. GEOPHYS. RES. C09S04, doi:10.1029/2004JC002671 (2005).

¹⁵³ Camille Parmesan & Gary Yohe, *A Globally Coherent Fingerprint of Climate Change Impacts Across Natural Systems*, 421 NATURE 37 (2003); Terry L. Root et al., *Fingerprints of Global Warming on Wild Animals and Plants*, 421 NATURE 57 (2003); Camille Parmesan, *Ecological and Evolutionary Responses to Recent Climate Change*, 37 ANNUAL REV. OF ECOLOGY EVOLUTION AND SYSTEMATICS 637 (2006); I-Ching Chen et al., *Rapid Range Shifts of Species Associated with High Levels of Climate Warming*, 333 SCIENCE 1024 (2011); Ilya M. D. Maclean & Robert J. Wilson, *Recent Ecological Responses to Climate Change Support Predictions of High Extinction Risk*, 108 PROC. OF THE NATL. ACAD. OF SCIENCES OF THE U.S. 12337 (2011); Rachel Warren et al., *Increasing Impacts of Climate Change upon Ecosystems with Increasing Global Mean Temperature rise*, 141 CLIMATIC CHANGE 106 (2011).

¹⁵⁴ DEIS at 6-52

¹⁵⁵ The DEIS states that the ULE alternative will require 270,000 dekatherms per day. DEIS at 1-16. It is unclear whether this figure refers only to feed gas, or if it also includes the 30,000 dekatherms needed for the onsite 101 megawatt powerplant included in the ULE design. DEIS at 7-3. The EIS must address, and clearly disclose, the *total* gas needs of the project, and clarify the relationship between these two values.

must be considered in the analysis of indirect and cumulative effects of the project.¹⁵⁶ Indeed, these effects are just as essential to the project, and just as closely linked, as the effects related to the generation of the electricity the project will purchase from the electric grid. In the NEPA context, EPA has argued, in comments on liquefied natural gas export proposals analogous to the methanol proposal here, that the environmental impact statement must address the indirect effects of producing and delivering natural gas to the liquefaction and export facility. In scoping comments for the Jordan Cove LNG project, EPA opined that in order to properly analyze indirect effects, “it is appropriate to consider available information about the extent to which drilling activity might be stimulated by the construction of an LNG export facility on the west coast, and any potential environmental effects associated with that drilling expansion.”¹⁵⁷

Producing the natural gas that would supply the Project would result in significant environmental impacts. Natural gas production—particularly from “unconventional” sources such as the shale gas formations that would likely provide the majority of the supply here—is a significant air pollution source, can disrupt ecosystems and watersheds, leads to industrialization of entire landscapes, disrupts communities, and presents challenging waste disposal issues. A subcommittee of the DOE’s Secretary of Energy’s Advisory Board highlighted “a real risk of serious environmental consequences” resulting from continued expansion of shale gas production.¹⁵⁸ In 2014, the National Energy Technology Laboratory released several reports detailing the adverse environmental impacts of natural gas production in general, and of modern hydraulic fracturing in particular.¹⁵⁹

¹⁵⁶ WAC 197-11-060(4)(d) (indirect effects), 197-11-792(2)(C); *Cheney v. City of Mountlake Terrace*, 87 Wash.2d 338, 344, 552 P.2d 184 (1976) (“Implicit in [SEPA] is the requirement that the decision makers consider more than what might be the narrow, limited environmental impact of the immediate, pending action. The agency cannot close its eyes to the ultimate probable environmental consequences of its current action.”).

¹⁵⁷ EPA, Scoping Comments – The Jordan Cove Energy Project LP, FERC Dkts. PF12-7 and PF12-17, 14 (Oct. 29, 2012); *see also* EPA, Scoping Comments – The Oregon LNG Export Project and Washington Expansion Project, FERC Dkts. PF12-18 and PF12-20 (Dec. 26, 2012). EPA reiterated these positions in comments on FERC’s draft EISs for these projects, and has consistently taken this position in comments on NEPA review for other liquefied natural gas export projects.

¹⁵⁸ DOE, Secretary of Energy’s Advisory Board, Shale Gas Production Subcommittee Second 90-Day Report 10 (Nov. 18, 2011); *see also* DOE, Shale Gas Production Subcommittee, First 90-Day Report (Aug. 18, 2011) (hereinafter “First 90-Day Report”).

¹⁵⁹ NETL, Environmental Impacts of Unconventional Natural Gas Development and Production, DOE/NETL-2014/1651 (May 29, 2014), available at http://www.netl.doe.gov/File%20Library/Research/Oil-Gas/publications/NG_Literature_Review3_Post.pdf; National Energy Technology Laboratory, Life Cycle Analysis of Natural Gas Extraction and Power Generation, DOE/NETL-2014/1646 (May 29, 2014), available at [http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life%20Cycle%20Anal](http://www.netl.doe.gov/File%20Library/Research/Energy%20Analysis/Life%20Cycle%20Analysis/NETL-NG-Power-LCA-29May2014.pdf)

For instance, fracking and other gas production operations are a significant source of air pollution. In particular, natural gas production is a major source of methane and other greenhouse gases. Natural gas systems are one of the nation's largest sources of methane pollution.¹⁶⁰ Emissions of methane are particularly important, because methane from fossil sources is a greenhouse gas that is 87 times more potent than carbon dioxide on a 20-year timeframe, and 36 times more potent on the 100-year timeframe.¹⁶¹ In addition, gas production is a major source of non-greenhouse gas air pollution. EPA acknowledges that “[t]here have been well-documented air quality impacts in areas with active natural gas development, with increases in emissions of methane, volatile organic compounds (VOCs) and hazardous air pollutants (HAPs).”¹⁶² Exposure to this pollution can cause eye, nose, and throat irritation, respiratory illnesses, central nervous system damage, birth defects, cancer, or premature death.¹⁶³ In Colorado, for example, an evaluation of birth defects in areas with high concentrations of oil and gas activity found that mothers who lived near many oil and gas wells were 30 percent more likely to have babies with heart defects.¹⁶⁴ Similarly, preliminary results from a study in Pennsylvania show impacts among newborns that could be linked to air pollution such as increases in low birth weight.¹⁶⁵

In many rural areas, the boom in oil and gas activity has been linked to unhealthy spikes in ozone concentrations.¹⁶⁶ In Wyoming, pollution from oil and gas production has caused areas to violate EPA's air quality standards for ozone.¹⁶⁷ These increased ozone levels were correlated

¹⁶⁰ See EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990 – 2014 (Apr. 15, 2016), <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf>.

¹⁶¹ IPCC, Climate Change 2013: Physical Science Basis, Anthropogenic and Natural Radiative Forcing, 714.

¹⁶² US EPA, Natural Gas Extraction - Hydraulic Fracturing, <http://www2.epa.gov/hydraulicfracturing#air>.

¹⁶³ John L. Adgate et al., “Potential Public Health Hazards, Exposures and Health Effects from Unconventional Natural Gas Development,” *Environmental Science and Technology* (2014), available at <http://pubs.acs.org/doi/abs/10.1021/es404621d>.

¹⁶⁴ Lisa M. McKenzie et al., “Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado,” *Environmental Health Perspectives*, (2014) at 12, available at <http://ehp.niehs.nih.gov/1306722/>.

¹⁶⁵ Adgate et al. *supra* note 163.

¹⁶⁶ Detlev Helmig et al., “Highly Elevated Atmospheric Levels of Volatile Organic Compounds in the Uintah Basin, Utah,” *Environmental Science & Technology*, March 27, 2014, available at <http://www.ncbi.nlm.nih.gov/pubmed/24624890>.

¹⁶⁷ EPA, Air Quality Designations for the 2008 Ozone National Ambient Air Quality Standards, 77 Fed. Reg. 30088, 30157 (May 21, 2012); Wyoming Department of Environmental Quality, Technical Support Document I for Recommended 8-hour Ozone Designation of the Upper Green River Basin (March 26, 2009) at viii (explaining that Wyoming ozone pollution was “primarily due to local emissions from oil and gas . . . development activities: drilling, production, storage, transport, and treating.”), available at http://deq.state.wy.us/out/downloads/Ozone%20TSD_final_rev%203-30-09_jl.pdf

with subsequent increases in outpatient clinic visits for respiratory problems in Wyoming's Sublette County.¹⁶⁸ Researchers who looked at air pollution levels near fracking sites in Colorado also found an increased risk of chronic and sub-chronic effects mainly stemming from oil and gas related pollutants, which can harm the respiratory and neurological systems and lead to symptoms like shortness of breath, nosebleeds, headaches, dizziness, and chest tightness.¹⁶⁹

In addition to these air pollution impacts, gas production harms water resources. Gas production, and unconventional gas production in particular, can also harm water quality. Hydraulic fracturing of shale formations requires millions of gallons of water per well.¹⁷⁰ This process also risks contaminating surface or ground water with chemicals added to fracturing fluid or chemicals naturally occurring in the formation.¹⁷¹ As one recent survey explained, many of the chemicals used present health risks.

Examples [of fracking fluid additives] include methanol, ethylene glycol, naphthalene, xylene, toluene, ethylbenzene, formaldehyde, and sulfuric acid, some of which are known to be toxic, carcinogenic, and associated with reproductive harm. Many of these compounds are also regulated in other industries under the Safe Drinking Water Act (SDWA) and the Clean Water Act (CWA) as hazardous water pollutants. [¶] Many of the chemical compounds used in the process lack scientifically based maximum contaminant levels (MCLs), which render a quantification of their public health risk more difficult. . . . [¶] At certain concentrations or doses, more than 75% of the chemicals identified are known to negatively impact the skin, eyes, and other sensory organs, the respiratory system, the gastrointestinal system, and the liver; 52% have the potential to negatively affect the nervous system; and 37% of the chemicals are candidate endocrine disrupting chemicals.¹⁷²

One of the most troubling additives is diesel. The SEAB Shale Gas Subcommittee has singled out diesel as a fracturing fluid additive for its harmful effects, recommending a ban on use of diesel in fracturing fluid.¹⁷³ The minority staff of the House Committee on Energy and

¹⁶⁸ State of Wyoming Department of Health, "Associations of Short-Term Exposure to Ozone and Respiratory Outpatient Clinic Visits — Sublette County, Wyoming, 2008–2011," 2013, available at health.wyo.gov/Media.aspx?mediaId=16318.

¹⁶⁹ McKenzie *et al.*

¹⁷⁰ DOE, Shale Gas Production Subcommittee, First 90-Day Report (Aug. 18, 2011).

¹⁷¹ Diminution of water quantity can also adversely affect water quality, as when reduced in-stream flows make streams less able to tolerate other sources of contamination.

¹⁷² Seth B. Shonkoff, et al., *Environmental Public Health Dimensions of Shale and Tight Gas Development*, Environmental Health Perspectives, 9-10 (April 16, 2014), <http://dx.doi.org/10.1289/ehp.1307866> (internal citations omitted).

¹⁷³ DOE, Shale Gas Production Subcommittee First 90-Day Report, at 25.

Commerce has determined that, despite diesel's risks, "between 2005 and 2009, oil and gas service companies injected 32.7 million gallons of diesel fuel or hydraulic fracturing fluids containing diesel fuel in wells in 20 states."¹⁷⁴

In addition to chemicals added to fracturing fluid, harmful chemicals naturally occur in the target formations, and these chemicals can be mobilized by the shale gas production process. Wastewater returned from the surface can occur harmful naturally occurring compounds such as benzene, toluene, ethylbenzene, and xylene.¹⁷⁵ Unconventional gas production can also introduce methane into water supplies, creating a safety hazard.

Shale gas production can introduce these harmful contaminants into surface and groundwater through a number of pathways: spills and leakages at the well pad, through a failure of the well casing or cement, or through other underground migration.¹⁷⁶ This migration might be most likely to occur through assistance of a pre-existing conduit such as an existing well or natural fault. Even in the absence of such a conduit, however, one study predicts that hydraulic fracturing could drive contaminants into aquifers in less than ten years.¹⁷⁷ This result is particularly troubling because, while a careful operator can reduce the risk of intersection with a fault or existing well, it is unclear whether any steps could be taken to avoid this contamination vector.

Numerous studies demonstrate that contamination occurs in practice. The National Energy Technology Laboratory summarized many of these studies.¹⁷⁸ Another study, reviewing drilling in Colorado, found that gas drilling correlated with increasing thermogenic methane and chloride levels in groundwater wells.¹⁷⁹ EPA has concluded that unconventional production likely led to groundwater contamination in Pavillion, Wyoming. In the Pavillion investigation, EPA's draft report concludes that "when considered together with other lines of evidence, the

¹⁷⁴ Letter from Reps. Waxman, Markey, and DeGette to EPA Administrator Lisa Jackson, 2 (Oct. 25, 2011), available at

<http://democrats.energycommerce.house.gov/sites/default/files/documents/Jackson-EPA-Hydraulic-Fracturing-2011-10-25.pdf>.

¹⁷⁵ Shonkoff 2014, *supra* n.172, at 19.

¹⁷⁶ NETL Environmental Impacts of Unconventional Natural Gas Development and Production, DOE/NETL-2014/1651 83-93.

¹⁷⁷ Tom Myers, *Potential Contaminant Pathways from Hydraulically Fractured Shale to Aquifers* (Apr. 17, 2012).

¹⁷⁸ NETL, Environmental Impacts of Unconventional Natural Gas Development and Production, DOE/NETL-2014/1651 (May 29, 2014), available at http://www.netl.doe.gov/File%20Library/Research/Oil-Gas/publications/NG_Literature_Review3_Post.pdf

¹⁷⁹ Geoffrey Thyne, *Review of Phase II Hydrogeologic Study* (2008), prepared for Garfield County, Colorado, available at

[http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/\(1_A\)_ReviewofPhase-II-HydrogeologicStudy.pdf](http://cogcc.state.co.us/Library/Presentations/Glenwood_Spgs_HearingJuly_2009/(1_A)_ReviewofPhase-II-HydrogeologicStudy.pdf).

data indicates likely impact to ground water that can be explained by hydraulic fracturing.”¹⁸⁰ EPA tested water from wells extending to various depths within the range of local groundwater. At the deeper tested wells, EPA discovered inorganics (potassium, chloride), synthetic organic (isopropanol, glycols, and tert-butyl alcohol), and organics (BTEX, gasoline and diesel range organics) at levels higher than expected.¹⁸¹ At shallower levels, EPA detected “high concentrations of benzene, xylenes, gasoline range organics, diesel range organics, and total purgeable hydrocarbons.”¹⁸² EPA determined that surface pits previously used for storage of drilling wastes and produced/flowback waters were a likely source of contamination for the shallower waters, and that fracturing likely explained the deeper contamination.¹⁸³ The U.S. Geological Survey, in cooperation with the Wyoming Department of Environmental Quality, also provided data regarding chemicals found in wells surrounding Pavillion.¹⁸⁴ Although the USGS did not provide analysis regarding the likely source of the contaminants found, an independent expert who reviewed the USGS and EPA data at the request of Sierra Club and other environmental groups concluded that the USGS data supports EPA’s findings.¹⁸⁵ EPA turned further investigation of contamination of Pavillion over to Wyoming, and did not finalize its draft report, but EPA stated that it “stands behind its work and data” in the draft report.¹⁸⁶

Here, the EIS must thoroughly discuss these indirect impacts. At a minimum, the EIS must provide a qualitative discussion of the nature of these impacts, and acknowledge that the project will contribute to these problems. In addition, in taking a “hard look” at these impacts, the EIS must use quantitative tools to assess them where possible. The National Energy Technology Laboratory has, for example, provided a methodology for assessing, for any particular volume of gas production, the amount and type of air pollution emitted, the volume of water required, and the volume of wastewater produced.¹⁸⁷ One strength of the Laboratory’s analysis is that, in addition to analyzing the impact of average existing U.S. gas production, the

¹⁸⁰ EPA, Draft Investigation of Ground Water Contamination near Pavillion, Wyoming, at xiii (2011), available at http://www.epa.gov/region8/superfund/wy/pavillion/EPA_ReportOnPavillion_Dec-8-2011.pdf.

¹⁸¹ *Id.* at xii.

¹⁸² *Id.* at xi.

¹⁸³ *Id.* at xi, xiii.

¹⁸⁴ USGS, *Groundwater-Quality and Quality-Control Data for two Monitoring Wells near Pavillion, Wyoming, April and May 2012*, USGS Data Series 718 p.25 (2012).

¹⁸⁵ Tom Myers, *Assessment of Groundwater Sampling Results Completed by the U.S. Geological Survey* (Sept. 30, 2012). Another independent expert, Rob Jackson of Duke University, has stated that the USGS and EPA data is “suggestive” of hydraulic fracturing as the source of contamination. Jeff Tollefson, *Is Fracking Behind Contamination in Wyoming Groundwater?*, *Nature* (Oct. 4, 2012). See also Tom Myers, *Review of DRAFT: Investigation of Ground Water Contamination near Pavillion Wyoming* (April 30, 2012) (concluding that EPA’s initial study was well-supported).

¹⁸⁶ <http://www2.epa.gov/region8/pavillion> (last accessed Aug. 2, 2013).

¹⁸⁷ National Energy Technology Laboratory, *Life Cycle Analysis of Natural Gas Extraction and Power Generation*, at 34 (greenhouse gas emissions), 50 (non-greenhouse gas air pollution), 55 (water consumption and wastewater production).

analysis addresses the impact of *marginal* gas production—*i.e.*, the impact of the additional production that might be added if U.S. gas demand were to increase.¹⁸⁸ On the other hand, recent research confirms that some of the assumptions used as inputs in the Laboratory’s analysis were optimistic; in particular, the Laboratory underestimated the amount of methane emitted per unit of gas production. EPA, which uses a similar “bottom-up” method of analysis based on assumptions about equipment counts and emission rates, has recently recognized significantly increased its estimate of methane emitted by natural gas extraction, processing, and transportation by 27%.¹⁸⁹ Even this revised figure, however, is far lower than estimates based on direct measurements of methane in the atmosphere.¹⁹⁰ Here, the EIS must use some method to take a hard look at the air pollution and other impacts of producing and delivering gas to the project site; if the revised EIS uses the National Energy Technology Laboratory’s methods, the EIS must nonetheless revise the inputs to that methodology.

Finally, the EIS must address whether available tools and information can predict where this additional production will occur, and how the gas demand created by the Project will influence overall U.S. gas supply. On the former point, it may be that the contracts with gas suppliers provide information that enables reasonable predictions as to where the supplied gas will come from. Even if such contracts provide no such information, more general modeling tools, such as the Environmental Information Administration’s National Energy Modeling System, may be able to predict, at a “play” or regional level, where this gas will be produced.¹⁹¹

¹⁸⁸ See *id.* at D-5. These values differ because, for example, fracked shale gas is likely to play a larger role in incremental gas production than in the average of existing production.

¹⁸⁹ Compare <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf> (page 3-68, table 3-43) with <http://www3.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2016-Main-Text.pdf> (page 3-70, table 3-45).

¹⁹⁰ Schneising, O, et al. (2014) Remote sensing of fugitive methane emissions from oil and gas production in North American tight geologic formations. *Earth’s Future*; Lavoie et al. (2015). Aircraft-based measurements of point source methane emissions in the Barnett Shale Basin. *ES&T*. [dx.doi.org/10.1021/acs.est.5b00410](https://doi.org/10.1021/acs.est.5b00410); Lyon et al. (2015). Constructing a spatially resolved methane emission inventory for the Barnett Shale region. *ES&T*. [dx.doi.org/10.1021/es506359c](https://doi.org/10.1021/es506359c); Marchese et al. (2015). Methane emissions from United States natural gas gathering and processing. *ES&T*. [dx.doi.org/10.1021/acs.est.5b02275](https://doi.org/10.1021/acs.est.5b02275); McKain et al. (2015). Methane emissions from natural gas infrastructure and use in the urban region of Boston, Massachusetts. *PNAS*. [dx.doi.org/10.1073/pnas.1416261112](https://doi.org/10.1073/pnas.1416261112); Zimmerle et al. (2015). Methane emissions from the natural gas transmission and storage system in the United States. *ES&T*. [dx.doi.org/10.1021/acs.est.5b01669](https://doi.org/10.1021/acs.est.5b01669).

¹⁹¹ Energy Information Administration, Assumptions to Annual Energy Outlook 2015 (Sept. 10, 2015), available at <https://www.eia.gov/forecasts/aeo/assumptions/>; Energy Information Administration, Oil and Gas Supply Module documentation, available at https://www.eia.gov/forecasts/aeo/assumptions/pdf/oil_gas.pdf; Energy Information Administration, Natural Gas Transmission Module documentation, available at <https://www.eia.gov/forecasts/aeo/assumptions/pdf/natgas.pdf>.

The EIS should also consider the effect of the Project on broader domestic energy markets. For example, in assessing the impact of liquefied natural gas exports, the Energy Information Administration predicted that a significant fraction of the additional demand created by exports would be supplied, not by increased gas production, but by shifting other existing gas consumers to coal, with different—but also severe—environmental consequences.¹⁹²

VI. SEISMIC HAZARDS

It is reasonable to expect that the proposed refinery will experience a very large earthquake within the lifetime of the project. The Cascadia Subduction Zone, where the eastward-moving Juan de Fuca tectonic plate plunges beneath the westward-moving North American plate close to the Oregon coast,¹⁹³ creates a severe hazard for earthquakes of magnitude 9.0 or even higher.¹⁹⁴ Experts estimate the recurrence time for earthquakes in the southern region of the Cascadia Subduction Zone, comprising Northern California and the Oregon coast, at 240 years over a period of 10,000 years.¹⁹⁵ Because the last event occurred in 1700, experts estimate a 42% likelihood of a severe seismic event within the next 50 years.¹⁹⁶

Soil underlying the dock,¹⁹⁷ the refinery, and the tank farm may liquefy in the event of a large earthquake. The site has been identified as having soils of moderate to high liquefaction susceptibility, as presented on Figure 3-3 of the DEIS. Geotechnical investigations conducted on and near the site indicate that sand and silt present below the groundwater levels are susceptible to liquefaction, and that liquefaction could occur down to approximately 80 to 100 feet underground.¹⁹⁸ Along the banks of the Columbia, including the project site, soil liquefaction

¹⁹² Energy Information Administration, *Effect of Increased Natural Gas Exports on Domestic Energy Markets* at 6, 12 (Jan. 2012), available at http://www.eia.gov/analysis/requests/fe/pdf/fe_lng.pdf

¹⁹³ Oregon Department of Land Conservation and Development, *Oregon Coastal Zone Management Program Tsunami Guide*, <http://www.oregon.gov/LCD/OCMP/docs/Publications/TsunamiGuide20140108.pdf> (April 2014).

¹⁹⁴ Goldfinger, Christopher *et al.*, *Turbidite Event History—Methods and Implications for Holocene Paleoseismicity of the Cascadia Subduction Zone*, U.S. Geological Survey Professional Paper 1661-F, <http://pubs.usgs.gov/pp/pp1661f/>, (2014)

¹⁹⁵ *Id.* at 3.

¹⁹⁶ *Id.* By the year 2060, within the lifetime of the proposed facility, the southern portion of the Cascade Subduction Zone will have exceeded 85% of recurrence intervals if no major earthquake has yet occurred.

¹⁹⁷ With regard to how the dock would respond to a large earthquake, project consultants concluded that: “the entire soil column below the groundwater table and above elevation -60 ft is potentially liquefiable during [an earthquake greater than 7.5 magnitude]. The effects of liquefaction on the dock would include “seismically induced settlement, lateral spreading toward the river, reduction in pile capacity due to soil strength loss, and downdrag loads” DEIS, Appx. C2, pp.6–7.

¹⁹⁸ See DEIS, p.3-6.

could cause lateral spreading of 5 to 10 feet and ground settlement from 18 to 30 inches. DEIS pp.3-8, -16, and -18. Such soil movement could cause serious damage to structures at the project site. For example, soil liquefaction caused by earthquakes has damaged industrial port facilities in the United States, Japan, Peru, Chile, Mexico, and other countries over the past several decades.¹⁹⁹

The EIS inexcusably delays any serious discussion of if and how the proposed facility can be built to withstand a large earthquake. First, the EIS states that a “ground improvement program” will be designed—later on as the project is being built—to address systemic risk.²⁰⁰ This stands the SEPA process on its head: project decision makers and the public need to know, in advance of approving the proposal, whether and how it will be safely designed. Second, the EIS simply repeats that the facility will be “built to code.”²⁰¹ For the purposes of an EIS, the question is not whether the project will be built to code, but rather what is the effect of building it to code? The FEIS must include a detailed discussion on if and how the proposed project can be built to withstand a likely large earthquake, and if the applicable building codes ensure this level of safety.

VII. GREENHOUSE GAS EMISSIONS

The greenhouse gas (“GHG”) analysis contained in the DEIS is flawed in several respects, explained below. Increased GHG emissions associated with the Project would exacerbate global climate change, leading to sea level rise and associated human displacement, extreme weather events, increased ambient temperatures, altered precipitation patterns, ocean acidification, and loss of habitat and species. In particular, the high global warming potential of the project’s fugitive methane emissions (at the wellhead, along the pipeline route, and at the refinery) must be described in the FEIS. Finally, the DEIS does not acknowledge the resulting unavoidable and significant adverse environmental impacts from the project’s GHG emissions and offers no effective mitigation for those impacts.

The health impacts of climate change are numerous and increasing. Many world leaders and medical, public health, and scientific bodies have expressed deep concerns about climate change as a threat to human health and well-being and are speaking out about these threats with increasing urgency. Physicians for Social Responsibility,²⁰² the American Public Health Association,²⁰³ the international medical journal *The Lancet*,²⁰⁴ the Union of Concerned

¹⁹⁹ Werner et al. (1998) Experiences from Past Earthquakes (Chapter 2), in *Seismic Guidelines for Ports*, ASCE Press.

²⁰⁰ DEIS, p.3-16.

²⁰¹ See *id.*; see also DEIS, Appendix C1, p.3.

²⁰² Washington and Oregon Physicians for Social Responsibility, *Position Statement on Crude Oil Transport and Storage to Governors of Washington & Oregon* (2015).

²⁰³ American Public Health Association, *Policy on Climate and Health* (2015) (online at: <http://www.apha.org/policies-and-advocacy/public-health-policy-statements/policy-database/2015/12/03/15/34/public-health-opportunities-to-address-the-health-effects-of-climate-change>).

Scientists, and many other scientific groups have all expressed the urgency for attention to the health threats of climate and are speaking out about these threats with increasing urgency.

The recently released National Climate and Health Assessment describes how human health is already being affected by climate change. “Climate change is a significant threat to the health of the American people. The impacts of human-induced climate change are increasing nationwide. Rising greenhouse gas concentrations result in increases in temperature, changes in precipitation, increases in the frequency and intensity of some extreme weather events, and rising sea levels. These climate change impacts endanger our health by affecting our food and water sources, the air we breathe, the weather we experience, and our interactions with the built and natural environments. As the climate continues to change, the risks to human health continue to grow. Every American is vulnerable to the health impacts associated with climate change.”²⁰⁵

A. SEPA Standards for GHG Emissions Review

SEPA and its implementing regulations explicitly require consideration of direct and indirect climate impacts. *See* RCW 43.21C.030(f) (directing agencies to “recognize the world-wide and long-range character of environmental problems”); WAC 197-11-444 (listing “climate” among elements of the environment that must be considered in SEPA review). SEPA regulations also explicitly direct that environmental impacts outside the jurisdiction of the deciding agency should be considered. WAC 197-11-060(c). Crucially, agencies are required to assess both the direct and indirect impacts of the proposal.

In 2008, a governor-appointed working group provided a list of recommendations on how to ensure that climate change is considered in meeting SEPA’s directives.²⁰⁶ Notably, those recommendations identified the following categories of greenhouse gas (“GHG”) emissions to be considered pursuant to SEPA: a) off-site mining of materials purchased for the project; b) transportation of raw materials to the project, and transport of the final product offsite; c) use of products sold by proponent to consumers or industry, including “emissions generated from combustion of fuels manufactured or distributed by the facility.”

Ecology has issued SEPA Guidance for its own consideration of GHG emissions.²⁰⁷ That guidance makes clear that SEPA requires climate to be considered in its environmental analysis. Ecology’s Guidance proposes that SEPA documents consider whether the proposal will significantly contribute to GHG concentrations.²⁰⁸

²⁰⁴ [http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(15\)60854-6.pdf](http://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(15)60854-6.pdf)

²⁰⁵ U.S. Global Climate Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016) (online at: <https://health2016.globalchange.gov>)

²⁰⁶ Available at

http://www.ecy.wa.gov/climatechange/docs/sepa/20110603_SEPA_GHGinternalguidance.pdf.

²⁰⁷ Available at <http://www.ecy.wa.gov/climatechange/sepa.htm>.

²⁰⁸ *Id.* at 4.

B. Other GHG Emissions Not Accounted for in the DEIS.

Besides ignoring the GHG emissions associated with producing delivering natural gas to the facility site, discussed above, the DEIS also fails to adequately consider the GHG emissions from these other sources and activities:

- **Fugitive methane emissions at the Kalama Methanol Refinery and the 101 MW on-site gas generator.**
- **GHG emissions associated with generating 100MW of electricity off-site.** The DEIS assumes that the 100 MW that NWIW will consume from off-site generation will be produced with the average GHG impacts of all power produced in the Pacific Northwest.²⁰⁹ This assumption almost certainly underestimates the Project's actual impact. This is because the existing average incorporates significant amounts of hydroelectric and other renewable power, with minimal air emissions. These electricity generation sources are presumably already being used to the fullest possible capacity. Thus, any incremental, additional power generation needed to satisfy the Project's added electrical demand will come from other sources with higher average emissions. The EIS must reflect the emissions of this incremental generation. It may be possible to quantify these incremental emissions by subtracting hydroelectric sources out of the eGRID data used in the DEIS; by examining NWIW's contracts with Cowlitz Public Utility District, and the District's contracts with electricity generators, to identify the particular additional capacity that will supply the Project, or through some other method.
- **GHG emissions from vessels traveling to and from China to deliver methanol.** The DEIS severely underestimates the GHGs (including CO² and black carbon) produced by the vessels carrying methanol. First, the DEIS inexplicably stops counting GHG emissions from vessels at the mouth of the Columbia River.²¹⁰ Obviously, the vessels serving NWIW's Project go all the way to China—and they aren't sailing ships. Second, the DEIS should explain whether the analysis accounts for emissions from vessels coming to the methanol refinery: the EIS says that the GHG accounting considered “with vessel operation emissions associated with transport of the final manufactured product within Washington State waters.”²¹¹ Does that mean that vessels that are headed to the refinery but are not yet carrying “final manufactured product” are not counted in the analysis?

²⁰⁹ DEIS, p.4-18; Appx. D, p.58.

²¹⁰ DEIS, Appx. D, p.58.

²¹¹ DEIS, p.4-14. This assertion also appears to be factually incorrect: Washington State's waters extend three nautical miles from the coast, but the analysis of vessel emissions stops at the mouth of the Columbia River. *See* DEIS, Appx. D, p.58.

GHGs are fungible in the atmosphere such that the impacts to Washington State and the rest of the world do not depend on where the emissions occur. For that reason, it is imperative that all emissions caused by this project—regardless of location—are considered.

C. This Project Would Result in Unavoidable and Significant Adverse Environmental Impacts.

Finally, the DEIS's conclusion that the Project's GHG emissions represent an insignificant impact is simply wrong. Even without the *significant* omissions noted above, this single project would increase Washington's GHG emissions by roughly 1.1 to 1.6 percent.²¹² The conclusion that this dramatic statewide increase in GHG emissions is insignificant is unsupported and unsupportable—this is a sizeable contribution to the State's entire GHG level for only a single project.

All GHGs should be mitigated, and the final EIS must consider various mitigation options. Mitigation options must include: denial of the Project outright; prohibition on high-GHG sources like fracked gas; requirements that gas bought by NWIW be extracted using BMPs to reduce fugitive gas emissions, and requirement to purchase credits from a legitimate and verified source to offset all net GHG emissions proximately caused by the project. This Project would be responsible for a tremendous increase in GHG emissions, and without mitigation, these emissions create unavoidable and significant adverse environmental impacts.

VIII. WATER QUALITY IMPACTS

NWIW would discharge wastewater from the methanol refinery into the Columbia River. Pollutants in the wastewater would include heat, lead, chromium, copper, and zinc. The treated wastewater would violate water quality standards (*i.e.*, standards set to protect salmon and people that eat local fish). In turn, the facility seeks authorization for a toxic mixing zone—an area of the Columbia River where pollution from the terminal would violate water quality standards. The DEIS fails to analyze the impacts of toxic water pollution on designated uses.

Finally, the Columbia River is too hot. The massive die-off of sockeye salmon in 2015 demonstrates the heavy toll of heat pollution on the Columbia River and its salmon runs. Yet the facility would add a new heat source to the Columbia River, in a segment of the Columbia that has specifically been added to Washington's 303d list for temperature.²¹³ The DEIS fails to evaluate the impacts of this new heat source that would contribute to ongoing violations of water quality standards in the Columbia River.

²¹² DEIS, p.15-11.

²¹³ See https://fortress.wa.gov/ecy/wats/UIEpaSearch/ViewApprovedListing.aspx?LISTING_ID=21538 (“Continuous monitoring data from a study by Parametrix (2002 and 2004) indicates exceedances of the numeric temperature criteria of 20°C at RM 71.9 in 2002 and 2003.”).

CONCLUSION

For the reasons set forth above, the DEIS is legally and factually inadequate. The DEIS misses key impacts and fails to take a hard look at all the direct, indirect, and cumulative impacts of the proposed Project. The DEIS also incorrectly concludes that NWIW's ambitious proposal has no significant adverse impacts to the environment and public health that are not addressed by the paltry mitigation proposed. To the contrary, the adverse environmental and public health impacts that must be disclosed in the final EIS will demonstrate that the Project should be denied. If the County and the Port do not exercise their substantive SEPA authority to deny the Project, the County should use the final EIS as part of its evidence for denying NWIW's upcoming Shorelines Substantial Development and Land Use permits.

Sincerely,



Miles Johnson, Attorney for Columbia Riverkeeper

*Submitted on behalf of Columbia Riverkeeper,
Sierra Club, Center for Biological Diversity,
Oregon Physicians for Social Responsibility,
Landowners and Citizens for a Safe Community,
Wahkiakum Friends of the River,
Save Our Wild Salmon, and Northwest
Environmental Defense Center*

Exhibits

- Exhibit 1, Comment of Columbia Riverkeeper to U.S. Army Corps of Engineers on CWA §404 Permit for NWIW's Proposal (2015).
- Exhibit 2, Comment of Columbia Riverkeeper to Washington Department of Ecology on CWA §401 Certification for NWIW's Proposal (2015).
- Exhibit 3, Comments of WDFW to FERC on the Kalama Lateral Pipeline (2015).
- Exhibit 4, Massachusetts Department of Environmental Protection, *Large Volume Ethanol Spills—Environmental Impacts and Response Options* (2011).
- Exhibit 5, Thom, R. *et al.*, *Columbia River Estuary Ecosystem Restoration Program, 2012 Synthesis Memorandum* (2013).
- Exhibit 6, NMFS, *Final Biological Opinion for Columbia Pacific Bio-Refinery Dock Expansion* (2015).

- Exhibit 7, U.S. Army Corps of Engineers, *Joint Public Notice of Application for a Department of the Army Permit and a Washington Department of Ecology Water Quality Certification for NWIW's Methanol Refinery and Export Terminal* (2015).
- Exhibit 8, Oregon Physicians for Social Responsibility, *Airborne Particulate Matter and Public Health* (2015).
- Exhibit 9, American Heart Association, *Danger in the Air: Air Pollution and Cardiovascular Disease* (2014).
- Exhibit 10, Jaffe *et al.*, *Diesel particulate matter and coal dust from trains in the Columbia River Gorge, Washington State, USA* (2015).