BEFORE THE STATE OF WASHINGTON
ENERGY FACILITY SITE EVALUATION COUNCIL

In the Matter of: Application No. 2013-01 TESORO SAVAGE, LLC VANCOUVER ENERGY DISTRIBUTION TERMINAL .	CASE NO. 15-001

ADJUDICATION FINDINGS OF FACT, CONCLUSIONS OF LAW, AND ORDER TO PROCEED TO RECOMMENDATION TO THE GOVERNOR

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I. INTRODUCTION

The Legislature has recognized that the selection of sites for new large energy facilities will have a significant impact upon the welfare of the population, the location and growth of industry, and the use of the natural resources of the state. "It is the policy of the state of Washington to recognize the pressing need for increased energy facilities, and to ensure through available and reasonable methods, that the location and operation of such facilities will produce minimal adverse effects on the environment, ecology of the land and its wildlife, and the ecology of state waters and their aquatic life."[1] In order to carry out these policies and obligations, the Legislature created the Energy Facility Site Evaluation Council (the Council).

As part of its statutory process for reviewing applications for site certification of large energy facilities, the Council must conduct an adjudication pursuant to the Administrative Procedure Act, RCW 34.05. Pursuant to RCW 80.50.090(3) and WAC 463-30, the Council held a 21-day adjudication for Site Certification No. 2013-01 starting on June 27, 2016, and ending on July 28, 2016. The hearing was held in Vancouver, WA for nine days and Olympia, WA for twelve days.

The Council members hearing the adjudication were Bill Lynch, Chair;[2] and Members Jaime Rossman, Department of Commerce; Cullen Stephenson, Department of Ecology; Joe Stohr, Department of Fish and Wildlife; Dan Siemann, Department of Natural Resources; Dennis Moss, Utilities and Transportation Commission; Kenneth Stone, Department of Transportation; Greg Shafer, Clark County; Bryan Snodgrass, City of Vancouver; and non-voting member Larry Paulson, Port of Vancouver. Administrative Law Judge Cassandra Noble presided over the adjudication for the Council.

A. APPLICATION FOR ENERGY FACILITY SITE CERTIFICATION[3]

Tesoro Savage Petroleum Terminal, LLC, d/b/a Vancouver Energy, LLC, (Tesoro Savage) a Delaware limited liability company, filed Application for Site Certification 2013-01 (ASC) with the Council on August 29, 2013, an amended ASC on February 25, 2014, a Supplemental ASC including revised air permit language in August of 2014, and a subsequent amended ASC on May 27, 2016.[4] Tesoro Savage proposed to construct and operate a facility called the Vancouver Energy Distribution Terminal (VEDT) at the Port of Vancouver USA (Port) in the City of Vancouver, WA. The VEDT will be designed to receive Bakken crude oil and diluted bitumen (collectively crude oil) from throughout North America, with the

[1] RCW 80.50.010.

[2] Chair Lynch resigned by letter to the Governor dated August 16, 2017. Governor Inslee appointed Roselyn Marcus, Interim Chair of the Council, effective September 11, 2017. Ms. Marcus has read the record and reviewed the evidence received.

[3] Additional changes to the Application for Site Certification were submitted on October 6, 2016, after the close of the record for this adjudicative proceeding, and therefore are not considered in this Order.

[4] Ex. 0001-000001-8233-PCE.

current expectation that most of the crude oil will come from mid-continent sources in America (with a focus on North Dakota) and Canada.

B. AUTHORITIES

RCW 80.50.030 created the Council, a Washington State agency. The Council's powers and duties are identified in RCW 80.50. One of the Council's duties is to "prepare written reports to the governor," including recommendations on site certification applications to construct proposed energy facilities on specific sites and, if the Council is recommending approval, the site certification agreement embodying the conditions upon which approval should be granted.[5]

When the Council is reviewing an ASC, RCW 80.50.090 directs that it conduct an adjudicative proceeding under the APA. The Council adopted WAC 463-30 to govern such hearings. This adjudication order is one part of the information the Council will evaluate in preparing its RCW 80.50.100(1) report to the Governor recommending approval or rejection of the ASC. This adjudication was conducted pursuant to the requirements and procedures in the APA and WAC 463-30.

C. PROCEDURE

1. Parties

On January 28, 2015, the Council issued an Order Commencing Agency Adjudication and Setting Intervention Petition Deadline: February 27, 2015. Statutory parties filed six Notices of Participation. Eight entities filed a Petition for Intervention through Earthjustice, and seven other entities filed individual Petitions for Intervention. The Council issued its March 25, 2015, Order Recognizing Participating Parties and Granting Interventions identifying the adjudication parties as follows.

The statutory parties are:

Applicant Tesoro Savage: Dale N. Johnson, Jay P. Derr, and Tadas A. Kisielius, attorneys, Van Ness Feldman, LLP, Seattle, WA.

Counsel for the Environment (the CFE): Matthew R. Kernutt, Assistant Attorney General, Olympia, WA.

Port of Vancouver, WA (the Port): David F. Bartz, attorney, Schwabe Williamson & Wyatt, Portland, Oregon, and Connie Sue Martin, attorney, Schwabe, Williamson & Wyatt, Seattle, WA.

Clark County, WA (Clark County): Taylor R. Hallvik, attorney, Vancouver, WA.

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[5] RCW 80.50.040(8); RCW 80.50.100(2).

City of Vancouver, WA (Vancouver): E. Bronson Potter, attorney, and Karen L. Reed, City Attorney, Vancouver, WA, and Susan E. Drummond, attorney, Law Offices of Susan Elizabeth Drummond, PLCC, Kirkland, WA.

State of Washington Department of Natural Resources (DNR): Terence A. Pruitt, Assistant Attorney General, Olympia, WA.

The intervention parties are:[6]

Columbia Waterfront, LLC (Columbia Waterfront): Linda R. Larson, attorney, Marten Law, Seattle, WA, and Daniel L. Timmons, attorney, Marten Law, Portland, Oregon.

Columbia River Inter-Tribal Fish Commission (CRITFC): Julie A. Carter, attorney, and Robert C. Lothrop, attorney, Portland, Oregon.

International Longshore Warehouse Union Local 4 (ILWU Local 4): Cager Clabaugh and Jared Smith, Vancouver, WA.

The City of Spokane (Spokane): Nancy Isserlis, City Attorney, Spokane, WA.

The Confederated Tribes of the Umatilla Indian Reservation (Umatilla Tribe): Brent H. Hall, attorney, Portland, Oregon.

The Confederated Tribes and Bands of the Yakama Nation (Yakama Nation): Amber Penn-Roco, attorney, and Joe Sexton, attorney, Galanda Broadman, Seattle, WA.

The City of Washougal (Washougal): Donald L. English and Scott Russon, City Attorney's Office, Vancouver, WA.

Columbia Riverkeeper; Climate Solutions; ForestEthics[7]; Friends of the Columbia Gorge; Fruit Valley Neighborhood Association; Sierra Club; Spokane Riverkeeper; and WA Environmental Council (collectively Columbia Riverkeeper): All represented by attorneys Kristen L. Boyles, Janette K. Brimmer, and Anna Sewell, Earthjustice, Seattle, WA, and David A. Bricklin, attorney, Bricklin & Newman, LLP, Seattle, WA.

2. Witnesses

Sixty-nine witnesses testified at the adjudicative hearing. Another 22 witnesses submitted pre-filed testimony, but did not testify at the hearing. The witnesses are listed in Appendix B attached.

3. Exhibits

Eight hundred eighteen exhibits were admitted into evidence, and are listed in Appendix C attached.

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[6] BNSF Railway Co. was granted leave to file an amicus brief on the issue of federal preemption of state authority as it pertains to rail operations in the state of Washington on May 16, 2016.

[7] ForestEthics changed its name to "Stand" in April 2016. Columbia Riverkeeper, *et al.* and Tribal Parties Pre-Hr'g Br. 1 n.1 (Columbia Riverkeeper Pre-Hr'g Br.).

4. Dispositive Motions

The Council addressed the following dispositive motions before the hearing.

Rail and Vessel Issues. On March 29, 2016, Tesoro Savage filed a Motion to Dismiss Issues 15, 20, 49, 50, 51, 52, 53, 66 and Portions of Issues 7, 12, 14, 18, 19, 39, 45, 64, 67, and 68 (Rail Operations Issues).[8] Tesoro Savage asked the Council to dismiss all proposed rail and vessel transport issues and not to hear any evidence about matters that concern rail operations expected to take place in connection with getting the crude oil to, and managing it at, the VEDT. The motion was based on federal preemption and constitutional commerce clause theories. Tesoro Savage argued that the Council lacks jurisdiction to consider evidence related to these issues as it could lead to the Council imposing unlawful conditions on a site certification agreement based on rail impacts.

Also on March 29, 2016, the Port filed a Motion for Partial Summary Judgment Re: Preemption.[9] This motion was based on federal preemption and constitutional commerce clause theories relating to vessel traffic.

Both motions were opposed by the following parties: Spokane, Vancouver, DNR, Columbia Riverkeeper, Columbia Waterfront, Umatilla Tribe, Yakama Nation, CRITFC, and the CFE. The opposing parties argued that federal law does not prevent the Council from considering evidence on the potential impacts of rail and vessel operations. The parties also argued that the motions are premature as it is unknown whether the Council will recommend conditions that would violate federal law.

On May 4, 2016, BNSF Railway Company (BNSF) filed BNSF Railway's Amicus Brief in Support of Vancouver Energy's Motion to Dismiss and The Port of Vancouver's Motion for Partial Summary Judgment, and moved for its inclusion in this adjudication record. Columbia Riverkeeper and Vancouver filed objections to the BNSF amicus brief.

On May 16, 2016, the Council's Administrative Law Judge issued an Order Granting BNSF Railway Company Leave to File Amicus Brief.

On June 6, 2016, after considering the arguments, the Council issued an Order Denying Tesoro Savage, LLC and Port of Vancouver Dispositive Motions. Federal law does not prevent the Council from hearing and considering evidence on these issues. Once all the evidence is heard, the Council can and will determine the extent of its jurisdiction.

Industrial Waste Discharges. On March 29, 2016, the Council received cross motions related to the VEDT's industrial waste discharge permit. Tesoro Savage filed a Motion for

[8] The Port joined in this motion and the BNSF Railway Company was granted leave to file an amicus brief in support of this motion.

[9] Tesoro Savage supported the Port's motion.

Determination Regarding Issuance of Industrial Waste Discharge Permit.[10] Tesoro Savage sought a ruling confirming that the Council is the sole agency authorized to issue such permit for effluent discharges to Vancouver's publicly owned treatment works. Vancouver filed City of Vancouver's Motion for Order Ruling that EFSEC Lacks Authority to Issue Pretreatment Discharge Permit. Vancouver argued that state law does not provide the Council this authority and that the Council has not received delegated authority from the Environmental Protection Agency (EPA). Responses were filed by the City, Tesoro Savage, Columbia Riverkeeper, and the Port.

On August 31, 2016, after considering the motions and all supporting documents, the Council issued Order Granting City of Vancouver's Motion for Ruling that EFSEC Lacks Authority to Issue Pretreatment Discharge Permit, and Denying Vancouver Energy's Motion for Determination Regarding Issuance of Industrial Waste Discharge Permit. The Council concluded that the National Pretreatment Program is a federal program governed by federal law, under the exclusive jurisdiction of the EPA. State law cannot confer jurisdiction on the Council and the EPA has not done so. In addition, the Council concluded that the objectives of the federal and state regulatory schemes will be met by Vancouver issuing the permit.

Motion for Issuance of Final EIS. On May 31, 2016, Vancouver and Columbia Riverkeeper filed a Motion for Issuance of Final EIS Prior to Commencement of Hearing. Movants argued that the State Environmental Policy Act (SEPA) required the environmental review to be sufficiently complete before the hearing commences to inform the final recommendation regarding the environmental impacts of the proposed action and alternatives. Tesoro Savage filed a Response that the Port joined. Tesoro Savage argued that SEPA does not require the Final Environmental Impact Statement (FEIS) to be completed prior to the hearing, that it was never anticipated that the FEIS would be complete prior to the hearing, and that this motion is "tantamount to a request to delay the adjudication."

On June 21, 2016, after considering the motion and all supporting documents, the Council issued an Order Denying Motion to Continue Adjudication until after Final Environmental Impact Statement is Issued. The Council concluded that the Council's SEPA rule provides that the Council may initiate the adjudicative proceeding prior to completing the FEIS or the Draft Environmental Impact Statement (DEIS). Further, the adjudication is not a process to challenge the adequacy of the DEIS or FEIS, and is a separate, distinct process that will produce findings of fact and conclusions of law based on the evidence received in that proceeding. The adjudicative proceeding is not an appeal of the Council's environmental review products, including the DEIS and FEIS.

[10] The Port filed a response to the motions, supporting the motion filed by Tesoro Savage.

II. DESCRIPTION OF THE PROPOSED PROJECT AND DISCUSSION OF RISKS AND BENEFITS

A. DESCRIPTION OF THE VEDT PROPOSAL

1. Overview of the VEDT

The proposed VEDT. According to the ASC, at full operation, the VEDT would receive an average of more than four loaded crude oil unit trains[11] per day, multiplied by 750 barrels (bbl) per car for an average of at least 360,000 bbl of oil a day, at 120 cars per unit train, and 1713 trains per year.[12] Each unit train is approximately one and one-half miles long.[13] The ASC's estimate of four trains per day corresponds with the maximum possible throughput of 131.4 billion bbl per year if one assumes the maximum 120 cars per train with each car fully loaded at 750 bbl. However, the ASC also acknowledges that the number of cars and the amount of oil per car would vary, and provides a range of estimated capacity per train of 65,000 to 90,000 bbl, which results in a range of 4 to 5.5 trains per day. In this order, the Council thus uses a figure in the middle of that range or 4.7 trains per day, based on the ASC figure of 1713 trains per year.

Tesoro Savage proposes to construct and operate the VEDT on property leased from the Port.[14] The VEDT will have three main areas: Area 200, the rail unloading area and where the office facilities will be located; Area 300, the oil storage area where the crude oil will be delivered via pipeline from the train unloading areas; and Area 400, the marine terminal (or dock area) that will receive crude oil via pipelines from the storage tanks and occasionally directly from the rail unloading area. Tesoro Savage will build a new rail track on the outside of existing loop tracks and shift existing tracks in Terminal 5 that were added as part of the West Vancouver Freight Access Project (WVFA Project). In addition, Area 500 will have the pipeline to move crude oil between Areas 200, 300 and 400 and Area 600 would consist of the boiler buildings.[15]

Expected life of the project. The ASC is based on a 10-year lease with the Port, with two five-year extensions for a total project length of 20 years.[16] However, for design purposes standard building codes typically assume that facilities will remain functional for a 50-year life.[17]

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[11] "Unit train" is a rail industry term that defines a single train of cars carrying the same commodity. PFT of Hack 7. The crude oil unit trains typically consists of between 80 and 120 cars all carrying exactly the same thing, crude oil. PFT of Millar 9.

[12] Ex. 0001-000740-PCE. Tr. 308, vol. 2.

[13] It is possible that more than four unit trains would arrive in a single day as there is variability in the supply chains moving to or from the facility. Tr. 308-09, vol. 2.

[14] Ex. 0001-000196-PCE.

[15] Tr. 303, vol. 2.

[16] Tr. 314, vol. 2.

[17] PFT of Wartman 3.

Crude oil. The VEDT is designed to handle crude oil with an American Petroleum Institute (API)[18] gravity range of 15 to 45. The gravity range designates crude oil products by measuring crude oil density as compared to water, which has an API gravity of 10. A higher API gravity is a lighter crude oil, and a lower API gravity is a heavier crude oil. Thus, an API gravity of 45 describes lighter crude, and an API gravity of 15 describes heavier crude. The VEDT is designed to handle more of the lighter crude, which is typical of Bakken crude. Tesoro Savage would require its customers to meet the API parameters for which the VEDT was designed.[19]

Rail cars. Crude oil rail cars are required by federal regulators to be upgraded by the end of 2018 to cars with safety improvements including thicker walls and valve and connections strengthening, designated as 'DOT-117' cars. Tesoro Savage has committed to requiring its customers to use only in DOT-117 cars or better for transporting crude oil to the VEDT.

Storage tanks. Crude oil at the VEDT will be stored in six 48-foot tall, 240-foot diameter crude oil storage tanks, each with a working capacity of approximately 342,000 barrels.

Transportation routes. Most trains coming to the VEDT will be carrying crude oil from North Dakota or nearby states. Some may be carrying dilbit from Alberta, Canada. Trains are generally expected to travel through North Dakota, Montana, and Idaho before entering Washington at Newman Lake near Spokane. In Washington, they would travel 385 miles, first southwest from Spokane to the Tri-Cities of Pasco, Kennewick, and Richland, and then west through the Columbia River Gorge National Scenic area alongside the Columbia River to reach Vancouver. Train lengths, configurations, and approach routes may vary. Trains may travel westward in part through Oregon on the south side of the Columbia River before turning north to the VEDT.

The westward route switches from BNSF to the Port connection track at Milepost 10.69, then enters the main body of the Port onto a loop track from which trains are unloaded.[20] Empty trains would exit to the east back to Milepost 10.69. Empty trains would later travel eastward on one of several routes, which could include a return along the inbound route, or continuing north from Vancouver and through central Washington via Stampede Pass and eventually returning to South Dakota or other points.

Loaded vessels would leave the Port and travel down the Columbia River, traversing the system of bars and shoals of the Columbia Bar to the Pacific Ocean and then to refineries in the United States, most likely in California or Hawaii, or elsewhere.

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[18] The American Petroleum Institute is an industry body that sets standards for how the industry operates.
[19] Tr. 306-07, vol. 2.
[20] Tr. 1557-58, vol. 7.

2. The VEDT Operator: Tesoro Savage

Tesoro Savage is a joint venture. Tesoro Savage is a limited liability company, formed as a joint venture of Tesoro Refining & Marketing Company LLC (a wholly owned subsidiary of Tesoro Corporation)[21] and Savage Companies.[22]

Tesoro Corporation. Tesoro Corporation (Tesoro) (now Andeavor) is a Fortune 100 company, and an independent refiner and marketer of petroleum products. Through its subsidiaries, Tesoro operates six refineries in the western United States with a combined capacity of approximately 875,000 bbl per day. Tesoro's six refineries are located in Anacortes, WA; Martinez, CA; Wilmington, CA; Mandan, ND; Kenai, AK; and Salt Lake City, UT. Tesoro Refining & Marketing Company LLC is a subsidiary of Tesoro Corporation.[23]

Savage Companies. Savage Companies (Savage) is a privately held operator that provides supply chain management solutions and industrial solutions tailored to meet the needs of customers across a variety of industries including oil refining and railroads. Operations include over 200 locations and more than 3000 employees in North America and internationally.[24]

VEDT Management and Operations. Tesoro Savage was established to build, own and operate the VEDT. Jared Larrabee, a Savage employee, will be the VEDT general manager. His job includes getting the VEDT up and running, hiring, establishing operation practices, and overseeing the permitting process. Tesoro Savage does not currently have any other employees. Tesoro Savage is governed by a management committee consisting of two executives from Savage and two executives from Tesoro. The management committee meets quarterly. Tesoro Savage's management structure and details regarding operating procedures, scope of control, day-to-day management, etc. have not yet been determined, but will be developed if and when the ASC is approved.[25]

The VEDT is planned as a transfer facility to deliver crude oil from the mid-continent to refineries on the West Coast.[26] The VEDT will conduct no refining although Tesoro, as a refinery, will be a VEDT customer.[27] Savage would be the primary operator of the rail unloading structure and storage tanks, and Tesoro would operate the dock infrastructure and

[21] Tesoro Corporation changed its name to Andeavor in connection with a merger that closed on June 1, 2017. See letter dated Aug. 11, 2017, to Stephen Posner, Manager, Energy Facility Site Evaluation Council from Charles Cavallo III, Deputy General Counsel-Commercial & Logistics, Andeavor; and Chair William H. Lynch's August 28, 2017, letter reopening the record to admit Mr. Cavallo's letter to the record.

[22] Ex. 0001-000048-PCE.

[23] Ex. 0001-000048-PCE.

[24] Ex. 0001-000048-PCE.

[25] Tr. 402-03, vol. 3.

[26] Tr. 297, vol. 2

[27] Tr. 385-86, vol. 3.

operations, but the VEDT would operate as an integrated system. Tesoro Savage's customers would be responsible for the delivery of the crude oil to and from the VEDT. While the crude oil is at the VEDT, Tesoro Savage would have 'care and custody' of the product, but would, at no time have control of the unit trains.

The VEDT site encompasses 47.4 acres, divided into Areas 200, 300, 400, 500, and 600. Unit trains would arrive and be stationed on the VEDT rail loops. The trains would be moved through the unloading area (Area 200) in segments, where the crude oil would be gravity-drained into the transfer pipeline system (Area 500). The crude oil would be pumped through the transfer pipelines to the crude oil storage tanks (Area 300) to be held until the marine vessel loading operation. Marine vessels would arrive and moor at the dock (Area 400) where they would be pre-boomed when possible. Crude oil would be pumped from the storage tanks to the loading area, and loaded to the marine vessels. Crude oil may also be pumped directly from the rail unloading area to the vessels at the marine terminal.[28]

3. The Lessor of the Site: the Port

Economic Activity. The Port has a 100-year history and mission in the State of Washington.[29] It is an economic engine for Vancouver and the region, generating up to $30 million in yearly revenue, re-invested back into the Port.[30] It has carried out a 20-year long-term investment in the regional and local economy. In addition to the proposed VEDT, there are three new projects planned at Port Terminal 1, a Marriott hotel, a mixed-use facility with office space and residential units. The Port also plans to move its own headquarters to the waterfront.[31]

Port Growth. In recent years, the Port has focused on growth and development and its operations have increased to an estimated $30 million as of summer 2016.[32] Alastair Smith, the Port's Director of Marketing and Operations,[33] testified that marketing efforts have brought the Port global recognition. The Port's long-term viability has been recognized in the Port's good financial rating. The Port has signed many long-term agreements for over-sized, over-weight cargo, taking advantage of a shortage of facilities and their specialized crane for large, heavy cargo that no other port can handle, such as wind energy components.[34]

The Port is a break-bulk facility. The Port is not a container handling facility. It focusses on cargo that can be transported by truck, vessel, and rail. To that end, the Port has engaged in long-term planning and investments, including the WVFA Project, which

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[28] Ex. 0001-0008233-PCE.
[29] Ex. 1022-000001-129-POR.
[30] Tr. 239, 246, vol. 2.
[31] Tr. 275, vol. 2.
[32] Ex. 1021-000001-000012-POR; Ex. 1022-000001-129-POR; Ex. 1018-000001-POR.
[33] Ex. 1011-000001-POR.
[34] Tr. 241-44, vol. 2.

constructed a new entrance to the Port for unit trains and rail lines into and out of the Port.[35] The WVFA Project increased rail movement efficiency into and through the Port. As part of this project, the Port also constructed bridges and underpasses for rail tracks to avoid traffic congestion problems in the surrounding Vancouver streets.[36]

4. The Crude Oil Industry in Washington and the Western United States

Petroleum Administration for Defense Districts. The United States is divided into regional Petroleum Administration for Defense Districts (PADDs) by the United States Department of Energy for the purposes of petroleum infrastructure and refining. The regions vary in the number of oil producing fields, the capacity for processing crude oil, and the end user base for refined oil. The PADDs also differ in terms of transportation of crude oil to refineries, pipeline infrastructure, crude-by-rail, and marine transport.[37]

PADD V. PADD V is comprised of the seven western states: Alaska, Washington, California, Oregon, Nevada, Arizona, and Hawaii. Tesoro has four refineries in PADD V. One is in Anacortes, WA; one in Kenai, Alaska; and two in California, Martinez and Los Angeles. While three of these refineries are above the average capacity of 95 maximum bbl per day, the Los Angeles refinery is the largest single refinery complex on the West Coast.[38] In addition to the Tesoro refinery in Anacortes, the state of Washington has four other refineries owned by three different companies: British Petroleum, Phillips 66, and U.S. Oil.[39]

Crude Oil Transport in PADD V. The modes of crude oil transport into PADD V vary. Existing pipeline infrastructure within PADD V brings crude oil to California refineries from the California crude fields. The Trans Mountain pipeline brings crude oil into northern Washington from Canada. Crude oil from the Alaskan North Slope (ANS) is brought down to the southern coast of Alaska and then transported by ships to PADD V refineries. Foreign marine vessels also bring crude oil to PADD V. More recently, crude by rail (CBR) from the mid-continent is transported to PADD V. Several Washington refineries have constructed CBR facilities, while recent CBR facility proposals in California have not moved forward. The use of three transportation modes, pipeline, marine and rail provide flexibility in bringing crude oil to PADD V refineries.[40]

Crude Oil at the VEDT. The VEDT would allow CBR transport from the Bakken oil fields and other mid-continent sources. However, the VEDT has been designed to accept crude oil in the range of 15 to 45 API. Although Bakken Crude is a lighter crude, the VEDT will be able to accept heavier crude oil with an API as low as 15 from other locations.[41] Tesoro Savage

[35] Ex. 1020-000001-POR.
[36] Tr. 447, vol. 3.
[37] PFT of Roach 4.
[38] PFT of Roach 3-4.
[39] PFT of Goodman 30; Ex. 5588-000034-CRK.
[40] PFT of Roach 5-6, 16, 18.
[41] Tr. 306-07, vol. 2.

intends that VEDT crude oil would be destined to PADD V refineries. Although Tesoro Savage did not originally intend the project to transfer crude oil for shipment to foreign refineries and the Port lease currently prohibits export, a federal export ban has been lifted and export from the VEDT could occur if the lease prohibition was changed.[42] The VEDT has the capacity to provide the crude oil to Washington refineries, but the immediate plan is likely to transport the crude oil ultimately to California refineries.[43]

Washington. Currently, Washington refineries produce all or nearly all fuels consumed in western Washington. The output of Washington refineries exceeds consumption of refined product within the state, and a portion is exported to Oregon, other states, or exported internationally. Although the output of refineries in Washington exceeds demand, infrastructure limitations generally make it uneconomical to transport product from refineries within western Washington to the eastern side of the state. While there is an occasional barge that goes to Pasco up the Columbia River, the majority of the refined fuel for eastern Washington comes into Spokane via pipelines from Utah and Montana refiners, which are in PADD IV. These pipelines carry refined product rather than crude oil.[44]

5. Description of Operations at the VEDT

a. Infrastructure for Receiving Trains

Ownership of crude oil. Crude oil trains coming into the VEDT will be owned and operated by BNSF on its established track. Most VEDT customers will use BNSF trains.[45] Other VEDT customers may use rail cars owned by other railroads such as Union Pacific.

Train Speeds. BNSF sets a 35 mile per hour (mph) speed limit for crude oil trains traveling though municipalities with a population of 100,000 or larger. Oil trains are limited to 40 mph if they carry one or more DOT-111 or CPC-1232 tank cars, when moving through federally designated “high-threat urban areas.”[46] Once the trains arrive onto the Port track, their speed would have been reduced to 10 miles per hour. When they enter the loop track area, the crude oil within the train cars would transition to the care and custody responsibility of Tesoro Savage, who maintains custody while the crude oil is at the VEDT.[47] Once at the VEDT, employees will reduce train speed to 5 miles per hour while they are passing through the Port. The trains would then move through the unloading area.

Unloading process, staffing, and safety planning. When a unit train comes to the VEDT, the train would be prepared for unloading. A team would connect the top of a segment of the rail cars to a vapor recovery system. Another team would handle the bottom of a

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[42] Tr. 201-02, vol. 2.
[43] PFT of Roach 8-10, Tr. 3326-28, vol. 14.
[44] Tr. 209-11, vol. 2.
[45] Tr. 3288, vol. 14.
[46] PFT of Kaitala 11.
[47] Tr. 298, vol. 2.

segment of the rail cars where the crude oil is drained into the piping to go into the storage tanks.[48] These two processes usually take about 45 minutes. At that point, the gravity draining of the rail cars would begin. It takes approximately 2 hours for the gravity drain to occur. Once the segment of cars is drained and confirmed to be empty, the cars would be disconnected from the unloading system, which would take approximately a half hour, and the next segment of cars would be advanced to be unloaded. Upon being fully unloaded, the train would depart the VEDT.[49]

Tesoro Savage submitted a 410-page safety plan with its ASC.[50] Mr. Larrabee anticipates having 176 employees on site working four on/four off shifts: 12-hour shifts for four days, then off for four days.[51] Mr. Larrabee anticipates 30 to 40 employees working on a shift schedule, with approximately 18 doing the unloading work.[52] There are three unloading tracks and unloading operations that take an average of 15–16 hours a train.[53] Every employee has "stop work authority" to stop work if he or she sees an unsafe practice occurring. The employee can stop work at a specific area or for the entire VEDT, depending upon the unsafe practice observed.[54] In addition, there would be a safety manager on site, with a safety team reporting to that person.[55]

b. Infrastructure for Storing Crude Oil

The VEDT will include six storage tanks to hold the crude oil after it is unloaded from the unit trains and before it is loaded onto marine vessels. The tanks are designed to hold four full unit trains per tank or approximately 342,000 bbl. All the tanks have mixers.[56] With a facility throughput of 131,400,000 bbl per year, each tank would experience about 64 turnovers a year.[57]

The storage tanks have convex, double fully welded bottoms with space in between for monitoring leaks. The tanks have two roofs—an external roof intended to prevent rain from entering the tank, and an internal floating roof intended to reduce vapor emissions. The internal floating roof has seals to minimize loss of oil when the roof moves up and down as the tanks are filled and drained. There is an automatic tank gauging system, along with high- and low-level alarms. The tanks also have a full fire detection system and nozzles on each tank. [58]

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[48] Tr. 370-71, vol. 3.
[49] Tr. 371, vol. 3.
[50] Tr. 326, vol. 2; Ex. 0001-004901-5310-PCE.
[51] Tr. 367, vol. 3.
[52] Tr. 368, vol. 3.
[53] Tr. 376, vol. 3.
[54] Tr. 377, vol. 3.
[55] Tr. 378, vol. 3.
[56] Tr. 692-93, vol. 4.
[57] PFT of Hansen 13.
[58] Tr. 564-65, vol. 3.

c. Seismic Design of the VEDT

The VEDT is proposed in a seismic-event-prone location on soil that is subject to liquefaction. Liquefaction can produce ground deformation, ground displacement, or bank collapse. To address the seismic hazard conditions at the site, Tesoro Savage has designed ground improvements for portions of the site and designed structures to meet or exceed the requirements of Risk Category II as set forth in Minimum Design Loads for Buildings and Other Structures (ASCE 7-10).

d. Vessel Loading Operations at the VEDT

Regulatory limit on vessel capacity. Several vessel types will call at the VEDT. Currently all tanker vessel traffic on the Columbia River is limited to 300,000 bbl. There is a process to change that planning standard and Tesoro Savage intends to work to increase this limitation to 600,000 bbl.[59]

Vessel loading will take place in Area 400, which includes Berth 13 and 14. Upon a vessel's arrival, line handlers will retrieve and place the lines on the shore mooring hooks.[60] The dock is T-shaped with restricted room so access on and off the vessels will only be from a platform.[61]

Under normal circumstances, once the vessel is tied at the dock, a boom is deployed around the vessel. Boom anchors and anchor buoys will be positioned and set in three locations on the offshore side of the ship to secure the boom and then one each on the starboard quarter, mid-ship on the starboard side and starboard bow.[62] There are times when the boom cannot be deployed due to inclement weather or wind conditions. In those instances, the vessel loading operation may continue without the boom.[63]

Once booms are in place, the cargo and vapor hoses can be connected to the ship.[64] The operations crew will use a loading tower with hoses that will move up and down and go out to the vessels via crane. Once the vessel is connected, a dock safety skid takes the displaced air to the marine vapor combustion units for destruction. Three different differential switches monitor the pressure.[65]

Once the cargo and vapor hoses are in place, the crude oil can be loaded onto the ship. Loading would begin at a slow rate, speed up if all is well, and slow down as the tanks get full. Although the maximum capacity to transfer the oil is 32,000 bbl per hour, at the full loading

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[59] PFT of Bayer 4.
[60] PFT of Bayer 8.
[61] Tr. 583, vol. 2.
[62] PFT of Bayer 9.
[63] Tr. 857, vol. 4.
[64] PFT of Bayer 9.
[65] Tr. 583-84, vol. 2.

rate, the ships will generally be loaded at approximately 24,000 bbl an hour. A higher rate could occur for larger vessels.[66]

Once loaded, the block valves on the dock and ship are closed. The hoses are then disconnected, put in a small bucket where the vessel drip pan is placed, and open the connection from the bottom so that any drops go into the bucket.[67] Once ready, the ship would work with the local U.S. Coast Guard unit on when it can depart the dock.[68]

e. Crude Oil Transport to and from the VEDT

River transit. During the transit down river, the ship will be guided by a River Pilot. In the vicinity of Kelly Point at the confluence of the Willamette and Columbia Rivers about 3.5 miles from the terminal, the ship will be met by two docking tugboats which will assist the ship to maneuver alongside the VEDT port (left) side to the dock.[69] The dock will have a scoreboard that tells vessels and pilots who are bringing the vessels the speed and angle at which the vessel is approaching.[70]

B. EVALUATION OF THE BENEFITS AND RISKS ASSOCIATED WITH THE VEDT

The Council takes notice of the fact that the Columbia River runs along a major portion of the rail route, and along that route also are public recreational and scenic resources such as the Columbia River Gorge National Scenic Area, Glacier National Park in the State of Montana, Fort Vancouver National Historic Site, the Lewis and Clark Greenway Trail, the Columbia River Renaissance Trail, the City of Vancouver Waterfront Park, and other such unique public amenities. To adequately evaluate the proposal's overall potential impacts and risks, the Council will evaluate individually three interrelated components of the VEDT:

1. VEDT site operations impacts and potential risks;
2. Rail route operations impacts and potential risks; and
3. Vessel operations impacts and potential risks.

1. VEDT Site Operations

a. Seismic Issues

The Council will begin its analysis by considering whether the site selected by the VEDT is seismically suitable for a crude oil terminal.

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[66] Tr. 797-98, vol. 4.
[67] Tr. 800, vol. 4.
[68] Tr. 871, vol.4.
[69] PFT of Bayer 8.
[70] Tr. 584, vol. 3.

The VEDT Site is Within a Region Prone to Seismic Events. The proposed VEDT would be the largest CBR facility in the United States.[71] Locating the VEDT in a seismic-event-prone location poses distinct and particular risks.

The Pacific Northwest is a seismically active region, unique in that it is subject to large magnitude subduction earthquakes. There are a number of active faults within 25 miles of the VEDT site.[72] Many earthquakes of all types have occurred in the past and they will occur in the future.[73] In addition to the geographic zone called "Cascadia Subduction Zone" (CSZ), there are a number of active shallow (closer to the ground surface) seismic sources that have different seismologic effects closer to the VEDT, including longer-duration shaking resulting in soil liquefaction.[74]

The United States Geological Survey (USGS) estimated that there is a 15 percent chance that a subduction earthquake[75] in the CSZ will affect the region within the next 50 years.[76] The CSZ spans a 680-mile coastal stretch between Vancouver Island, British Columbia and Cape Mendocino, CA. The Juan de Fuca tectonic plate is subducting beneath the North American Plate at a rate of approximately four centimeters per year. Measurements show that the offshore portion of this megathrust is now "locked" along the entire length of the subduction zone and is progressively accumulating tectonic stress and strain that will be released in a large magnitude earthquake at some time in the future.[77] This is a primary geologic hazard that poses a great threat to the Port and its surrounds, should it be the site of, or affected by, a large crude oil storage and transfer operation.

Joseph Wartman, Ph.D., an Associate Professor of Civil and Environmental Engineering at the University of Washington,[78] testified that this 15 percent estimate of the likelihood of such a large CSZ earthquake occurring in the next 50 years is based on the best current available science.[79]

The Council agrees that there is a 15 percent chance that a great CSZ megathrust earthquake will occur in the region within the next 50 years. As noted above, although the VEDT currently has a 20-year lease with the Port, for design purposes, standard building codes

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[71] PFT of Goodman 24; Tr. 2852, vol. 12.

[72] Tr. 2979, vol. 13.

[73] Tr. 2977, vol. 13.

[74] Tr. 2977-80, vol. 13.

[75] This type of subduction earthquake would be a magnitude 8 or greater. PFT of Wartman 3.

[76] PFT of Wartman 3.

[77] PFT of Wartman 4-5.

[78] He has visiting appointments in Environmental Engineering in New Zealand and Spain; has received numerous professional awards and honors; and has many publications about earthquakes and soil stability. Dr. Wartman is currently part of a large National Science Foundation-sponsored research effort at the University of Washington that is making predictions of the effect of a large 9.2 subduction earthquake. PFT of Wartman 1; Tr. 3007, vol. 13.

[79] Tr. 3006-07, vol. 13.

typically assume that facilities will remain functional for a 50-year life.[80] Thus, there is a 15 percent chance of a CSZ megathrust earthquake during the design lifetime of the VEDT.[81]

Shallow earthquakes are seismologically different from CSZ megathrust earthquakes, but also potentially dangerous. USGS data suggests that the peak ground acceleration (horizontal shaking) at the VEDT site that can be anticipated from a shallower earthquake on a local fault could be higher than in a CSZ megathrust quake, due to its closer proximity to the surface.

Frequent aftershocks can also be expected after an earthquake. They are especially pronounced after large earthquakes such as those expected in the CSZ. The main consequence of aftershocks is that they tend to inhibit or impede rescue, recovery and cleanup efforts, particularly if there are damaged structures.[82]

In a Seismic Event, the Soils at the VEDT Site are Subject to Liquefaction. Earthquake magnitude is a quantitative measurement of earthquake size based on instrumental measurements that allow an objective, quantitative measurement of ground shaking activity.[83] The ground motion hazard depends upon the magnitude of an earthquake, its distance from the epicenter, and the subsurface conditions.[84] Horizontal ground movement is referred to as Peak Ground Acceleration (PGA).[85] If an earthquake has a PGA of 0.42g, then during pulses of high amplitude shaking, about 40 percent of gravity would be acting horizontally on structures and facilities.

The PGA value of an earthquake is important because it is an indication of an earthquake's ability to cause damage and trigger soil liquefaction.[86] Forces up to about 42 percent of gravity could act horizontally on soils, structures and facilities. That level of peak ground acceleration is significant because it exceeds the threshold to trigger soil liquefaction, the controlling geotechnical concern for seismic design at the VEDT site. Earthquakes with longer periods of shaking also cause soil to remain in a liquefied state for a longer period of time, increasing damage.[87]

Soil liquefaction occurs when pore pressure or water pressure is generated in the soil as a result of earthquake shaking causing loss of soil strength and soil stiffness. When liquefaction occurs, the solid layer temporarily behaves as a viscous liquid instead of a solid. A

[80] PFT of Wartman 3, 6; Tr. 1210, vol. 5.
[81] Tr. 1210, vol. 5; PFT of Wartman 6.
[82] Tr. 2984-85, vol. 13.
[83] Ex. 0273-000004-TSS.
[84] PFT of Shanahan 11.
[85] PFT of Shanahan 11.
[86] Tr. 2978, vol. 13.
[87] Tr. 2977-78, vol. 13.

loss of soil strength or stiffness can produce ground deformation, ground displacement, or collapse of banks.[88]

The first prerequisite for soil liquefaction is saturation of the ground surface, which makes it more likely that water will fill gaps between soil particles and cause them to lose contact with each other. The second prerequisite is low density, uncompacted soil.[89]

The first effect of soil liquefaction is vertical settlement of the ground surface, which is rarely uniform and almost always differential. This means that the ground may settle one foot at one place, 3 inches in another adjacent spot, and eight inches nearby. The second effect is horizontal movement, sometimes known as lateral spreading, of the ground surface, which can be many feet. A third effect is landslide development resulting from significant strength loss.[90] These effects are more pronounced at ports located along bodies of water because of the nature of the geologic processes that deposited soils at those locations.[91]

The soils at the VEDT site are highly susceptible to soil liquefaction.[92] The soils are compacted fill underlain by silt and sand of varying strength down to approximately 60 to 100 feet below ground surface.[93] This is an important factor in predicting the effects of seismic activity at the site. Structures that may otherwise withstand ground movement could be damaged if underlying soils liquefy, as is predicted for the VEDT.[94] Some of the soils at the VEDT fall within the National Earthquake Hazards Reduction Program site Class F, meaning they are unstable soils prone to liquefaction during very strong ground motion.[95] Almost the entire Port is mapped by the State of Washington as having a moderate to high level of liquefaction hazard.[96] At the VEDT, the likely results of soil liquefaction in the types of earthquakes modeled for the project include significant dynamic settlement and lateral spreading deformations in some areas, especially near the riverbank. Ground settlement is estimated to be approximately 10 to 16 inches in the unloading and office areas and the boiler building; 6 to 10 inches in the storage tank area; 3 to 15 inches in the transfer pipelines area; and 12 to 24 inches in the marine terminal.[97] Estimates of lateral spreading at the shoreline for Terminal 5 predict up to approximately 12 feet at the site, which could impact slope stability along the banks of the Columbia River.[98]

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[88] Tr. 2978, 2981-82, vol. 13; Ex. 0001-006618-19-PCE.
[89] Tr. 2983, vol. 13.
[90] Tr. 2981-82, vol. 13.
[91] Tr. 2981, vol. 13.
[92] Tr. 2982, vol. 13.
[93] PFT of Shanahan 13.
[94] PFT of Shanahan 13.
[95] PFT of Shanahan 13.
[96] Tr. 2985-86, vol. 13.
[97] PFT of Shanahan 13-14.
[98] PFT of Shanahan 13-14.

Design of Ground Improvements in Areas 300 and 400. Mark Rohrbach is an expert on ground improvements for seismic conditions.[99] For the VEDT site, he is the design engineer of record for all ground improvements in Areas 300 (the tank area) and 400 (the marine terminal).[100] Mr. Rohrbach evaluated the design of the ground improvements for Areas 300 and 400. He designed the ground improvements to limit static and seismic settlement, and movement of the pipeline proposed to run parallel to the Columbia River, and for the dock abutment and peripheral buildings including emergency power and fire suppression facilities. Mr. Rohrbach was responsible for evaluation and mitigation of seismic lateral spreading of the riverbank at the pipeline footing and dock abutment during seismic loading.[101]

The plan for seismic improvements for the VEDT includes non-ground improvement design features throughout the terminal site.[102] In his design work, Mr. Rohrbach utilized geotechnical reports prepared by Geotechnical Resources, Inc. (GRI) for the soils existing at the facility site.[103] After consulting with USGS site-specific information, he prepared a report that describes his design for ground improvements for Areas 300 and 400.[104]

The design for ground improvements included several techniques to address different types of ground movement and stress.[105] The use of stone columns is a ground improvement technique that uses specialty purpose-built vibrating probes to densify and reinforce the soils while constructing a stone column.[106] Deep soil mixing is a ground improvement technique that improves the characteristics of weak soils by mechanically mixing them with cementitious binder slurry.[107] This technique is used to increase bearing capacity, decrease settlement, increase global stability, and mitigate liquefaction potential for the planned structures, tanks, embankments, and levees.[108] Wet soil mixing is used to construct *in situ* gravity retaining structures and to facilitate tunnel construction and remediate the impact tunneling may have on nearby structures. Soil stabilization by wet soil mixing can provide structural support and reduce lateral loads on bulkhead walls.[109] Jet grouting is a technique that creates *in situ* grouted soil.[110] The jet grouting process constructs grouted soil full columns with a known designed strength and geometry. It was Mr. Rohrbach's opinion that using these techniques, the static and seismic components of the VEDT design would be in accordance with all applicable standards and codes.[111] He compared the design information provided to him for the VEDT for

[99] PFT of Rohrbach 1.
[100] PFT of Rohrbach 1.
[101] PFT of Rohrbach 3.
[102] PFT of Rohrbach 1; Ex. 0001-000214-PCE.
[103] Ex. 0001-006478-PCE for Area 300; Ex. 0001-006609-6693-PCE for Area 400.
[104] Ex. 0001-006695-7252-PCE.
[105] Tr. 1137-38, vol. 5; Ex. 0001-006701-PCE.
[106] PFT of Rohrbach 9.
[107] Ex. 0001-000453-PCE.
[108] Ex. 0001-000453-PCE.
[109] PFT of Rohrbach 10.
[110] PFT of Rohrbach 11.
[111] PFT of Rohrbach 1, 11.

consistency with IBC 2012, ASCE 7-10 and other design guides, and determined that it is consistent with or more conservative and safer than what is required by the various design guides.[112]

With regard to Area 300 where the storage tanks are located, the Opponent's question the adequacy of the designs for planned secondary and tertiary containment structures and the containment berm.[113] The ground improvement in Area 300 consists of stone columns 3 feet in diameter and spaced 8.2 feet on center spacing in a square grid. Various techniques will be followed and special equipment and software will be used to monitor and ensure correct operation of the wet soil mixing, potential differential settlement and unusually poor soil conditions. Based on Hayward Baker, Inc.'s (HBI) analysis, the ground below the proposed transfer pipeline will be improved.[114] The ground improvement in Area 300 will not extend all the way through the liquefiable soil layers. Mr. Rohrbach's opinion was that this was acceptable because analysis showed that the performance objectives could be satisfied without fully penetrating the liquefiable layers. He said that adding stone column length in Area 300 has the practical effect of increasing the carbon footprint of the project and adds to the cost of the project without benefit to the environment or the VEDT. He concluded that the ground improvement design meets or exceeds all applicable standards and takes a conservative approach.[115]

In Area 400, the marine terminal, the transfer pipeline alignment is generally parallel with the Columbia River and about 94 feet northeast of the ordinary high water mark (OHWM).[116] The HBI analysis advised that ground improvement below the proposed transfer pipeline is necessary. In the pipeline portion, stone columns alone were not felt adequate to provide the required stability. They will extend to the non-liquefiable soils at approximately the 50-foot elevation. The design includes a series of jet grout columns, deep soil mixing panels, and stone columns. The deep soil mixing panels planned will limit the potential liquefaction below the pipe alignment. The jet grout column will provide the vertical support of the pipe rack foundation, and the stone columns will form a non-liquefiable buttress that stabilizes the shoreline area.[117] Ground improvements in the vicinity of the proposed dock abutment will also be necessary and will consist of different approaches to three zones.

Mr. Rohrbach's opinion of the improvements planned in Area 400 is that, during a very significant earthquake, the soil between the deep soil mixing panels could liquefy and displace laterally toward the Columbia River. He testified that this type of failure is unlikely to occur

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[112] PFT of Rohrbach 8.

[113] PFT of Wartman 17; Tr. 2986, 2998, vol. 13.

[114] PFT of Rohrbach 12.

[115] PFT of Rohrbach 12.

[116] The mark that will be found by examining the bed and banks and ascertaining where the presence and action of water are so common and usual, and so long continued in all ordinary years, as to mark upon the soil a character distinct from that of the abutting upland. RCW 90.58.030(2)(c).

[117] PFT of Rohrbach 13.

due to the planned Area 400 ground improvements. It was also Mr. Rohrbach's opinion that the design for Area 400 meets or exceeds all applicable standards and takes a conservative approach to ground improvement for that area.[118] Mr. Rohrbach's design assumed that earthquake activity would occur at the VEDT site. Recognizing that the VEDT is a major project planned to be constructed adjacent to valuable environmental and economic resources, and that these resources are highly regulated Mr. Rohrbach said that he expects the system he designed would comply in every way with the local standard of practice for similar structures.[119]

Mr. Rohrbach stated he believes these techniques would meet project specifications including reducing possible settlement under tanks and pipelines in areas 300 and 400 to as little as 2 inches of total settlement, and one inch of differential settlement.[120]

Secondary Containment. In spacing the storage tanks, Tesoro Savage followed the American Petroleum Institute and NFPA recommendations, placing each one half the diameter of the nearest other tank. The number one failure point on tanks is the tank bottom. This is addressed by double bottoms with interstitial monitoring, and a 60-mil HDPE liner within the tank area. There would be a berm around all of the tanks. It would be approximately 22 feet at the base and 10 feet at the top, and six feet tall, running around the perimeter of all the tanks. The liner is tied into the foundation of all the tanks, and is tied into the berm as well. The berm area is designed to hold 110 percent of the contents of the largest tank. Although applicable code provisions require a berm to be designed to accommodate a 24-hour, 25-year storm event, Tesoro Savage has designed it to hold a 24-hour, 100-year storm event. There are also smaller berms around the individual tanks, preventing a total loss of containment in the event of total loss of containment for a tank.[121]

There are no ground improvements underneath the berms in Area 300.[122] The rationale for decision is based on a theory about liquid levels in a seismic event where the berm area settled, but the entire area settled uniformly, and not differentially. In that circumstance, it was assumed the berms would maintain their entire capacity. Designers reasoned that even accounting for the space needed for oil and rain, there would still be over nine inches of freeboard (height above a liquid line). Geotechnical engineer, Matthew Shanahan reviewed Tesoro Savage's design in light of ASCE 7-10 and found that, if the plans, including those for the containment berms were implemented, the risk of severe structural damage of failure of facility elements resulting from earthquake ground motion, even from the CSZ event would be "minor."[123]

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[118] PFT of Rohrbach 14.
[119] PFT of Rohrbach 12, 15-16.
[120] PFT of Rohrbach 5-7.
[121] Tr. 567-68, vol. 3.
[122] Tr. 568, vol. 3; Ex. 0370-000083-TSS.
[123] PFT of Shanahan 14.

On the other hand, Dr. Wartman found the berm design a deficiency in Tesoro Savage's seismic mitigation plan.[124] Dr. Wartman was concerned the ground improvement had not been implemented under the secondary containment berms, and the design assumed uniform settlement of the berm, which he said was "very rare," because of natural variability in subsurface conditions.[125] Geotechnical test borings indicated that the onshore portions of the site, including Area 300, are underlain by approximately 20 feet of sandy fill over a 10-foot layer of soft silts and clays. These, in turn, overlie sands extending to the top of a deep, stiff, gravel deposit. The lower sand layer is susceptible to liquefaction, and is expected to cause several feet of lateral deformation of the ground surface. Dr. Wartman characterized this as a high liquefaction hazard and predicted this level of liquefaction under Area 300 would result in significant damage to containment protection structures such as berms and walls, reducing or negating their ability to contain spills.[126] With regard to the adequacy of an approach that meets code requirements, Dr. Wartman said it was his opinion that mere compliance with codes and standards would be insufficient to protect the community from triggering events that exceed predictions, and that "multiple hazards at the site together with the severe consequences of failure combine in a manner that poses a high risk to the local region." [127]

Demonstrated Survival of Oil Terminal Facilities in Liquefaction Zones. Given the historical rarity of earthquakes of the magnitude projected to occur in this region, the record contains few empirical examples demonstrating survival of oil terminal facilities located in liquefaction zones. Unrebutted testimony from Dr. Wartman indicated the only example that he is aware of where ground improvements to the competent (non-liquefiable) layer were demonstrated to secure a facility during a comparable earthquake was in Tecomán, Mexico.[128] Tesoro Savage has not proposed to extend ground improvements to the competent, non-liquefiable layer.

Uncertainty exists not just in the absence of demonstrable examples where comparable engineering has secured comparable facilities in liquefaction areas during a comparable magnitude earthquake, but also in knowing the size of the earthquake that must be designed for. For example, in 2011, there was a full rupture earthquake in Tōhoku Japan. Despite longstanding national experience with earthquakes, prior to that earthquake, there was doubt as to whether you could have a full length rupture of the fault, so it was not anticipated or prepared for locally. It is only now with improved instrumentation and seismological arrays that scientists are better able to understand that you do not necessarily see small individual segments rupture, but instead ruptures combine and spread across an entire region.[129]

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[124] PFT of Wartman 4.
[125] Tr. 3001-02, vol. 13.
[126] PFT of Wartman 14.
[127] PFT of Wartman 12, 13.
[128] Tr. 3024, vol. 13.
[129] Tr. 3023-24, vol. 13.

State Building Code Requirements. The parties disagree about several aspects of the physical design of the VEDT as it relates to seismic conditions at the site. Tesoro Savage contends that WAC 463-62-020 establishes the seismic standard for issuance of a site certification agreement unless the Council exercises its substantive SEPA authority.[130] WAC 463-62-020 says "[t]he seismicity standard for construction of energy facilities shall be the standards contained in the state building code." Tesoro Savage says that the VEDT will be built in accordance with the International Building Code (IBC) as it has been adopted into the State Building Code.[131]

As discussed elsewhere in this order, WAC 463-62 does not establish standards for the Council's current consideration of Tesoro Savage's ASC. The Council will nonetheless consider whether Tesoro Savage has demonstrated compliance with WAC 463-62-020.

The State Building Code sets forth the minimum performance standards for construction in Washington.[132] The Code is comprised of model codes such as the IBC, as adopted and modified by the State Building Code Council.[133] The purpose of the State Building Code is to promote the health, safety, and welfare of building occupants, building users, and the general public.[134] The IBC says it is to be interpreted by the building official in accordance with the purpose of the IBC,[135] which is to protect public health, safety, and general welfare, and to provide safety to fire fighters and emergency responders.[136] The building official can approve alternative materials, designs, and methods of construction so long as the design complies with the intent of the IBC.[137] The building official is the officer or other designated authority charged with administering and enforcing the IBC.[138] For facilities under the Council's jurisdiction, the Council is the building official.[139]

The Applicability of ASCE 7-10 to Portions of the VEDT. The IBC incorporates the standards in the American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures ASCE 7.[140] ASCE 7-10 standards concern seismic design criteria for buildings.[141] Most structures at the site were designed to standards either contained in ASCE 7 or adopted by reference, such as the following: Storage tanks in Area 300 were designed to meet API 650 standards, as referenced in Chapters 15 and 23 of ASCE 7.[142]

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130 Applicant Post-Hr'g Br. 28.
131 Applicant Post-Hr'g Br. 28.
132 RCW 19.27.020.
133 RCW 19.27.031; RCW 19.27.074.
134 RCW 19.27.020.
135 WAC 51-50-003; IBC § 104.1 (2012).
136 WAC 51-50-003; IBC § 101.3 (2012).
137 WAC 51-50-003; IBC § 104.11 (2012).
138 WAC 51-50-003; IBC § 202 (2012).
139 RCW 80.50.110, .120.
140 WAC 51-50-003; IBC § 1613 (2012).
141 Applicant Post-Hr'g Br. 34.
142 Applicant Post-Hr'g Br. App. B, D.

Concrete and steel foundation work was designed to meet ACI 318 and AISC 360 standards, respectively, as referenced in Chapter 23 of ASCE 7.[143] However, in Area 400, mooring and berthing design, structural load combinations, and seismic design are outside the scope of ASCE 7 because they are piers/wharves inaccessible to the general public. Such structures were designed to a recently released standard ASCE 61-41.[144] The pipelines in Areas 200, 300, 400, and 500 were designed to meet the American Society of Mechanical Engineering (ASME) B31.4 standards.

ASCE 7-10 Chapter C1 includes the basic requirements for strength and stiffness for buildings. Chapter C1.5.1 sets out different risk categories used to relate the criteria for maximum environmental loads or distortions, as specified in the ASCE 7-10 standards, for earthquake zone construction to the consequences for a structure and its occupants when the loads are exceeded.

The ASCE 7-10 is a standard meant to guide engineering judgment:

> While ASCE's process is designed to promote standards that reflect a fair and reasoned consensus among all interested participants, while preserving the public health, safety and welfare…ASCE does not intend, nor should anyone interpret, ASCE's standards to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this standard.[145]

Tesoro Savage says that tanks and other structures at the facility were properly designed to the default level of risk allowed in ASCE 7-10, Risk Category II.[146] This is the standard generally applicable to most structures. Opponents, including Dr. Wartman, argue that structures at the site should properly be classified as Risk Category III.[147]

The appropriate risk category is an important determination in regard to seismic design. A Risk Category II structure has a seismic importance factor of 1.0, while Risk Category III has an importance factor of 1.25.[148] These importance factors are then applied to structural calculations to determine appropriate loads and supports. Consequently, a structure designed to the higher category and importance factor would be less likely to fail in the event of an earthquake.

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[143] Applicant Post-Hr'g Br. App. B.
[144] PFT of Shanahan 12.
[145] Minimum Design Loads for Buildings and Other Structures, American Society of Civil Engineers, ii.
[146] Applicant Post-Hr'g Br. 34-35.
[147] Columbia Riverkeeper Final Adjudication Post-Hr'g Br. 27-28.
[148] Tr. 3843-44, vol. 16.

Design Criteria at the VEDT Site. Matthew Shanahan is a Principal with GRI, a geotechnical engineering and engineering geology firm with supporting expertise in environmental services.[149] GRI provided a geotechnical analysis of geological or soil hazards at the VEDT site. GRI summarized seismic design criteria for the facility in geotechnical reports for the upland area of the facility and for the dock modifications.

Applying accepted geotechnical investigative methods, GRI developed criteria to describe appropriate foundation support methods, site preparation, earthwork, seismic hazard mitigation, berm construction, and other necessary geotechnical design for the proposed VEDT.[150]

In Mr. Shanahan's view, all structural elements except the dock structure, the storage tanks, and the pipes will be constructed in accordance with the 2012 IBC, incorporating the ASCE 7-10. These codes' seismic hazard levels are based on a Risk-Targeted Maximum Considered Earthquake (MCE_R). The ground motion associated with the probabilistic MCE_R is a targeted risk level of 1 percent in 50 years probability of collapse in the direction of maximum horizontal response.[151] (This is to be distinguished from Mr. Shanahan's statement that there is a 2 percent chance that an earthquake exceeding the design quakes will occur within 50 years.)[152]

GRI's geotechnical recommendations for the facility designers strove to reduce the likelihood of negative impacts from ground motion, prevent collapse, protect human lives, and have structures that continue to function at a high level immediately following an earthquake.[153]

With regard to the portion of the dock in Area 400 that is inaccessible to the general public, and therefore beyond the scope of ASCE 7-10, Mr. Shanahan said that the ASCE 61-14 standard, Seismic Design of Piers and Wharves, would be used.[154] He did not explain whether ASCE 61-14 is part of the State Building Code, describe what it requires, or explain how the VEDT would comply.

With regard to the pipelines in Area 500, Mr. Shanahan said that ASME B31.4 would apply. Mr. Shanahan did not explain whether ASME B31-4 is part of the State Building Code, describe what it requires, or explain how the VEDT would comply.

[149] GRI has completed more than 50 projects for the Port and is familiar with the subsurface, shoreline, and environmental conditions at the Port. PFT of Shanahan 1-2.

[150] PFT of Shanahan 4-8.

[151] PFT of Shanahan 12-15.

[152] PFT of Shanahan 15.

[153] PFT of Shanahan 2, 12.

[154] PFT of Shanahan 12.

It was Mr. Shanahan's professional opinion that, if the design standards in API 650 (applicable to the storage tanks) and ASCE 61-14 (applicable to the docks) are implemented, the risk of severe structural damage or failure of these elements from earthquake motion would be "reduced."[155] Mr. Shanahan cautioned, however, that:

> It is important to note, however, that while engineering design can reduce the adverse effects of the anticipated design earthquake event, the risk is never completely eliminated irrespective of design and construction used at a site.[156]

Summary of the Council's Analysis of Seismic Risk and Construction Standards. In considering the evidence in this adjudication record, the Council believes that the ability and sufficiency of the proposed physical alterations to behave in an earthquake in a determined, safe, and predictable manner in any type, size, or duration earthquake has not been established, especially for the most serious types of earthquakes. The Council notes that Mr. Rohrbach would not apply current modeling techniques to confirm his hand calculations as to the adequacy of ground improvements. While indicating a willingness to participate in a third-party review of the designs for ground improvements using these methods, in the Council's view, Mr. Rohrbach expressed overconfidence that limited analysis was sufficient. This undermined his credibility.

The lack of such advanced modeling analysis in the adjudication record, particularly in light of an absence of empirical evidence of the stability of deep soil mixing panels and other features of the VEDT in securing similar facilities from damage in the event of large earthquakes, supports the Council's conclusion. What has been established is that the site selected for the proposed project poses substantial risks associated with lateral spreading during a major subduction earthquake, which the applicant has not demonstrated, can be mitigated with the measures proposed. The Council generally agrees with Dr. Wartman's assessment that dangerous facilities such as the VEDT should not be sited on lands that are geologically unstable and hazardous. Although risk cannot always be eliminated, when the consequences can be catastrophic, the level of acceptable risk is greatly reduced. Given the consequences, the Council concludes that in this instance, the level of risk is too high.

The Council first determines that there is a 15 percent chance that a CSZ megathrust earthquake will occur in the region within the next 50 years and that for design purposes the proper assumption is that facilities will remain functional for a 50-year life. Thus, there is a 15 percent chance of a CSZ megathrust earthquake during the expected lifetime of the VEDT. After a magnitude subduction earthquake, aftershocks also pose a risk of impeding rescue, recovery and cleanup efforts.

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[155] PFT of Shanahan 12-13.
[156] PFT of Shanahan 13.

The Council next determines that shallow earthquakes may also occur at the VEDT. Such earthquakes are very dangerous if the level of peak ground acceleration exceeds the level to trigger soil liquefaction that can remain in a liquefied state for a longer period.

The Council also determines that in the absence of adequate ground improvements, the soils at the VEDT are highly susceptible to soil liquefaction. In the absence of adequate ground improvements, structures will fail. Ground settlement is estimated to be approximately 10 to 16 inches in the unloading and office areas and the boiler building; 6 to 10 inches in the storage tank area; 3 to 15 inches in the transfer pipelines area; and 12 to 24 inches in the marine terminal, with lateral spreading at the shoreline estimated to be up to approximately 12 feet, which could impact slope stability along the river bank.

Tesoro Savage does not intend to extend ground improvements through liquefiable soil to the gravel layer (the competent layer) in Area 300 (the storage tanks). The unrebutted testimony from Dr. Wartman indicated the only example he was aware of where ground improvements to the competent layer secured a facility during a comparable earthquake was in the case of Tecomán, Mexico. Uncertainty exists not just in the absence of demonstrable examples where comparable engineering has secured comparable facilities in liquefaction areas during a comparable magnitude earthquake, but also in knowing the size of the earthquake that must be designed for given examples such as the 2011 Tohoku earthquake, where the full rupture nature of the quake was simply not anticipated locally despite longstanding national experience with earthquakes.

The berm area around the storage tanks is designed to hold 110 percent of the contents of the largest tank plus the rainfall from a 24-hour, 100-year storm event. There are also smaller berms around the individual tanks. There are no ground improvements underneath the berms based on an assumption that in an earthquake the area would settled uniformly with the berms maintaining their entire capacity. The Council is persuaded by Dr. Wartman's testimony that uniform settlement of the berm would be very rare. He predicted significant damage to containment protection structures such as berms and walls, reducing or negating their ability to contain spills.

Analysis of Seismic Risks under WAC 463-62-020. The Council next evaluates whether WAC 463-62-020 applies to the Council's current evaluation, and if Tesoro Savage has met its burden of demonstrating that the VEDT has complied with the relevant provisions of the State Building Code, specifically the IBC and ASCE 7-10.

Table 1.5-1 of ASCE 7-10 provides examples of risk categories for buildings or structures that will be used for various purposes. Risk Category II is defined as all uses not falling into a different category. Risk Category III is appropriate for buildings and structures not otherwise falling into Category IV, the failure of which could:

- Pose a substantial risk to human life
- Cause a substantial economic impact or mass disruption to day-to-day civilian life, or

- In the case of facilities that process or store large quantities of hazardous fuels, chemicals, waste, or explosives, or similar substances, pose a threat to the public in the event of a release.[157]

Tesoro Savage argues that Risk Category II is appropriate because it is the default category for most structures, and a higher category is not required under ASCE 7-10, based on the testimony of its expert witnesses. They analyze the language of the category definitions in the standard, noting that crude oil is neither "toxic" nor "explosive" as defined.[158] Similarly, David Corpron testified that the tanks were designed to Seismic Use Group I, which corresponds to the same importance factor 1.00 as required by Risk Category II, in accordance with API standards, although aspects of the design such as wall thickness were in excess of the level required by that category.[159]

Dr. Wartman testified that, while compliance with building codes was not his particular area of expertise, Risk Category III was more appropriate. The higher seismic importance factor of 1.25 would result in a 25 percent more robust design, reducing risk. He further testified that placing facilities such as the VEDT in areas with known geological hazards, such as the Port, was an outdated and dangerous practice.[160] In commentary published together with these standards, ASCE 7-10 provides background on changes to risk categorization from prior versions. Current standards have been generalized to be less prescriptive and allow more discretion, because "the acceptable risk for a building or structure is an issue of public policy, rather than purely a technical one." The commentary continues that, "[e]limination of the specific examples of buildings that fall into each category has the benefit that it . . . provides individual communities and development teams the flexibility to interpret acceptable risk for individual project."[161]

Taking ASCE 7-10 as a whole, including the commentaries regarding risk category, the Council finds Dr. Wartman's exercise of professional judgment to be the most persuasive. One reason is that the testimony of Tesoro Savage's geotechnical and engineering experts essentially did not disagree with Dr. Wartman as to the danger that the predicted earthquake activity presents to the public. The evidence clearly established that the Port is located in a place that is especially vulnerable to seismic activity from several types of earthquakes that all predict will occur at some time in the relatively near future. This includes the potentially catastrophic CSZ earthquake of magnitude 8 or 9. The evidence clearly established that the experts agreed that there is no amount of infrastructure improvement that can ensure the public would be fully protected from the consequence of such an earthquake. The Council notes that

[157] Applicant Post-Hr'g Br. App. B, at 12. (The electronic version of Apps. A-D is in .pdf format; this cite is App. B on page 12 of that .pdf.)

[158] Applicant Post-Hr'g Br. 34.

[159] Tr. 4870, vol. 21.

[160] Tr. 2993-95, vol. 13.

[161] Applicant Post-Hr'g Br. App. B, at 27-28. (The electronic version of Apps. A-D is in .pdf format; this cite is App. B on pages 27-28 of that .pdf.)

even if all designs perform as appropriate, there is still a 2 percent chance that an earthquake exceeding these design specifications will occur within the next fifty years, further highlighting the importance of selecting the right risk category.

Given the testimony of expert witnesses such as Dr. Kelly J. Thomas, discussed later in this Order, his quantitative risk estimates for populations on and off-site assume normal operating conditions, and that he did not model risk in the event of an earthquake, the Council infers that such probabilities would be significantly higher in the event of an earthquake exceeding the design earthquake used by Tesoro Savage's consultants, potentially resulting in significant risk to human life. This risk is exacerbated, in the Council's view, by the lack of any evidence provided to indicate that water supply lines serving the facility would be likely to remain intact in the event of a large earthquake. As noted by Dr. Wartman, such linear infrastructure is particularly vulnerable to liquefaction.

Tesoro Savage further does not provide any evidence, expert testimony, or even argument, in regard to the commentaries on risk categorization that are included in ASCE 7-10. These commentaries demonstrate that the choice of proper risk categorization is a question of public policy and discretion for the building official and the community. This project-by-project decision is to be made on the basis of public policy, and the acceptable degrees of risk for each project.

The Council notes the unquantified but potentially grave risks to human health and safety, to persons at the site, nearby workers, Clark County Jail Work Center (JWC) residents, and others, that could result from a failure of structures at the VEDT, as well as the unique threats to the environment posed by the location of some structures, including pipelines, adjacent to the Columbia River. Unrebutted testimony discussed later in this Order also suggests that damage from a spill into the Columbia could disrupt economic activity, specifically commercial and Tribal fishing, and that such disruptions could include fishery closures for months or longer. The Council further notes that, at full build out, the VEDT could potentially pass through significant quantities of fuel stock to refiners, as discussed further in other sections of this Order, and that the disruption of such supplies could potentially be economically disruptive.

Therefore, the Council finds as a matter of public policy that designing structures at the VEDT to the default Risk Category II represents an unacceptable level of risk. Risk Category III (and the corresponding API Seismic Use Group II, as to storage tanks) would reduce risk by requiring a seismic importance factor of 1.25, which would be more appropriate under the circumstances. Testimony and exhibits establish that structures at the VEDT were instead designed with a seismic importance factor of 1.00, which is less protective in the event of an earthquake.[162]

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[162] Little testimony is provided regarding the criteria for determining the appropriate Seismic Use Group under API 650. In a highlighted portion of the standard provided by Tesoro Savage as Exhibit D to its Post-Hearing Brief, API 650 it is stated that it is unlikely for petroleum storage tanks to be categorized as SUG

The Council concludes that, if WAC 463-62 applies to limit the Council's current consideration of seismic impacts absent an exercise of substantive SEPA authority, Tesoro Savage has not met its burden of proof under WAC 463-62-020 to demonstrate that the VEDT meets seismic standards contained in the State Building Code.[163] Thus, the Council's consideration of seismic issues is unconstrained by the limits that Tesoro Savage alleges are imposed by WAC 463-62-020.

Analysis of Seismic Risks beyond WAC 463-62-020. The Opponents argue that, in light of the location of the proposed VEDT facility in a seismically dangerous location, bare compliance with minimum seismic standards is inadequate because the structures, as planned, will represent a substantial risk to human life in the event of a structural failure. They call for the application of the more robust standard of Risk Category III. As explained in the preceding discussion, the Council agrees that even under the State Building Code, Risk Category III is the appropriate choice.

Moreover, as explained elsewhere in this Order, WAC 463-62-020 and its reference to the State Building Code, do not apply at this point in the Council's process. The VEDT will represent a substantial risk to human life and safety, including the safety of fire fighters and first responders in the event of a structural failure. In fulfilling its duty, the Council must go beyond State Building Code compliance and decide whether it should recommend the siting of the VEDT facility *at the proposed location.* This is one reason why the Council's authorizing statutes preempt and supersede all regulatory provisions of state law, including the State Building Code. There is little disagreement that there is a significant chance[164] that a very serious large earthquake will occur sometime in the design life of the project, along with the possibility of other, no less potentially dangerous, earthquakes that can be expected at the VEDT site. The proposed VEDT at this location represents un-mitigatable and substantial risks to human life, safety, and the environment in the event of a structural failure.

Based upon his education and experience, the Council considers Dr. Wartman's opinion the more credible as it relates to the nature and threat of a catastrophic earthquake event at the VEDT within its projected life and the effectiveness and adequacy of the proposed ground improvements. The Council is persuaded by Dr. Wartman's statement that:

III, the highest category, absent extenuating circumstances. Without reaching that question, the Council extends its finding that a seismic importance factor of 1.25 is more appropriate for the VEDT to conclude that SUG I is not appropriate or compliant with the State Building Code in this instance. (The electronic version of Apps. A-D to the Applicant's Post-Hr'g Br. is in .pdf format; this cite is App. A on pages 1-7 of that .pdf.)

[163] The Council notes that Tesoro Savage also failed to sustain its burden of demonstrating that the State Building Code sets standards for the portion of the Area 400 marine terminal that is not subject to ASCE 7-10. Tesoro Savage suggests that portions of Area 400 are subject to ASCE 61-14 but does not demonstrate that the State Building Code has adopted ASCE 61-14 and, if it has, how the VEDT meets those requirements. Tesoro Savage similarly suggests that the pipelines in Areas 200, 300, 400, and 500 are subject to ASME B31.4 but has not linked that standard to the State Building Code or demonstrated the VEDT's compliance.

[164] Dr. Wartman testified to a 15 percent chance, while Tesoro Savage relies on a 6-14 percent chance of an earthquake. In either event, the Council finds this probability "significant." Tr. 1133, vol. 5.

> [W]e should not be citing [sic] potentially dangerous facilities in lands that are geologically unstable or otherwise geologically hazardous. I think that is a basic rule. I know that such facilities exist and decades ago we built those kind of facilities without the kind of understanding that we have of geologic hazards that we have today, and those have become legacies that are expensive for us to maintain and they pose a risk to us societally as well.[165]

Thus, the Council concludes that the VEDT, as proposed by Tesoro Savage, poses a substantial risk to human life and safety and the environment. The Council will therefore include those risks in its balancing analysis in Section IV of the Order.

b. Operational and Security Risks Associated with Normal Operations

The Council next evaluates the operational and security safety of the VEDT operations under normal conditions.

David A. Sawicki is an emergency and crisis program management consultant with a Master of Science degree in Geology. Mr. Sawicki has worked in the energy business since 1978. The Port hired Mr. Sawicki to analyze and testify about the safety and suitability of the Port site for the VEDT.[166] After reviewing the plans for the VEDT and the materials in support of the ASC and visiting the VEDT site, Mr. Sawicki's opinion was that the VEDT would be safe and suitable for the proposed location if the VEDT fully develops the draft plans he reviewed, based on his analysis that included operations facility safety and site security. Operations facility safety is the organized efforts and procedures for identifying workplace hazards and reducing accidents and exposure to harmful situations and substances. It also includes training personnel in accident prevention, accident response, emergency preparedness, and use of protective clothing and equipment. Site security means fundamental security measures taken to protect against external threats, such as terrorism, including access controls, communications, restricted areas, cargo handling and monitoring, training, and incident reporting required in applicable law.[167]

Mr. Sawicki's overall opinion was that the VEDT has been designed and engineered to be as safe as possible. Moreover, he said, where a risk cannot be entirely eliminated through design and engineering, Tesoro Savage has further reduced the existing risk through its operational and emergency response planning. His evaluative methodology included looking at the potential hazards associated with a specific process and then reducing potential hazards through either redesigning the overall process or adding engineered steps into the existing process. He also reviewed the Port's security plans.[168]

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[165] Tr. 2994-95, vol. 13.
[166] PFT of Sawicki 1-2.
[167] PFT of Sawicki 10.
[168] PFT of Sawicki 10.

Mr. Sawicki gave examples of how Tesoro Savage has provided additional safety layers where needed. For instance, the proposed installation of a permanently installed "self-healing" foam fire-fighting application system in the crude oil tanks provides an added engineering step that results in an additional layer of protection resulting in a reduction of the overall risk by lowering both the likelihood and the consequences of a fire. Another example of additional safety planning Mr. Sawicki praised is the Operations Site Security Plan.[169] It was Mr. Sawicki's conclusion that the Port site is safe and suitable for the VEDT operation, and that the Port's security plans are complete and robust.

Summary of the Council's Analysis of Operational and Security Risks Associated with Normal Operations. The Council has evaluated Mr. Sawicki's testimony about the operational safety and suitability of the Port site for the VEDT. Mr. Sawicki opined that the VEDT would be operationally safe with regard to identifying and reducing workplace hazards, accidents, and exposure to harmful situations and substances, and protecting against external threats. The Council agrees with Mr. Sawicki that from a routine operational and site security standpoint, the VEDT does not pose an inordinate risk to the public interest. The Council will therefore not move this issue into its balancing analysis of public interest impacts in Section IV of this Order. As discussed elsewhere in this Order, the Council will move the potential impacts of non-routine events such as earthquakes and spills into its balancing discussion in Section IV of this Order.

c. Rail Operations at the VEDT Site

The Council will next examine the risk of a derailment at the VEDT site arising from track construction or rail-related operational safety deficiencies.

Track construction. Larry R. Guthrie is the General Director, Operations Analysis at TUV Rheinland Mobility Rail Sciences Division.[170] He authored two articles relevant to the issues surrounding the VEDT addressing prevention of railroad accidents and CBR accidents. He testified about rail engineering, operations, and safety as it relates to the railroad tracks that would be used by oil unit trains going to the VEDT.[171]

Mr. Guthrie used modeling techniques to do a risk assessment of the potential for derailment of a designed connection track into the Port. He looked at three different types of trains to determine the risk of derailment entering the facility and to make recommendations. He used a train operations simulator that is an industry standard for modeling longitudinal forces and an analysis of the lateral to vertical ratios between the wheel and the rail, which is

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[169] PFT of Sawicki 11.

[170] He joined TUV after more than 41 years of service with the Norfolk Southern Corporation performing analytical, certification, and planning services to the domestic and international rail industry to assess factors impacting safe and efficient train operations, capacity planning, process improvement, and accident and derailment investigations. PFT of Guthrie 1, 8; Ex. 1045-000001-POR.

[171] PFT of Guthrie 1, 8; Ex. 1045-000001-POR.

the determining factor of whether or not a railcar will derail on a high side of a curve or possibly roll over a rail. Mr. Guthrie determined whether the operation or the design itself was below industry-accepted thresholds for safety, and what recommendations would be appropriate to enhance the safety of the operation.[172]

High guardrails. Mr. Guthrie explained the purpose of train track guardrails and how they work. The high type of guardrail is approximately an inch to an inch and three-quarters higher than a running rail. It is often located at a switch where a track subdivides into two lines to control the movement of the train from one line to another. The purpose of the high guardrail is to ensure the wheel stays properly channeled on the running rail. If the car begins to rock, the high rail assures that the rocking will not cause the wheel to lift sufficiently high to get over the high guardrail.[173]

Low guardrails. The second type of guardrail is the same height as a running rail, installed inside the normal running rails, which are four feet, eight and one half inches apart. The two rails assure that if a railcar that gets off the rail, the car would stay on the track structure on the cross ties and avoid the rail car overturning. This type of rail has been used since the 1800s primarily on bridges and other high-risk locations.[174]

Guthrie's Recommendations to the Port. On the tracks entering the VEDT site, Mr. Guthrie recommended guardrails from the switch to beyond the six-degree curve-out. The Port followed that recommendation in its installation of the tracks entering the VEDT that will serve entering crude oil trains and also instituted a 10 mph or less speed limit. In addition, the rail around the Port site is installed in a continuous ribbon instead of having bolted joints.[175] In his over 50 years of experience, Mr. Guthrie has never seen an incident where a guardrail did not perform the way it is supposed to.[176] Mr. Guthrie said that track construction at the VEDT site was excellent, and equivalent to mainline construction, "it's far superior, exceeds anything that I've seen in any other industry track."[177] He concluded it was unlikely there would ever be a derailment at the Port site.

Guthrie's Assessment of Risk of Derailment at the VEDT. Mr. Guthrie characterized the risk of derailment at the Port as very low, based primarily on modeling of forces trains would put on the Port track, including the looped portion.[178] He noted that the connection and loop track would be constructed to exceed mainline Class 3 standards, that guardrails between the main line and the trench will significantly reduce risk of rail car

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[172] Tr. 1558-59, vol. 7.
[173] Tr. 1561-62, vol. 7.
[174] Tr. 1562, vol. 7; Ex. 1043-000001-POR; Ex. 1044-000001-POR; Ex. 1045-000001-POR.
[175] Tr. 1576, vol. 7.
[176] Tr. 1571-72, 1575, vol. 7.
[177] Tr. 1577, vol. 7; PFT of Guthrie 13-14.
[178] Tr. 1558-61, vol. 7.

turnover and rollover, and that lubrication in higher degree curves will encourage proper car steering and reduce potential for wheel climb or rail wear.[179]

Mr. Guthrie also stated that proper maintenance will further increase the level of safety. In speaking with Port staff, Mr. Guthrie determined that the Port's standard maintenance protocols will ensure that: (1) track neutral temperatures will be periodically monitored; (2) the Connection Track will be maintained to a minimum Class 2 standard; and (3) track geometry will be periodically measured so that vehicle dynamic simulations can be performed if the track changes significantly over time.[180]

Robert Chipkevich's Evidence about Safety Deficiencies at a BNSF Rail Yard. The cargo unloading area of the VEDT is a rail yard. Rail safety expert Robert Chipkevich cited the 2015 Federal Rail Administration (FRA) Inspection Report of a BNSF yard in Vancouver.[181] The report noted 50 items of concern at a different rail yard at the Port, which he characterized as safety deficiencies rather than violations.[182] These safety deficiencies included improper fit between switch point and stock rail; insufficient fasteners in a track segment; worn or defective connecting rod fastening; turnout or track crossing fastenings not intact or maintained; no effective support ties within the prescribed distance from a joint; center cracked or broken joint bar; crossties not effectively distributed to support a 39-foot segment of track; loose, worn or missing frog bolts near a switch; improper fit between a switch point and a stock rail; unusually chipped or worn switch point. Mr. Chipkevich said that rail yards typically have more such deficiencies than mainline track because mainline tracks are more frequently maintained.[183]

Chipkevich's Testimony about Incidents in Rail Yards. Mr. Chipkevich described two accidents involving trains that were unattended in rail yards. In one incident, a handbrake wasn't set and the cars rolled out of the yard onto the mainline track before reaching speeds of 95 mph and derailing.[184] In a second incident, an air leak in a brake valve caused a brake failure and the locomotive rolled out of the yard, through seven grade crossings, hit ten vehicles, and reached speeds of 31 mph before hitting the vehicle that ultimately stopped it.[185]

Risk of Spills Associated with Crude Oil Unloading. As described above, crude from the tank cars is drained into piping that goes into storage tanks.[186] First, the rail cars are secured and a sufficient number of brakes are set so that the cars cannot move.[187] There will be

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[179] PFT of Guthrie 3-4.
[180] PFT of Guthrie 24.
[181] Ex. 3110-0001-13-VAN.
[182] Tr. 2432-33, vol. 10.
[183] Tr. 2390, vol. 10.
[184] Tr. 2405-06, vol.10.
[185] Tr. 2406, vol. 10.
[186] Tr. 333, vol. 2.
[187] Tr. 328, vol. 2.

a team of up to three people working each side of the unloading process.[188] The top of the rail cars have the vapor recovery system, while the bottom is where the crude oil is drained into the piping.[189] This is a closed loop system, so vapors are captured and left within the rail car or within the system itself.[190] There is cap that needs to be loosened, but the product will still not flow until the valve is shut off. Every operator will have a spill pan underneath to collect minor drips that occur in the unloading process.[191] The spill pan runs the length of five or six cars, and runs with a drain system to collect oil in case of a larger spill.[192] The H2S monitor will sound an alarm if it detects vapors.[193] Also, every employee has the authority to stop work at the specific work site or the VEDT, if a safety violation is observed.[194]

Risk of Spills from Derailed Trains at the VEDT. As described above, the speed of trains arriving on Port track would be reduced to 10 mph and to 5 mph once they enter the loop track area.[195] Christopher Barkan[196] stated that spill risks from stationary rail cars or those moving as slow as 5 mph would be limited. In such cases cars would not likely breach from lateral tip-overs, since the car shell would likely be strong enough to withstand the impact and bottom fittings and car heads would not be engaged. Unprotected *top* fittings in DOT-111s have failed such tests, but DOT-117s have protected top fittings, although testing has not been completed. Piping and hosing for cars engaged in unloading at the Port have automatic shut off valves.[197]

Summary of the Council's Analysis of Rail Operations at the VEDT. Deficiencies at rail yards have the potential to occur, as noted in testimony about areas of concern at the BNSF yard described in the 2015 FRA report and in Mr. Chipkevich's testimony about two incidents in rail yards.[198] This evidence was not specifically rebutted by Tesoro Savage. However, no historic examples or hypothetical scenarios specific or similar to conditions at the VEDT or the Port and proposed site operations were presented. Mr. Guthrie's assertions about the effectiveness of guardrails in the approach track, and the general safety provisions related to rail construction and maintenance at the Port is also unrebutted. The Council is also mindful of the evidence demonstrating that if a train derailed at the VEDT, it would be going at a slow speed.

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188 Tr. 332, vol. 2.
189 Tr. 333, vol. 2.
190 Tr. 336, Vol. 2.
191 Tr. 337, vol. 2.
192 Tr. 375, vol. 3.
193 Tr. 338, vol. 2.
194 Tr. 377, vol. 3.
195 Tr. 300, vol.2.
196 Professor in the Department of Civil & Environmental Engineering, as well as the Executive Director of the Rail Transportation and Engineering Center at the University of Illinois at Urbana-Champaign. He has a B.A. in Ecology and environmental studies, a masters and doctorate in biology. He was the Director of Risk Engineering at the Association of American Railroads. PFT of Barkan 1.
197 Tr. 4659-61, vol. 20.
198 Tr. 2390, vol. 10.

The total volume of crude oil proposed to be unloaded from trains at the terminal raises concerns about overall risk, but as described above, there are many safety features from spill pans to automatic shut off valves, to employees being able to stop work on their own authority.

Taken together, this evidence does not support a finding that the potential occurrence of an incident stemming from rail based activities at the VEDT or Port is other than remote. Thus, the Council will not move rail operations at the VEDT site into its balancing analysis in Section IV of this Order.

2. Rail Route Operations

Rail traffic associated with the VEDT raises the potential for impacts to public health, safety, property, and the environment in four broad areas: derailments and accidents along the rail route, fire risks along the route, landslide risks along the route, and the temporary blockage of at-grade crossings.

a. Existing and Increased Rail Traffic

The Council first considers whether the VEDT will induce additional rail traffic. According to the ASC, the VEDT will be served by four inbound unit trains per day, each composed of 100 to 120 tank cars and each, approximately one mile long inbound trains per day, based on 1713 trips anticipated per year.[199] As explained above, a more accurate estimate is 4.7 rains per day. Tesoro Savage asserts it is unclear that the VEDT would add to existing rail traffic because the rail system is dynamic and fluctuates daily on the anticipated route. Existing rail traffic on the route already includes existing oil and hazardous materials train shipments. Tesoro Savage asserts that, even assuming an addition of four trains per day, the increase would not be significant because the total rail traffic on the route would still be within historical highs and lows, and estimated to increase in Washington by only 13 percent by 2040.[200]

Summary of the Council's Analysis of Rail Traffic Increases. The Council sees nothing in the record to support Tesoro Savage's assertion and is convinced it is incorrect. To the contrary, the Council determines from the evidence that an additional 4.7 incoming train trips per day on average will be generated by the VEDT, which is the ASC's estimate of 1713 trains annually divided by 365. This is slightly below the application's estimated intake of 360,000 bbl of crude daily, which the record suggests would likely require 4.7 trips per day.[201] We consider new rail activity generated by the VEDT to be an added impact, as Tesoro Savage confirmed that existing rail traffic will not be displaced.[202] The additional 4.7 inbound

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[199] Ex. 0001-000740-PCE.

[200] PFT of Kaitala 3.

[201] One hundred ten tanks cars (Tr. 1530, vol. 7; PFT of Hack 8), each carrying below maximum capacity in order to meet loaded car weight limits in the face of new heavier safety features, potentially 660-670 bbl per car. Tr. 1645, vol. 7. 360,000/110/670 = 4.9.

[202] Tr. 1539, vol. 7.

trips per day would result in an approximate tripling to quadrupling of inbound CBR unit trains on the route compared to current levels estimated by BNSF.[203] Based on Tesoro Savage's single day count of existing trains, this would also represent a potential 29 percent increase in the number of all current inbound trains, and a 25 percent increase in the average length of trains.[204] The Council believes that regardless of fluctuations in other rail traffic on the route, new traffic generated by the VEDT is a significant added impact because it represents an estimated increase of 283 percent to 430 percent in the number of inbound unit trains carrying Bakken crude oil or bitumen on the rail route compared to the current 10 to 18 per week estimated by BNSF.[205]

b. Rail Cars, Tracks, and Equipment

The Council next considers the causes of derailments, the efficacy of track inspection and monitoring to prevent derailments, and the ability of various tank car models to withstand the forces of a derailment.

Track conditions as a leading cause of derailments. Robert Chipkevich is the Principal of Chipkevich Safety Consulting Group and past head of several programs at the National Transportation Safety Board (NTSB), including Accident Investigation, Pipeline Accident Investigation, and Railroad Accident Investigation.[206]

Mr. Chipkevich explained rail accident data provided in an FRA accident report.[207] He testified that track conditions are the most frequent source of derailments.[208] From 2012 to 2015, BNSF track has been involved in 491 mainline rail accidents nationally, second to Union Pacific Railroad's 599 accidents for the same time period.[209] From 2006 through 2015, FRA data for Class I railroads such as BNSF (excluding AMTRAK) identifies 2522 train derailments on main tracks with 780 of those derailments occurring on BNSF rail lines.[210] The FRA train derailment data identifies the leading causes of derailments assigned to track, roadbed, and structure related causes including broken rails attributed to detail fractures, irregular track alignment and wide gage, including defective or missing cross ties, spikes, or other fasteners.[211]

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[203] Ex. 3138-0003-VAN.

[204] Based on applicant's observed single day rail traffic inventory provided in Exhibit 0114-000062-TSS identifying 16 trains averaging 91 cars on 3/30/16 at the 6th Street crossing in Washougal.

[205] City of Vancouver's Closing Br. 17; Ex. 3138-0003-VAN.

[206] Mr. Chipkevich is a rail safety expert with a Bachelor of Science in business with a major in transportation. He has taken numerous transportation and accident reconstruction courses at the Transportation Safety Institute, has written on the topic of rail accidents, has provided testimony before committees and subcommittees of the United States Congress on rail safety, pipeline safety, and hazardous materials safety issues numerous times, and has provided testimony before state lawmakers. PFT of Chipkevich 1-6.

[207] Ex. 3109-0001-0014-VAN.

[208] Tr. 2367, vol. 10.

[209] Tr. 2401-05, vol. 10; Ex. 3109-0001-0014-VAN.

[210] PFT of Chipkevich 19.

[211] PFT of Chipkevich 19; Ex. 3109-0006-0014-VAN.

Most of the inbound route serving the proposal in Washington is FRA Class 4 track.[212] Mr. Chipkevich stated that FRA Class 4 track was involved in most U.S. and Canadian crude oil and ethanol spills since 2006,[213] and slightly less than half (693 of 1634) of general freight accidents nationally from 2012-2015.[214]

Landslides as a cause of derailments. Timothy J. Walsh has been the Assistant State Geologist at Washington Department of Natural Resources since February 2015.[215] Mr. Walsh stated that the Columbia River Gorge is among the most landslide prone areas in the state and that significant portions of the BNSF tracks in that area are built atop past landslides,[216] which indicate the likelihood of a recurrence.[217] Such landslides could involve fast moving land that can derail trains, or slow moving land (as slow as 50 centimeters over four years) that can cause track distortions or stresses.[218]

The ability of inspections and monitors to identify potential problems on the rail line. Tesoro Savage highlights the quality and maintenance of the rail track. Dava Kaitala, the General Director of Construction Permitting at BNSF, stated that 99.99 percent of hazardous material tank cars shipped on BNSF tracks arrive without incident[219] and that in 2015, BNSF invested $189 million on track improvements in Washington.[220]

BNSF visually inspects tracks four times per week, twice what the FRA requires, and at least five to six times per week in the Columbia River Gorge.[221] BNSF also uses a high rail vehicle, which has both tires that run on streets and special steel tires that look like those on a train. The vehicle can move along the track and check track geometry to ensure the track is level. At the same time, it puts pressure down and outward to mimic the pressure of the train to check that the gauge is not being impacted.[222] This vehicle is used on main line routes every 30 to 50 days on average to measure rail gauge, cross level alignment, and vertical acceleration using ultrasonic rays.[223] Wayside monitors at fixed locations along the track check freight cars for potential defects in wheels, bearing temperature, brakes, draft gear, and truck components.[224] Approximately 90 percent of the route west of Spokane is projected to be signal territory. This means that a train dispatcher in a remote location can see if something is

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[212] Ex. 0123-000009-10-TSS.
[213] Tr. 2418, vol. 10.
[214] Tr. 2401-05, vol. 10.
[215] PFT of Walsh 1.
[216] Tr. 3351, vol. 14.
[217] PFT of Walsh 3.
[218] Tr. 3373, 3369, 3371, vol. 14.
[219] PFT of Kaitala 13.
[220] Tr. 1485, vol. 7.
[221] Tr. 1485-87, vol. 7.
[222] Tr. 1488, vol. 7.
[223] PFT of Kaitala 4-5.
[224] Ex. 0113-000010-TSS.

wrong, whether a train has moved, if a car has come on to the track, or if the track has been disturbed.[225]

Opponents challenged the effectiveness of track inspections for uncovering potentially consequential defects. In Vancouver, Mr. Chipkevich observed several split crossties in a row at one grade crossing on the mainline track.[226] Mr. Chipkevich testified that track inspections do not guarantee that a derailment won't occur. There is also no guarantee that when "there's a defect in a rail that isn't identified" that "it won't grow to critical size and failure before the next inspection."[227]

Failure to find defects has been identified by the NTSB in several accidents nationally. Poor rail surface conditions can cause ultrasonic testing to miss internal detail fractures that can grow under train loads and cause failure once they reach critical size.[228] Mr. Chipkevich cited four examples of train accidents involving significant spills, evacuations, fatalities, or fires that were triggered by detail fractures on tracks that had been ultrasonically tested days or weeks prior. The NTSB found that these track fractures had been undetectable because of rail conditions and/or the size of the fracture. In the most recent of these examples, a 2014 oil train derailment, involved a reverse detail stress fracture of 5 percent, a size previously not considered to be a defect subject to complete failure.[229] Mr. Chipkevich gave examples of oil train derailments and spills: one in South Dakota was attributed to broken rail with documentation of detail fracture; in West Virginia, a railhead split went undetected; and most recently, in Oregon, an accident was attributed to broken lug nuts.[230]

Tank car improvements. Longstanding legacy DOT-111 tank cars that have been used to transport oil, ethanol, and other materials with 7/1-inch thick tank shells are required by federal law to be phased out in 2018.[231] Newer CPC-1232 cars, developed by the rail industry in response to ethanol accidents, with 1/2-inch shells and protected valves, must be phased out in 2020 (or 2025 if they are jacketed).[232] The new tank car standard, DOT-117, requires 9/16-inch shells using enhanced steel, 11-guage thickness jacketing around the shell, head shielding, and provisions for thermal protection including a modified bottom outlet valve. Existing DOT-111 and CPC-1232 tank cars can also be retrofitted to meet this standard as 117Rs with their existing 7/16 or 1/2-inch thick shells using existing steel if they include the other features.[233] High hazard flammable unit trains, such as those servicing the VEDT, are required to use electronically controlled pneumatic braking systems by 2021, unless an

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225 Tr. 2130-31, vol. 9.
226 Tr. 2391-92, vol. 10; *see also* Ex. 3003-000001-04-VAN.
227 Tr. 2382-83, vol. 10.
228 PFT of Chipkevich 19-22.
229 PFT of Chipkevich 19-22.
230 Tr. 2382, 2442, vol. 10; Tr. 2487, vol. 11.
231 PFT of Chipkevich 24, Tr. 1625, vol. 7.
232 PFT of Chipkevich 24, Tr. 1626, vol.7.
233 PFT of Hack 9-12.

upcoming Pipeline and Hazardous Materials Safety Administration (PHMSA) study finds them unnecessary.[234]

Tank car improvements will improve safety,[235] but there is disagreement about the extent of the improvement that is possible. For example, the CPC-1232 rail car model was introduced in 2011. Although its improvements were touted as adequate, cars still breached when derailed causing several recent spill incidents.[236] The PHMSA estimates that the DOT-117 model will only provide a 21 percent total risk reduction over the unjacketed CPC-1232, and only a 10 percent risk reduction over the jacketed CPC-1232.[237] DOT-117s have a puncture velocity of only 12.3 miles per hour, a speed well below that at which releases have occurred.[238] DOT-117s are only designed to withstand pool fires[239] of up to 100 minutes and torch fires up to 30 minutes.[240] Mr. Chipkevich noted that chlorine tank cars with 3/4-inch shells similar to the DOT-117 model punctured in accidents in South Carolina and Texas.[241]

Opponents claim that only six field tests were conducted on the DOT-117 models, in part because of the rush to review the new tank car design.[242] Opponents also question the actual implementation of the DOT-117 model, noting there is currently a backlog from suppliers.[243] Federal law allows retrofitted DOT-111 and CPC-1232 tank car models to qualify as DOT-117s. Tesoro Savage's new commitment to only use new DOT-117 models may not be permanent, but only as long as its use of that model rail car remains economically competitive.[244]

Summary of the Council's Analysis of Rail Cars, Tracks, and Equipment. The Council is persuaded that track conditions are a frequent source of derailments and that BNSF track has been involved in a reasonably large number of mainline rail accidents nationally. Landslides that can derail trains or deform tracks also pose a specific risk to trains running through the Columbia River Gorge.

While BNSF has a well-developed system to inspect and monitor to identify potential problems, the evidence shows that even with track inspections, derailments are expected. Failure to find defects has been identified by the NTSB as a cause of rail accidents nationally, sometimes resulting in significant spills, evacuations, fatalities, or fires.

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[234] Tr. 1661, vol. 7.

[235] Tr. 2394, vol. 10.

[236] Mosier, OR; Gogama, Ont.; Galena, IL; Mount Carbon, WV, Lynchburg, VA. PFT of Chipkevich 25; PFT of Millar 8.

[237] PFT of Chipkevich 26.

[238] Ex. 5547-000119-CRK; Tr. 4714, vol. 20.

[239] A pool fire is a fire on a pool of liquid, like an oil pool. It is a two-dimensional fire. Tr. 635, vol. 3.

[240] Tr. 4737, vol. 20; Tr. 5139, vol. 22; Tr. 2398, vol. 10.

[241] Tr. 2398, vol. 10.

[242] PFT of Millar 19.

[243] PFT of Chipkevich 25.

[244] Tr. 5139, vol. 22.

While tank car shells, valves, and brakes are improving over time, those improved tank cars still derail and cause spill incidents. According to the PHMSA, the DOT-117 model only provides a 21 percent total risk reduction over the unjacketed CPC-1232, and only a 10 percent risk reduction over the jacketed CPC-1232. DOT-117s have a puncture velocity of only 12.3 miles per hour and are designed to withstand pool fires for only up to 100 minutes and torch fires for up to 30 minutes. Tank cars with ¾ inch shells similar to the DOT-117 model have punctured in accidents.

c. Rail Route Accident Risk and Consequences

The Council next considers the risk of rail accidents along the route and the consequences of such accidents if they occur.

Route. As described above, the VEDT would receive an average of 360,000 bbl of crude oil every day delivered by 4.7 incoming trains per day, each carrying up to 120 fully loaded tank cars to Washington; through cities and over land from the border of Washington, through Spokane, the Tri Cities, and on to Vancouver, passing through many cities and communities on the way. The trains will also pass through some of the most fire-prone areas in Washington.[245] Tesoro Savage chose this route for economic reasons, so that the crude oil trains could avoid the significant grades over mountain passes.[246]

Risk of Inbound Derailments and Spills on the Main Rail Route. The Council agrees with Tesoro Savage that Dr. Barkan's analysis is the only probabilistic model in the record specific to the proposal, and uses it a starting point. We also consult the larger record and in particular CBR accident history, as we note PHMSA's analysis that crude oil unit trains may derail more frequently and with greater severity than other trains.[247]

Dr. Barkan's probabilistic analysis of derailment frequency and spill size. Dr. Barkan, Professor of Civil and Environmental Engineering at the University of Illinois at Urbana-Champaign,[248] testified that his analysis projected that an assumed average of four daily incoming trains to the VEDT composed of 118 tank cars meeting DOT-117 or higher standards would result in the following:

- A loaded inbound train derailment once every 2.4 years on average somewhere on the Washington route, with 12.7 tank cars derailing on average.
- Release of crude oil of some amount on the Washington route once every 6.4 years.
- A medium-sized crude oil release of 30,000 gallons or more on the Washington route every 23 years.

[245] Tr. 3392-93, vol. 14.
[246] Tr. 1540, vol. 7.
[247] Ex. 3058-0024-VAN.
[248] He also serves as Director of the Rail Transportation and Engineering Center at the University. Dr. Barkan provided an analysis of the probability of derailments. PFT of Barkan 1.

- A large release of 92,000 gallons on the Washington route every 110 years.
- At single locations, accident probabilities vary, but on average, a single mile-long segment of the Washington route would experience a medium spill once every 9,000 years, and a large spill every 42,500 years.[249]

Dr. Barkan's derailment estimates were derived first from historical national rail accident data for general freight trains from 2005 to 2009. His data was taken from a combination of historical FRA accident data and railroad industry proprietary databases, which are not publicly available, so Mr. Barkan was unable to show complete data, although some of it is available in summary form. The FRA database contains comprehensive information on a range of variables associated with derailment, including the FRA track class where a derailment occurred, the speed of the derailment, the number of cars that derailed, and the number of hazardous materials cars, including the number of hazardous materials cars that derailed and released.[250] This initial national derailment rate is then adjusted to account for the FRA class for the Washington route, the presence of wayside signalization, and the density of train traffic on the route, three factors that Dr. Barkan concluded correlated closely with derailments in other studies.[251] The derailment rate was then reduced by approximately 37 percent to account for the overall historic trend of declining derailment rates since 2009.[252]

Dr. Barkan's analysis of rail car performance was based on the Railway Supply Institute Association of American Railroads tank car accident database; on structural dynamic modelling; and on U.S. Department of Transportation physical testing.[253] Dr. Barkan estimated that new tank car features in DOT-117J tank cars (similar to DOT-120 tank cars) reduce the probability of oil release 85 percent from those of unjacketed DOT-111s. He emphasized the importance of thermal insulation and appropriately sized pressure relief valves in making secondary thermal failures of tank cars much less likely after an initial derailment.[254] Dr. Barkan said his estimates may overstate actual risk, as they do not account for the fact that overall freight derailment rates have declined nationally since 2009, or the fact that BNSF's derailment rates are better than the national average. Also, he pointed out that BNSF is implementing additional safety improvements.[255] He also notes that government and industry studies over the past three decades have found no added safety impacts from potential internal movement or "sloshing" of oil within tank cars.[256]

Dr. Barkan pointed to university research that did not suggest that the unit train derailment rates differed significantly from other types of freight trains. He said that research

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[249] PFT of Barkan 5-6, 10.
[250] Tr. 4581, 4673-74, vol. 20.
[251] Tr. 4585, vol. 20; Ex. 0123-000011-TSS, Figure 4.
[252] Supplemental PFT of Barkan 2.
[253] Tr. 4582, 4595, vol. 20.
[254] PFT of Barkan 8.
[255] PFT of Barkan 12.
[256] Tr. 4604, vol. 20.

on the topic continues “but the increased incidence of crude oil unit train derailments in recent years was more likely the result of the enormous (more than 40-fold) increase in petroleum crude oil traffic since 2009. The substantial growth in this traffic meant that these trains were exposed to greater potential involvement in accidents.”[257] He concluded that there was no evidence that unit trains carrying crude oil were themselves inherently less safe than other types of trains, just that there were many more of them operating. Further, Dr. Barkan said that high profile incidents occurring under different circumstances than exist along the Washington BNSF route should not be considered comparable. He felt it incorrect to apply those circumstances to rate estimates for such routes that have higher quality infrastructure and other attributes that make accidents less likely.[258]

The Opponents criticized Dr. Barkan’s analysis and argue that his data sources and computations were not available for verification and that his use of general rail freight accident data to derive CBR derailment projections is contrary to PHMSA analyses. They further argue that CBR trains may be more likely to derail, and involve more cars when they derail, than other trains.[259] Dr. Barkan projected a spill of 92,000 gallons on the route once every 110 years and a worst-case spill of 840,000 gallons once every 20,000 years. In fact, Opponents argue, from 2006 to 2015, 13 crude and ethanol accidents involving DOT-111 and CPC-1232 tank cars spilled an average of 457,738 gallon per accident. If a particularly large accident (Lac-Mégantic) is excluded, the remaining 12 accidents each released an average of 364,216 gallons of product per accident.[260] Opponents criticize Dr. Barkan’s projection that, in a third of the tank car releases, less than 5 percent of a tank’s contents will be spilled, pointing out that in crude and ethanol accidents since 2006 the average release per car was 21,000 gallons.

Dr. Barkan’s analytical methodology for estimating derailments raises concerns. The primary concern is his use of modelling assumptions rather than accident data related to crude oil trains to estimate that the Washington route is three times less likely to produce derailments than elsewhere,[261] an assumption not claimed in BNSF testimony. Dr. Barkan provided no numeric data in support of his estimate that the accident rate on the Washington route is three times less than elsewhere. Dr. Barkan’s analysis also did not address any train accidents associated with the proposal occurring outside of Washington, or accidents within Washington involving empty trains on return routes.

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[257] PFT of Barkan 12.

[258] PFT of Barkan 12, 13.

[259] PFT of Chipkevich 11 (citing PHMSA Draft Regulatory Impact Analysis, at 24 (July 2014)): “There is reason to believe that derailments of [High Hazard Flammable Trains] will continue to involve more cars than derailments of other types of trains. There are many unique features to the operation of unit trains to differentiate their risk. The trains are longer, heavier in total, more challenging to control, and can produce considerably higher buff and draft forces which affect train stability. In addition, these trains can be more challenging to slow down or stop, can be more prone to derailments when put in emergency braking, and the loaded tank cars are stiffer and do not react well to track warp which when combined with high buff/draft forces can increase the risk of derailments.”

[260] PFT of Chipkevich 27.

[261] Tr. 4755, vol. 20.

The Council has several other concerns with Dr. Barkan's analysis of derailment frequency. First, Dr. Barkan's methodology does not account for risk factors of the Washington route such as track grade or curvature, crossing signals, the risk of landslides, and BNSF routing practices such as the potential use of Union Pacific rail lines in Oregon to serve the VEDT.[262] Second, the three variables he uses to arrive at his assumption that the Washington route is three times safer than other routes are not supported by the record. Third, his assumption that increased density of other rail traffic reflects increased safety is contradicted by the PHMSA, which cites increased density as a factor reducing safety as it may result in increased wear on track and cars between maintenance.[263] Fourth, while his assumption that FRA class track and wayside signalization increase safety is certainly reasonable, the comparative advantage of the Washington route may be modest as the record indicates 80 percent of U.S. track had wayside signals by 2008,[264] and Oppenents' assertions that most recent national CBR accidents have occurred on Class 4 track was unrebutted. Fifth, Dr. Barkan's reduction of the projected derailment rate by 37 percent to account for a national trend of lower freight derailment rates may be a double counting, to the extent that this trend has been driven by upgrades in FRA rail class, wayside signalization, or increased traffic density.

The Council does not believe the record supports Dr. Barkan's contention that his derailment rate projection is conservative. Some factors he cites as further reducing risk have already been incorporated into his model, and his assertion that BNSF has a better-than-average derailment rate appears contradicted by the record.[265] Dr. Barkan's projection that derailments will involve an average of 12.7 tank cars appears reasonable. It is approximately half way between the historical average of 18 derailed cars in the recent North American crude and ethanol accidents listed by Opponents, and the future U.S. projection of five by PHMSA. As Dr. Barkan notes, his estimate of derailment severity is impacted by the length and speed of trains serving the terminal.[266]

Dr. Barkan's opinion about the *derailment* rate of trains serving the VEDT is similar to others in the record, projecting one inbound train derailment in Washington every 2.4 years on average. These are similar to PHMSA's national projection, which when interpolated to the

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[262] Tr. 4679-80, 4718, vol. 20.

[263] Ex. 3058-0022-VAN.

[264] Ex. 0239-000004-TSS.

[265] The overall trend of lower general freight derailment rates is already considered in Dr. Barkan's 37 percent reduction in 2005-09 accident rates. Supplemental PFT of Barkan 2. The Liu study of U.S. freight derailment rates found "statistically identical" derailment rates among the four Class I freight railroads. Ex. 0240-000006-TSS.

[266] PFT of Barkan at 9-10; Ex. 3089-0004-VAN elaborates: "Because of the speed difference, higher track classes tend to have more cars derailed. Data from the FRA Rail Equipment Accident Database from 2000 to 2014 were used to calculate the average number of railcars derailed per freight train derailment on Class I railroad mainlines. It was found that, on average, a freight train derailment caused by a broken rail on track of higher classes (Class 3 to Class 5) caused 16 railcars to derail, whereas approximately nine railcars derailed on track of lower classes, Classes 1 and 2."

train-miles involved in this proposal would project that without further safety improvements one inbound derailment would occur in Washington every 1.2 years.[267] Dr. Barkan's projection of a derailment every 2.4 years would become 1 every 2 years if a more appropriate input of 4.7 instead of 4 daily trains serving the terminal were used.

However, the Council does not find Dr. Barkan's projections for the *amount of crude oil released* from derailed cars to be reasonable, as they are unsupported by the record, and in some cases contrary to the record:

- Dr. Barkan projected an oil release of some size would occur every 6.4 years, or one release per 2.8 derailments, but he provided no supportive data or anecdotal evidence about how often oil or other hazardous material unit trains have derailed without release in practice. This omission is troubling because he states that he had access to industry accident data, which he described as including these very type of incidents.[268]

- Dr. Barkan projected that derailments of 12.7 cars every 2.4 years on average would lead to a 92,000 gallon or larger spill only once in 110 years. This means that he predicts that only one out of 17 future spills would involve release of more than one quarter of the total contents of the derailed tank cars.[269] In recent crude and ethanol accidents listed by Opponents almost 2/3 (16 of 24) of the incidents involved release of more than a quarter of the derailed tank car contents. By this measure, Dr. Barkan projected future tank cars will perform ten times better than they have actually performed in recent incidents.[270]

- The Council is convinced that new tank car design will almost certainly improve accident results, but observes that Dr. Barkan projects individual tank car risk reductions that are almost twice as large as those estimated by FRA and PHMSA in the final rule documentation requiring those tank designs. He estimates individual DOT-117 tank cars are 83 percent less likely to release than unjacketed DOT-111s and 35 percent less likely to release than jacketed CPC-1232s.[271] PHMSA and FRA assume risk reductions of 50 percent and 16 percent, respectively.[272] Dr. Barkan does not explain why his risk reductions differ so significantly from PHMSA's. The

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[267] Ex. 3058-0024-VAN projects 207 derailments from 17,944,447 carloads through 2034, an average of one for every 86,495 carloads. The terminal is anticipated to accommodate 188,430 carloads annually (1713 annual trains x 110 cars). Adjusting for the fact that the 385 mile Washington route is shorter than the 1000 mile average CBR trip estimated by Dr. Barkan (Tr. 4743, vol. 20) yields a return of one derailment every 1.2 years.

[268] Tr. 4643-44, vol. 20.

[269] One release every 6.4 years over 110 years = 17.1 releases. 12.7 train cars containing 670 bbl = 357,378 gallons.

[270] PFT of Chipkevich 12-13.

[271] PFT of Barkan 6.

[272] Ex. 3067-0111-VAN.

Council also observes that at least five of the most recent spills (Mosier, Gogama, Galena, Mt. Carbon, and Lynchburg) involved newer CPC-1232 cars which are considerably closer to the DOT-117 cars in estimated risk profiles than the older DOT-111 cars, yet the 1232 cars still failed in significant numbers, averaging 209,000 gallons per spill. In fact, the Mosier incident involved *jacketed* CPC-1232 tank cars, which Dr. Barkan described as similar to and a certain class of DOT-117Rs.[273]

- Most curiously, Dr. Barkan projected significant future improvements in the performance of derailed tank cars even without design improvements. He projected that hypothetical continued use of non-jacketed DOT-111 tank cars would result in one spill of 92,000 gallons or more once every 13 years on the Washington route.[274] The record indicates that since 2006, from significantly fewer shipments than the Vancouver terminal would receive in 13 years, there have been four national oil spills of this size, some involving safer jacketed DOT-111 and CPC-1232 tank cars. There have also been four Canadian oil and five U.S. ethanol spills of this size during this time.[275] It is unclear what factors other than tank car design would lead to such large reductions in spills from the derailed cars. While track infrastructure and operation of the Washington route could impact the type of derailments that occur, as Dr. Barkan observes factors lowering derailment probability on the Washington route such as FRA class allow for higher speeds which likely increase derailment severity.[276]

- Dr. Barkan may underestimate the full volume of oil proposed to be delivered to the terminal. He states that the proposal would only have a fraction of the exposure of the recent national CBR activity, but the record indicates somewhere in the range of 1.8 million crude carload shipments originated in the U.S. in the decade prior to the adjudication, a figure the terminal is anticipated to double over the course of its assumed 20 year lifespan.

Because of these concerns about Tesoro Savage's view of the probability and consequences of oil train spill events, the Council is left with considerable doubt about the Proponents' estimates of likely spill sizes. We believe a more defensible alternative estimate, as supported by the record, is available through the recent crude oil and ethanol accident history, where an average of 51 percent of derailed tank car contents were released (46 percent if only U.S. incidents are considered). This would eliminate the potentially anomalous release

[273] Tr. 4697, vol. 3; Tr. 4697, vol. 20.

[274] PFT of Barkan 6.

[275] Dr. Barkan's assumptions result in 2.2 million (4 x 365 x 118 x 13) CBR carloads arriving at the terminal in 13 years of full operation. PHMSA indicates approximately 1.3 million U.S. CBR carload shipments originated from 2006 through 2014 (Ex. 3067-0285-VAN), and U.S. annual shipments have declined 2/3 since (Tr. 3254, vol. 14) suggesting a maximum 1/2 million U.S. shipments in 2015 and the first half of 2016 combined.

[276] PFT of Barkan 9-10.

size as was involved in the Lac-Mégantic incident. Applying the latter to Dr. Barkan's estimated average derailment of 12.7 tank cars yields an average spill of 165,013 gallons. A further reduction of 50 percent to account for safety improvements attributable to use of DOT-117 tank cars as estimated by PHMSA results in a projected average spill of 82,500 gallons. This estimate is similar to PHMSA's projected average spill size of 83,602 gallons per mainline derailment nationally based on CBR accident history.[277]

The Opponents' Analysis of Accident History Data. Rail safety expert Robert Chipkevich cautioned that it is critical to focus on accident history and data from "real world" experience accumulated for trains transporting large volumes of crude oil and ethanol oil in tank cars to appropriately understand the risks presented by High Hazard Flammable Trains. Opponents emphasize CBR accident history, noting that previous non-CBR studies by the NTSB found that more CBR accident history was needed to reveal rail risks. In 1971, the NTSB issued a Special Study on Risk Concepts in Dangerous Goods Transportation. The NTSB noted that it was not until accident experience began to accumulate that the change in risk became evident.[278] The NTSB study made two key findings, broadly stated as follows:

Shippers and carriers convinced regulators to incorporate new, larger containers based on their feasibility to industry, rather than any testing to assess changes in risk levels from the larger containers. Because of this, when accidents occurred, they were not particularly noted until the accident experience began to accumulate and changes in the levels of accidents became evident.

Regulatory changes to increase economies of scale allowed liquefied petroleum gas tank car size to increase three-fold and the external insulation to be eliminated. Although safety valve capabilities were allegedly increased to compensate for removal of the insulation, no operational requirements were adopted. This enabled jumbo cars to be put into service in great numbers and moved in multiple-car shipments. The use of jumbo cars has produced accidents of a much larger scope. Fire fed by the contents of one of the jumbo cars rapidly heats up the contents of the adjacent cars. This causes pressure increases that exceed the capacity of the safety valves resulting in subsequent explosive ruptures and fires of far larger proportions. Losses in such events have greatly increased compared to losses involving the smaller cars. In this way, regulatory decisions unknowingly resulted in an increase in risk levels.[279]

Mr. Chipkevich provided a listing of 24 crude oil and ethanol train incidents involving release of tank car contents in the United States and Canada since 2006, taken from NTSB, PHMSA, FRA, and Transportation Safety Board of Canada reports. He noted that almost 3/4 (71 percent) of total tank cars involved in the incidents released oil, 442 tank cars derailed and 314 tank cars released cargo. The average number of cars derailed in the 24 accidents is

[277] Ex. 3058-0034-VAN.
[278] PFT of Chipkevich 7.
[279] PFT of Chipkevich 7-8 (citing Special Study, Risk Concepts in Dangerous Goods Transportation Regulations, NTSB, at 7 (1971)).

18.4 and the average number of cars that breached is 13. A total of 6,498,602 gallons of product were released in the 24 accidents. The average release per accident was 270,775 gallons, which is the equivalent of about 30 gasoline cargo tank trucks. Ten of the 24 accidents had releases of 245,336 gallons or greater, the equivalent of 27 gasoline cargo tank trucks.[280] Seventeen of the 24 incidents occurred at speeds of 40 mph or less, eight at speeds of 25 mph or less, and two at 10 mph or less.[281] Twenty of the 24 train derailments (83.3 percent) resulted in a fire.[282]

PHMSA's Predictions of a High Consequence Event. The record provides substantial evidence that the new VEDT trips, regardless of existing rail traffic, are at risk of generating a high consequence event somewhere along the rail corridor simply due to the projected increased number of rail trips. PHMSA described various near misses that have occurred in crude and ethanol transport accidents nationally to date,[283] and calculated that, although unlikely, damages as high as $6 billion "could occur when a substantial number of people are harmed or a particularly vulnerable environmental area is affected."[284] PHMSA stated that it is reasonable to assume events of the magnitude of Lac-Mégantic may occur in the United States, and that costs and fatalities could be several times greater in a worst-case scenario.[285] Proponents argue, appropriately in the Council's view, that the operational circumstances involved in the Lac-Mégantic event will not be replicated, but as PHMSA notes, Lac-Mégantic is a small town with lower population density than the average density in urban and rural areas within ½ kilometer of the U.S. rail network used by crude oil and ethanol carriers. PHMSA identifies population density as an important and frequently used consideration in assessing hazardous material shipment risks.[286] Mr. Barkan testified that he conducted population density studies in the past.[287] PHMSA projected that, absent further safety improvements, there will be 15 mainline derailments for 2015, falling to a prediction of about 5 mainline derailments by 2034 for a total of 207 derailments nationwide over 20 years. In addition, based on population densities along mainline track nationwide, PHMSA further projected that the United States would experience between zero and 10 high consequence events, each with over $1.15 billion in total environmental damages and monetized injury and fatality costs exceeding $5.75 billion and 49 fatalities, over 20 years. PHMSA also projects one event exceeding $5.75 billion with 245 fatalities.[288]

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[280] PFT of Chipkevich 13.

[281] Tr. 2393, vol. 10.

[282] PFT of Chipkevich 18.

[283] PHMSA states that if a Lynchburg, Virginia, derailment had occurred on the town rather than river side of the track, the trains may have hit a restaurant and caused multiple fatalities, even though only one car ruptured. A Vandergrift, Pennsylvania, derailment that punched a large hole in an industrial facility might have resulted in a violent release of ignited liquid killing local workers had it been carrying more easily ignited light, sweet crude (as Bakken crude has been described) instead of heavy crude. Ex. 3058-0038-VAN.

[284] Ex. 3058-0042-VAN.

[285] Ex. 3058-0037-VAN.

[286] Ex. 3058-0040-VAN.

[287] Tr. 4782, vol. 20.

[288] Ex. 3058-0004; Ex. 3058-0051-52.

PHMSA's nationwide projection has significant implications for this review, as VEDT is projected to generate 21 percent of the United States crude oil and ethanol tank car shipments on which PHMSA's projections are based.[289] Adjusting for the shorter length of the Washington route relative to the average national crude oil trip, PHMSA's methodology would project that without additional safety improvements, the VEDT would generate one higher consequence event with at least $1.15 billion in costs and at least 49 fatalities somewhere along the Washington route every 49 years.[290] It is unclear from the record how the population density over the full Washington route, including rural areas, compares with other crude and ethanol routes nationally, but the Council observes that there are 19 Washington municipalities on the rail route, including two of the four largest in the state. Extrapolating from Washington to the full rail route serving the VEDT suggests there would most likely be one high consequence event produced by the VEDT on average very 16 years. According to the 2014 Marine and Rail Transportation Study (Washington Study), which included not just Vancouver and Spokane, but also Kennewick, Pasco, Spokane Valley, Sprague, Ritzville, Lind, Hatton, Connell, Mesa, Lyle, White Salmon, Stevenson, North Bonneville, Washougal, Camas, Millwood, and Cheney, all cities on or near the inbound Washington route, every city will be placed at risk of fire and crude oil spill from a derailment. As of 2012, the population centers on the rail route account for a total population of 669,501.[291] (These numbers do not include unincorporated rural hamlets and Census Designated Places on the route, such as Wishram, WA, Dallesport, WA, and others.)[292]

Consistent with other portions of this Order, the Council first considered impacts generated by the VEDT in Washington, but then also considered the roughly 1200-mile rail corridor in Idaho, Montana, and North Dakota. For simplicity, we multiply projected Washington route impacts by 3 to approximate total route rail impacts. Dr. Barkan's projections of a derailment on the Washington route every 2.4 years and spill every 6.4 years equate to an inbound derailment approximately every 10 months and spill every 2.1 years over the full Project route.

The record contains no assessment of risks from derailment of empty trains on return routes, where potential impacts presumably include spill of diesel fuel from locomotives on the train. There is also no information on risks from train collisions or other train accidents not involving derailments, which FRA lists as accounting for 29 percent of all train accidents nationwide in 2015.[293]

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[289] 3,774,100 projected Vancouver tank carloads divided by 17,904,446 nationwide (Ex. 3058-0024-VAN, total carloads of Table B3) = 0.210.

[290] Vancouver share of national carload 0.210 x .385 (to account for 385 mile Washington inbound route vs. 1,000 mile national CBR average) = .081. .081 x 5 national high consequence incidents projected by PHMSA over 20 years = 0.404 high consequence events projected along Washington corridor in 20 years.

[291] Ex. 3088-0061-VAN.

[292] Ex. 3088-0061-VAN n.73.

[293] Ex. 3109-0009-VAN.

The implications of an accident. Emergency response consultant Greg A. Rhoads described accident implications. He said that derailed trains without any oil release pose little risk of fire or explosion after the initial event.[294] In Mr. Rhoads' opinion, derailments that result in a release of oil but no fire in the initial incident can sometimes escalate to fire if concentrations of flammable vapor accumulate and are ignited by nearby sources such as cutting, internal combustion engines, or smoking, but typically only if they are within a few feet.[295] Oil from a release will flow downhill like other liquids, and will continue to emit vapors when contained.[296] Also, spilled oil can be carried to adjacent bodies of water by the application of water for firefighting.[297] Mr. Rhoads recognized that crude oil vapors contain volatile hydrocarbons, which can have health impacts, but he felt that significant risks are typically limited to the immediate spill area and the initial moments after release. He said that exposure of responders to Barkan crude oil spills "is an issue of concern but [the spilled crude oil] is not typically found in concentrations which pose a significant risk outside of the immediate spill area and the initial few moments of release."[298]

Based on the record, the Council is convinced that most future oil spills stemming from derailments, other than the smallest, will involve fire. Consequences will likely vary depending on the location as well as the nature of the accident, response, and other factors. Opponents claim that the Mosier incident could have had a worse outcome if any of several factors had been different are unrebutted.

Probability of an Incident at a Specific Location. Tesoro Savage argues that the probability of any kind of an incident at any single point on the rail route is small and that, in the event a rail incident occurs, response capabilities are adequate to mitigate any resultant risk. However, in the event of a crude oil spill, response capabilities are limited, and at times completely unavailable. In support of this contention, Tesoro Savage provides no analysis that considers the whole Washington rail corridor to be used by the additional crude oil trains. In fact, the record has no evidence or suggestion that there are any locations along the corridor where the consequences from a fire or spill would be minor or modest. The record suggests large portions of the corridor would be particularly impacted as shown by the Washington Study.

Tribal Issues. The Washington Study also illustrates how tribal reservations and treaty ceded areas cover most of the route in the Columbia River Gorge and points east. It states that culturally important fishing, hunting and other activities are at risk from rail accidents, and access would be diminished from prolonged cleanup.[299] The Washington route includes long stretches of track running alongside the Columbia River and Sprague Lake, as well as

[294] PFT of Rhoads 19.
[295] PFT of Rhoads 21-22; Tr. 2168, vol. 9.
[296] PFT of Rhoads 22-23.
[297] Tr. 2160, vol. 9.
[298] PFT of Rhoads 22, 19-21.
[299] Ex. 3088-0066-68-VAN.

crossings of smaller bodies of water, in which an oil spill could have significant environmental consequences.

Public Health and Safety. Public health and safety impacts near population centers include not just impacts to persons and property from smoke, vapors, fire or explosion, but also potential drinking water contamination from spills. The Washington Study states that areas at risk on the route include water intakes along the Columbia River for Kennewick, Pasco, and Richland, as well as numerous wells and intakes at aquifers in inland areas. The Washington Study indicates that the Spokane region is served by a sole-source aquifer.[300]

Damage to Buildings. The record also contains evidence of derailed trains directly damaging adjacent buildings, illustrating the risks from multiple tank car derailments in urban areas without a spill or fire.[301] Homes are relatively close to the tracks in much of the Vancouver corridor,[302] and buildings are below the elevated track in Spokane.[303]

Rail Traffic Regulations. The record does not demonstrate that current or proposed rail traffic regulation will sufficiently mitigate rail risks associated with the proposal to a level where citizens are protected and environmental impacts are minimal. There are several unrebutted examples of oil or hazardous material train accidents caused by faulty track that had been recently inspected. However, the record is devoid of evidence that specific new regulations are being targeted at this apparent problem.[304] Tank car design is subject to new regulation, but the results are unproven. Opponents' argument that, because of the rush to finalize standards, DOT-117 tank cars have only been subject to six simulated accidents by federal regulators is unrebutted. Improvements in puncture velocity are still well below the speeds at which most actual oil train rail accidents have occurred. Thermal protection and other improvements allows DOT-117 tank cars to withstand pool fires of 100 minutes or torch fires of 30 minutes, but the record clearly establishes that most oil train fires take considerably longer than this to bring under control. Improvements in pressure release devices lower the risk of tank car explosions or heat induced tears, but they also facilitate a release of vapors and oil, which might then become engaged by an explosion and fire.

Summary of the Council's Analysis of Rail Route Accident Risk and Consequences. Dr. Barkan's projection that one inbound train derailment will occur in Washington every 2.4 years on average is similar to PHMSA's national projection, which when interpolated to the train-miles involved in this proposal would project that without further safety improvements one inbound derailment would occur in Washington every 1.2 years. (Dr. Barkan's projection of a derailment every 2.4 years would become one every 2 years if a more appropriate input of 4.7 instead of 4 daily trains serving the terminal is used.)

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[300] Ex. 3088-0065-VAN.
[301] Ex. 3058-0038-VAN; Tr. 2406, vol. 10.
[302] PFT of Wechner 19-20.
[303] PFT of Hildebrand (City of Spokane) 9-10; Tr. 2539-40, vol. 11.
[304] Tr. 2443, vol. 10.

Dr. Barkan's projections of a derailment on the Washington route every 2.4 years and spill every 6.4 years equate to an inbound derailment approximately every 10 months and spill every 2.1 years over the full Project route.

Dr. Barkan's projection that derailments will involve an average of 12.7 tank cars also appears reasonable because it is approximately half way between the historical average of 18 derailed cars in the recent North American crude and ethanol accidents listed by Opponents, and the future U.S. projection of five by PHMSA.

However, Dr. Barkan's projection of the amount of crude oil would be released from derailed cars is unreasonable. He projected that a derailment in Washington would spill 92,000 or larger gallons only once in 110 years or in one out of 17 future spills. However, almost two-thirds of recent crude and ethanol accidents (16 out of 24) spilled more than a quarter of the derailed tank car contents. By this measure, Dr. Barkan projected future tank cars will perform ten times better than they have actually performed in recent incidents. Dr. Barkan also projects DOT-117 tank cars are 83 percent less likely to release crude oil than unjacketed DOT-111s and 35 percent less likely to release than jacketed CPC-1232s, but PHMSA and FRA assume risk reductions of 50 percent and 16 percent, respectively.

The Council believes there are more defensible alternative estimates that are supported by the record. For example, one method is to apply the average of 51 percent of derailed tank car contents being released to Dr. Barkan's estimated average derailment of 12.7 tank cars. This yields an average spill of 165,013 gallons. A further reduction of 50 percent to account for safety improvements attributable to use of DOT-117 tank cars, as estimated by PHMSA, results in a projected average spill of 82,500 gallons, which is similar to PHMSA's projected average spill size of 83,602 gallons per mainline derailment. Consideration of tank car releases in North America since 2006 suggests that actual releases could average 270,000 gallons.

The record provides substantial evidence that the consequences of a derailment and spill could be significant. Derailed trains without any oil release pose little risk of fire or explosion, but derailments with a release and no initial fire can escalate to fire. Released oil can flow downhill and emit vapors. Spilled oil can reach adjacent waterbodies, including by the application of water for firefighting. The Council is convinced that most future oil spills stemming from derailments, other than the smallest, will involve fire with consequences varying depending on the location and nature of the accident, response, and other factors. Damages could reach as high as $6 billion if a large population or particularly vulnerable environmental area is harmed. The VEDT is projected to generate 21 percent of the United States' crude oil and ethanol tank car shipments so adjusting for the length of the Washington route, the PHMSA's methodology would project that without additional safety improvements the VEDT would generate one higher consequence event with at least $1.15 billion in costs and at least 49 fatalities somewhere along the Washington route every 49 years and one high consequence event every 8-9 years somewhere along the full rail corridor to North Dakota. Even a lower consequence event will result in fatalities at a rate of .048 per mainline derailment, which when adjusted to this proposal, would project one fatality from a lower consequence event every 41 years on average in Washington and once every 15 years along the full route.

In the event of a derailment and spill, response capabilities are limited, and at times unavailable. The record suggests no locations along the corridor where the consequences from a fire or spill would be minor or modest. The record suggests large portions of the corridor would be particularly impacted. Every city and large numbers of people along the route will be placed at risk of a crude oil spill and fire. Public health and safety impacts include not only impacts from smoke, vapors, fire, or explosion, but also potential drinking water contamination from spills. Areas at risk include water intakes along the Columbia River for Kennewick, Pasco, and Richland, as well as numerous wells and intakes at aquifers in inland areas. Washougal and the Spokane region are each served by a sole-source aquifer. Tribal reservations and treaty ceded areas, and culturally important fishing, hunting, and other activities are at risk from rail accidents and prolonged cleanup. The Washington route includes long stretches along the Columbia River and Sprague Lake, as well as crossings of smaller bodies of water, in which an oil spill could have significant environmental consequences. Derailed trains can also directly damage adjacent buildings even without a spill or fire. Homes are close to the tracks in much of the Vancouver corridor, buildings are below the elevated track in Spokane,[305] and derailed trains can directly damage adjacent buildings without a spill or fire.

The record does not demonstrate that current or proposed rail traffic regulation will sufficiently mitigate rail risks associated with the proposal to a level where citizens are protected and environmental impacts are minimal. There are several unrebutted examples of oil or hazardous material train accidents caused by faulty track that had been recently inspected. But the record is devoid of evidence that specific new regulations are being targeted at this apparent problem. Tank car design is subject to new regulation, but the results are unproven. Opponents' argument that, because of the rush to finalize standards, DOT-117 tank cars have only been subject to six simulated accidents by federal regulators is unrebutted. Improvements in puncture velocity are still well below the speeds at which most actual oil train rail accidents have occurred. Thermal protection and other improvements allows DOT-117 tank cars to withstand pool fires of 100 minutes or torch fires of 30 minutes, but the record clearly establishes that most oil train fires take considerably longer than this to bring under control. Improvements in pressure release devices lower the risk of tank car explosions or heat induced tears, but they also facilitate a release of vapors and oil, which might then become engaged by an explosion and fire.

d. Rail Route Fire Risk and Consequences

The Council next considers the risks posed by rail-related fires along the route.

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[305] PFT of Hildebrand (City of Spokane) 9-10; Tr. 2539-40, vol. 11; PFT of Wechner 12.

Fire will likely result from a crude oil spill. Tesoro Savage acknowledges that if oil is released from a crude oil train, the result will likely be a fire. When asked to consider the probability of fire from a crude oil train that derails and releases product, Mr. Barkan testified that "if we spill petroleum crude oil, I think…there's a fair chance that there's going to be an ignition source which will lead to a fire."[306] Opponents' listing of recent accidents showed that fire resulted in 13 of 17 crude oil incidents. Fire resulted in half of the smaller CBR releases in the list of 30,000 or fewer gallons, the approximate contents of one full tank car. Two releases of less than 10,000 gallons did not involve fire.[307] Larger fires may include explosions, potentially including heat induced tears or in rare cases boiling liquid expanding vapor explosion events,[308] and subsequent fireballs. Proponents also acknowledge that a fireball from a single tank car could produce a radiant heat area within 2000 feet lasting 10 to 20 seconds, and larger fires could result in larger events.[309]

Topography and vegetation along the route increase the likelihood of fire. The record suggests topographic and vegetative conditions in large portions of rail corridor may increase the likelihood of fire or flammable vapors spreading. Unrebutted testimony indicates the route through much of Vancouver and the Columbia River Gorge is sloped parallel to the tracks, and fire is more likely to spread uphill. Much of the route in central and eastern Washington is dry in summer and fall months to the point that recent wildfires have been started not only by derailments, but also from wheel sparking and carbon emissions from normal train travel, and even from track maintenance activities.[310]

Properties of Bakken crude oil. Quoting U.S. congressional briefings, Mr. Chipkevich explained that "the properties of Bakken shale oil are highly variable, even within the same oil field. In general, however, Bakken crude oil is much more volatile than other types of crude. Its higher volatility may have important safety implications.[311] Tesoro Savage presented the testimony of emergency response consultant Greg Rhoads, Principal Consultant and President of Greg Rhoads & Associates, Inc., of Jacksonville, Florida, which is a full service health, safety, and environmental consulting company specializing in serving the chemical, petroleum, and transportation industry sectors.[312] He stated that North Dakota's requirements for preconditioning Bakken crude prior to loading onto trains lessen volatility from vapors. He opined that U.S. Department of Energy studies and statements from NTSB indicate that volatility of the oil is not a significant determinant of the degree of combustion that occurs in CBR accidents.[313] "The amount of fuel released, the surrounding infrastructure and environment, and the mechanical energy involved in a train derailment all play a large role

[306] Tr. 4779, vol. 20.
[307] Tr. 4779, vol. 20.
[308] PFT Rhoads 25.
[309] Tr. 2156-57, vol. 9.
[310] Tr. 3392-93, vol. 14.
[311] PFT of Chipkevich 18.
[312] Mr. Rhoads has 30 years of experience in the emergency services sector, however, none of his experience appears to be in the Washington or Oregon geographic area. PFT of Rhoads 2-3.
[313] PFT of Rhoads 13-14.

in the severity of the event."[314] Mr. Rhoads's opinion was that there was no single or driving factor in crude oil release fires in a derailment. Crude oil flammability is a function of several parameters in addition to volatility. Also contributing to flammability are factors such as flashpoint, flammable limits, and auto-ignition temperature. He pointed to a conclusion of NTSB Chair Christopher Hart in 2015 that "[t]he biggest contributor to a large explosion or fire is how much product is released, rather than the volatility of the product."[315]

Fire behavior. Small fires associated with small releases can burn out quickly, while larger fires can heat other spilled product or cause intact tank cars exposed to flames over time to breach if pressure in the tank exceeds the capacity of pressure relief devices. In such cases, tank cars can experience a sudden boiling liquid expanding vapor explosion, more typical of more flammable liquids such as propane, in which tank fragments are expelled considerable distances. Oil tank cars subject to long-term high temperatures are more likely to experience a slower heat-induced tear with a large product release in the form of fireball combustion. A fireball from a single car of Bakken crude oil could produce a radiant heat area to 2000 feet of the incident, lasting 10 to 20 seconds, and posing serious risk including injury to unprotected skin. In Mr. Rhoads' opinion, impacts to the immediate area can be major, but long-term impact is negligible, and he deemed claims of craters, bedrock fracturing, or other lasting impacts from explosion are overstated.[316]

Vancouver Fire Chief Joe Molina testified that, in his experience, released Bakken crude oil vapors may ignite even as low as 31 degrees below zero. He said vapors are spread both by wind and topographic conditions and may be ignited some distance from their original sources if the mixture of vapor and oxygen is more conducive to ignition than in the immediate release area, which may be saturated with vapors.[317] Also, vapors often concentrate in low spots like valleys, storm water catchments, and sewers.[318] Ignition of vapors removed from a derailment can even burn backward to the original sources.[319]

Emergency Planning consultant Michael Hildebrand explained that fire attack can occur in two ways: (1) offensive operations to rapidly control or extinguish the fire in its early phases, or (2) defensive actions that result in extinguishment of the fire in its later stages after its size and intensity has diminished, i.e., after equilibrium as occurred.[320] Early extinguishment requires early application of high volumes of water and foam, which most fire departments do not have.[321]

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[314] PFT of Rhoads 13-14.
[315] PFT of Rhoads 14.
[316] PFT of Rhoads 24-26, 30-31; Tr. 2155-57, vol. 9.
[317] PFT of Molina 3-4, Tr. 2737, vol. 12.
[318] Tr. 2736, vol. 12.
[319] Tr. 2738, vol. 12.
[320] PFT of Hildebrand (City of Spokane) 6.
[321] PFT of Hildebrand (City of Spokane) 6-7.

Mr. Hildebrand also described the stages of CBR fires, which he referred to as High Hazard Flammable Trains Fires, and the low odds of being able to actively fight and extinguish such a fire:

- In Phase I, in the first hour following a derailment, fire from cars breached in the derailment may occur, with flames sometimes impinging adjacent tank cars.[322] Based on actual High Hazard Flammable Trains derailment experience, to date no High Hazard Flammable Trains fire has been controlled by using an offensive strategy during Phase I.[323]

- In Phase II, two to eight hours after the initial incident, fires typically grow as additional oil is released from impinged tank cars through activation of their pressure relief devices, or through heat-induced tears or rapid release events. Running or unconfined spill fires and releases may occur, and spills may flow into storm drains and other structures creating secondary fires. During this stage, fireballs may occur.[324] The window for extinguishment closes and the fire fighters have to shift to either a defensive or non-intervention strategy.[325]

- Phase III, equilibrium is reached when fires are no longer expanding, typically 8-12 hours after the initial incident.[326] Fires will continue to burn off the available fuel until it achieves equilibrium and is no longer growing in size or scope.[327]

Mr. Hildebrand provided two hypothetical accident scenarios in Vancouver. First, he described a scenario near Vancouver City Hall where a seven-car derailment results in three cars releasing 48,000 gallons of crude oil. The release causes a pool fire and leakage of burning oil into storm drains, which in turn triggers the thermal failure of other rail cars and results in further releases and a fire that local firefighters are unable to even approach for 8-12 hours.[328] Second, he described a scenario where a 27-car derailment near the only exit from Marine Park traps people in the park. This results in seven cars releasing 100,000 gallons and associated fires that are then spread uphill to homes by wind. Within four hours, 13 further railcars suffer thermal failure, spilling another 275,000 gallons with fire and not reaching equilibrium stage for six to eight hours.[329] Mr. Hildebrand also testified that three downtown Spokane locations are particularly vulnerable because railcars derailing from elevated tracks

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[322] PFT of Hildebrand (City of Spokane) 7.
[323] PFT of Hildebrand (City of Spokane) 7.
[324] PFT of Hildebrand (City of Spokane) 7.
[325] PFT of Hildebrand (City of Spokane) 7.
[326] PFT of Hildebrand (City of Spokane) 8.
[327] PFT of Hildebrand (City of Spokane) 8.
[328] PFT of Hildebrand (City of Vancouver) 19-20.
[329] PFT of Hildebrand (City of Vancouver) 20-21.

may fall on top of buildings, and burning oil in the area could enter the storm system, likely causing secondary and tertiary fires.[330]

Fire consequences for the Mosier, OR derailment. The consequences of recent accidents in the United States and Canada illustrate the potential consequences of a crude oil spill and fire along the rail route for the VEDT. The Lac-Mégantic, Aliceville, and Casselton incidents were cited to illustrate the potential for fatalities, multiple explosion events, large fireballs, and grave environmental consequences.[331] Fire Chief Jim Appleton described the Mosier, OR oil train derailment and fire incident that occurred just prior to the adjudication hearing. He called it "a small and angry fire."[332] A derailed tank car that released crude oil caught fire and the flames spread to 3 other tank cars. This created non-explosive fireballs that resulted in a creeping wildland fire and damage to the local sewage treatment plant before the fire was put out after 12-14 hours.[333]

Impacts from the Mosier derailment and fire could have been much worse but for a series of fortunate circumstances. The accident happened in the spring when surrounding vegetation was still green and not completely dry.[334] It happened on a day with unusually low winds because sustained higher winds with higher gusts that were common in the area were calm. Chief Appleton said that wind has a huge role in fighting a wild land fire.[335] On the day of the derailment, there were only two Mosier firefighters who were able to respond in addition to Chief Appleton. Nevertheless, other local entities reacted with "a picture perfect response."[336] They also had the help of railroad personnel that Chief Appleton said were two very brave guys from Union Pacific, who were the only people to actually handle the equipment that put out the fires.[337] Response resources from Mosier's usual mutual aid partners were not available as they had gone to another serious fire that had started six hours before. Chief Appleton said that this was an example of how variable their mutual aid can be in that area, and that, due to the prevalence of wild fires at the time, had the derailment happened a month later they would not have had a quick, effective massive local response.[338] In closing argument, the Opponents pointed out that, had the train that derailed at Mosier derailed further east it may have impacted a fruit processing plant, or further west it might have entered a water body, and that, as it was, municipal water and sewer systems were disrupted and groundwater now has ten times the allowed level of benzene.[339]

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[330] PFT of Hildebrand (City of Spokane) 9-10; Tr. 2539-40, vol. 11.
[331] PFT of Millar 7-8.
[332] Tr. 2314, vol. 10.
[333] Tr. 2338, vol. 10; Tr. 2322, 2326, vol. 10.
[334] Tr. 2743, vol. 12.
[335] Tr. 2331, vol. 10.
[336] Tr. 2316, vol. 10.
[337] Tr. 2321, vol. 10.
[338] Tr. 2317-19, vol. 10.
[339] Tr. 5137, vol. 22.

Wildfire risk and consequence. Tesoro Savage argues that a rail incident attributable to increased rail traffic serving the VEDT is "unlikely" and that, even if fires occur, response capabilities are adequate to mitigate any risk.[340] It offered no evidence to rebut the considerable evidence to the contrary of the likelihood and potential for devastating results from derailments, spills, and fire along the rail route that, among their other consequences, can easily lead to the ignition of wildfires. Opponents of the VEDT point to natural conditions in large portions of the rail corridor that increase the potential for crude oil train accident caused wildfires that are expensive in every way.

DNR presented the testimony of Robert W. Johnson, Division Manager for the Wildfire Division of DNR.[341] His unrebutted testimony highlighted the fire risks on the route and mapping active northwest wildfires as of July 2014, showing wildfires throughout the state, and not restricted to heavily forested areas, concluding that much of the route appears vulnerable to wildfire.[342]

DNR maintains the state's largest on-call wildland firefighting force.[343] DNR is responsible for responding to fires on over 13 million acres of land under the state's protection, and it also assists local fire districts across the state. DNR's wildland firefighting resources consist of 400 seasonal firefighters and 800 regular DNR staff, from forester to budget analysts, who may be dispatched to fires from their normal jobs as needed.[344]

Mr. Johnson said that, in the summer of 2015, wildfires in Washington State burned over 1 million acres of land, destroying over 300 homes and taking the lives of three firefighters. It was the worst fire season on record in the state, and the year before was the previous worst. To respond to these fires, DNR had to dispatch staff not ordinarily part of the fire program and seek assistance from other states as response need outpaced resources.[345]

Mr. Johnson described the route serving the VEDT as among the most fire-prone areas in the state where even normal railroad traffic and maintenance activities regularly ignite wildfires. He said that the increased train traffic from the proposed VEDT would raise the risk of wildfire ignition along every mile of track used. Heat and sparks from the trains have a history of igniting wildfires, particularly in areas of dry vegetation, typical of much of Eastern Washington, through which crude oil trains travel for many miles on their way to the Port. Mr. Johnson said that railroad maintenance work is an additional potential ignition source.[346]

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[340] Applicant Pre-Hr'g Br. 80.

[341] Robert W. Johnson works with state, contract, federal and local partner resources and leads all aspects of DNR's wildfire program from preparedness to suppression. Mr. Johnson has held 15 positions in a diverse cross-section of DNR programs over a 33-year career with the Department. PFT of R. Johnson 1.

[342] Ex. 3088-0063-VAN.

[343] PFT of R. Johnson 1.

[344] PFT of R. Johnson 2.

[345] PFT of R. Johnson 2.

[346] PFT of R. Johnson 2-3.

Wildfires are numerous and expensive. Mr. Johnson provided examples of incidents resulting in wildfires. In 2003, a westbound BNSF train derailed near the Columbia River. Sparks from that derailment ignited two fires that quickly spread to 800 acres. In the summer of 2007, trains travelling west along the BNSF line caused multiple fires along the tracks, including several blazes that grew into a 365-acre complex southwest of Spokane that caused significant property damage and cost state taxpayers $460,000 in suppression costs. In 2015, sparks from a passing BNSF train along the same line caused a 30-acre fire in northwest Portland. BNSF operations or track maintenance in Washington State were associated with four unrelated wildfire ignitions in 2008, two in 2014, and one in 2015.[347]

DNR uses a methodology called 'Industrial Fire Precaution Levels' to regulate activities that carry the risk of ignition when conditions create an increase in fire danger. When conditions are conducive to fire, industrial activities in or adjacent to forestlands are either restricted or suspended. Industrial Fire Precaution Levels are an important tool in the management of fire risk in response to current conditions and they often coincide with DNR's times of lower resources to deploy to new fire starts. Increased rail traffic increases the risk of wildfire in areas under conditions where the fire risk is so high that a shutdown of other industrial activities is considered necessary. However, as Tesoro Savage has argued, rail operations are generally regulated by the federal Surface Transportation Board, which has given no indication to DNR that rail line operations serving the VEDT would be adjusted or curtailed during high fire risk conditions.[348]

Mr. Johnson warned that the increase in crude oil train traffic will mean increased risk of catastrophic explosion. He said that fire suppression either from a crude oil spill or from sparks generated under normal train operations could quickly become the responsibility of external fire response entities, including state resources.[349]

The rail corridor through Vancouver is located at the base of a slope running parallel to the tracks and fire is more likely to spread uphill.[350] Scott Johnson is the Emergency Management Division Manager for the Clark Regional Emergency Services Agency (CRESA). He described the topography of the Columbia River Gorge as it relates to wild fire. The Gorge is steeply sloped, which causes bottleneck or isolation concerns for evacuations along the Columbia River. There are only five streets that allow vehicles or people to evacuate the area between the river and Highway 14 while simultaneously allowing emergency responders to enter the area. As it transects Vancouver, the BNSF mainline is located along the north shore of the Columbia River. State Highway 14 also parallels the north shore of the river to the north of the railroad tracks. This area is 4.78 square miles in size and has a population of

[347] PFT of R. Johnson 2-3.
[348] PFT of R. Johnson 3.
[349] PFT of R. Johnson 3.
[350] Tr. 2743, vol. 12.

3261 people. However, the terrain is steeply sloped and there are only five streets that allow vehicles or people to evacuate the area between the river and Highway 14. [351]

The Columbia River Gorge area has consistent high winds allowing fire to move quickly up cliffs and beyond to other areas. DNR's Robert Johnson also noted the frequency and effects of the Columbia Gorge's wind conditions: "anybody that's lived in that area knows that one of the factors you can always count on down there is that the wind is going to blow." He said that these winds are problematic in a fire because it causes fire to move very quickly up the cliffs out of the Gorge.[352] Robert Johnson described a phenomenon called "spotting," where wind in the Gorge causes embers from a fire to be lifted by the convection column and be deposited a distance from a fire that he said was "amazing." Mr. Robert Johnson related a Chelan Washington fire in 2015 that was characterized by spotting behavior up to a mile away from the original fire.[353] And a 2003 freight derailment in Wishram, WA on the route serving the terminal quickly grew to 800 acres because of wind.[354]

Summary of the Council's Analysis of Rail Route Fire Risk and Consequences. The record supports a conclusion that if oil is released from a crude oil train, the result will likely be a fire and larger fires may include explosions, including heat induced tears, or in rare cases, a Boiling Liquid Expanding Vapor Explosion event and subsequent fireballs. A fireball from a single tank car could produce a radiant heat area within 2000 feet lasting 10 to 20 seconds.

Topographic and vegetative conditions in large portions of the rail corridor may increase the likelihood of fire. Unrebutted testimony indicates the route through much of Vancouver and the Columbia River Gorge is sloped parallel to the tracks, and fire is more likely to spread uphill. Much of the route in central and eastern Washington is dry in summer and fall months to the point that recent wildfires have been started not only by derailments, but also from wheel sparking and carbon emissions from normal train travel, and even from track maintenance activities.

The properties of Bakken crude are highly variable but, in general, it is more volatile than other types of crude, which may have important safety implications. Mr. Rhoads stated that North Dakota's requirements for preconditioning Bakken crude prior to loading onto trains lessens volatility and that volatility is not a significant determinant of the degree of combustion in a CBR. Mr. Rhoads's opinion was that crude oil flammability is a function of several parameters in addition to volatility, quoting NTSB Chair Christopher Hart that the biggest contributor to a large explosion or fire is how much product is released, rather than the volatility of the product.

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[351] PFT of S. Johnson 10.
[352] Tr. 3393, vol. 14.
[353] Tr. 3390, vol. 14.
[354] Tr. 3400, vol. 14.

Small fires associated with small releases can burn out quickly, while larger fires can heat other spilled product or cause intact tank cars exposed to flames over time to experience a slower heat-induced tear with a large product release in the form of fireball combustion, producing a radiant heat area to 2000 feet of the incident, lasting 10 to 20 seconds, and posing serious risk of injury.

Crude oil vapors may ignite even as low as 31 degrees below zero and can spread by wind and topographic conditions with ignition some distance from their original sources. Vapors can often concentrate in low spots like valleys, storm water catchments, and sewers. Ignition of vapors removed from a derailment can even burn backward to the original sources.

The consequences of recent accidents that have occurred in the United States and Canada illustrate the potential consequences of a crude oil spill and fire along the rail route for the VEDT. The Mosier, OR oil train derailment and fire incident occurred just before the adjudication hearing. A derailed car released crude oil that caught fire and the flames spread to 3 other cars. This created non-explosive fireballs that resulted in a creeping wildland fire and damage to the local sewage treatment plant before the fire was put out after 12-14 hours. Impacts from the Mosier derailment and fire could have been much worse but for the fact that the surrounding vegetation was green on a day with unusually low winds. Although only 3 Mosier firefighters were able to respond, other local entities and railroad personnel provided help. Chief Appleton testified that due to the prevalence of wild fires at the time, had the derailment happened a month later, they would not have had a quick, effective, massive local response.

Tesoro Savage argues that a rail incident attributable to increased rail traffic serving the VEDT is “unlikely” and offered no evidence to rebut the considerable evidence about the likelihood and potential for devastating results from derailments, spills, and fire along the rail route. Robert W. Johnson’s unrebutted testimony concluded that much of the route appears vulnerable to wildfire as among the most fire-prone areas in the state where even normal railroad traffic and maintenance activities regularly ignite wildfires. The federal Surface Transportation Board has given no indication to DNR that rail line operations serving the VEDT would be adjusted or curtailed during high fire risk conditions.

The rail corridor through Vancouver is located at the base of a slope running parallel to the tracks and fire is more likely to spread uphill. Scott Johnson from CRESA described the Gorge as steeply sloped, which causes bottleneck or isolation concerns for evacuations along the Columbia River. There are only five streets that allow vehicles or people to evacuate the area between the river and Highway 14, while simultaneously allowing emergency responders to enter the area.

The Columbia River Gorge area has consistent high winds allowing fire to move quickly up cliffs and beyond to other areas and to cause ‘spotting,’ where wind causes embers to be lifted by the convection column and deposited a distance from a fire.

Taken together, this evidence supports a finding that fires are a likely accompaniment to derailments and that the topography and vegetation along the route pose a real, albeit unquantifiable, risk of urban fires or wildfires.

e. Rail Route Landslide Risk and Consequences

Assistant State Geologist and Assistant Division Manager for the Washington Geologic Survey Timothy J. Walsh has worked for the State of Washington Department of Natural resources for 36 years.[355]

Mr. Walsh explained that Washington has a long history of landslides.[356] Widespread landslides have historically occurred during large storm events, but landslides can also move without large events and without warning.[357] Areas typically susceptible to landslides are steep hillsides and convergent topography. Landforms are also a factor in landslide susceptibility such as areas of steep shoreline bluffs, colluvial (soil accumulated at the bottom of a slope), hollows (also known as bedrock hollows), inner gorges, meander bends, rugged topography (mountainous terrain), and areas with previous deep-seated landslide movement.[358] Areas that have been the most active in the recent past include the Columbia River Gorge, which forms a significant portion of the rail corridor associated with the VEDT.[359]

Mr. Walsh characterized the Columbia Gorge as a landslide province that houses some of the world's most famous landslides.[360] An example was the 600-year old Bonneville landslide at the "Bridge of the Gods" over the Columbia River. That landslide dammed the river, and got its name from the fact that Native Americans were able to cross the river before it was breached.[361] Another landslide was the Old Maid lahar, which came down Sandy River and was noted by Lewis and Clark when they came through the area. These are just two of "a huge number of landslides all along the . . . Western Columbia Gorge."[362]

Mr. Walsh cautioned that there has been insufficient analysis of landslide hazards along the rail corridor to evaluate the potential impacts. Citing the authorities relied upon by VEDT planners, Mr. Walsh said that a landslide analysis would almost certainly identify a greater risk than is fully understood. There is a difference between landslide hazard, which is a geologic

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[355] Mr. Walsh is a licensed engineering geologist in the State of Washington. As such, he has assessed the geologic hazards posed by earthquakes, volcanoes, tsunamis, and other sources for the State of Washington. He served as a technical expert and participated with other agencies in educating affected groups about geologic hazards, preparing mitigation plans, and planning emergency response to geologic disasters, and, in collaboration with other experts, has published numerous geologic and hazard maps. PFT of Walsh 1-2.

[356] PFT of Walsh 2.

[357] PFT of Walsh 2; Ex. 4503-000001-33-DNR.

[358] PFT of Walsh 2.

[359] Ex. 4503-000004-DNR.

[360] Tr. 3343, vol. 14.

[361] Tr. 3343, vol. 14.

[362] Tr. 3343-44, vol. 14.

physical process with some defined probability of occurrence that could have negative consequence, and landslide risk, which also incorporates potential consequences and is a function of hazard, including the probability estimate, the value of assets at risk, and the vulnerability of those assets.[363]

Mr. Walsh's opinion was that the proposal appeared to mischaracterize the DNR landslide database, which is not a measure of landslide probability. The landslide hazard analysis on which the VEDT proposal relies is inadequate and misleading. It is not appropriate to use this database to determine whether a landslide hazard exists for a particular geographic area. Mr. Walsh concluded that "[w]ithout this, the risks of landslides on the impacted areas are almost certainly underestimated."[364] A statewide systematic inventory of landslides has been started, but is only 10 percent completed. Therefore, it is insufficient for planning purposes.[365] Mr. Walsh was unable to find that Tesoro Savage had done a review or analyzed the landslide hazard in the Columbia River Gorge.[366] To his knowledge, no one has done a comprehensive landslide investigation of the rail corridor in the Columbia River Gorge. There is, however, new research that has identified a much more extensive landslide hazard than had previously been known in the Columbia River Gorge.[367]

There are a couple of active faults along the rail route for the VEDT, and in the Columbia Gorge, there are a large number of landslides. The BNSF tracks are built on top of landslide deposits in a significant amount of the Gorge and a number of landslides in the Gorge are still moving.[368] There is very little relative flat ground between the river and the Cascade Range, so a great deal of the ground in the Gorge where railroad track is built is landslide deposit. This makes the area more susceptible to future landslides because research has established that about 70 percent of the landslides that were mapped by the USGS were actually reactivated rather than first-time landslides. For instance, the Piper Creek landslide destroyed two homes in Stevenson, WA.[369]

There are different ways that landslides could affect railroad operations. Mr. Walsh warned that a landslide hitting a train would obviously cause a derailment by forcing trains to stop suddenly or by damaging tracks. Rapidly moving landslides have hit and derailed trains as they passed by, as happened in January 1977 when five mail cars were pushed into Puget Sound near Woodway, WA. Creeping landslide movement can affect the ground upon which the tracks are built and cause distortions that gradually build.[370] Mr. Walsh testified as to the

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[363] Tr. 3341, vol. 14.
[364] PFT of Walsh 6.
[365] Tr. 3347, vol. 14.
[366] Tr. 3354, vol. 14.
[367] Tr. 3355, vol. 14.
[368] Tr. 3351-52, vol. 14.
[369] Tr. 3352-53, vol. 14.
[370] Tr. 3354, vol. 14.

reasons why it is important to adequately assess the landslide hazard associated with the BNSF rail corridor servicing the VEDT project:

> [T]his gets now past the hazard part and to the risk part and that is the consequences. So because the tracks [are so] close to the river, derailments have significant potential for having an impact on the river, and if that impact is from a volatile or potentially toxic crude oil, that could have significant impacts to the salmon population of the river, for instance.[371]

Summary of the Council's Analysis of Railroad Landslide Risk and Consequences. Washington has a long history of landslides that can occur without warning. Areas that have been the most active in the recent past include the Columbia River Gorge, which houses some of the world's most famous landslides and which forms a significant portion of the VEDT rail corridor. There are two active faults along the VEDT rail route. The BNSF tracks are built on top of landslide deposits in a significant amount of the Gorge and a number of landslides in the Gorge are still moving. A great deal of the ground under the track is landslide deposit, which makes the area more susceptible to future landslides.

There has been insufficient analysis of landslide hazards along the rail corridor. A landslide analysis would almost certainly identify a greater risk than is fully understood. In Mr. Walsh's view, the VEDT appeared to mischaracterize the DNR landslide database, which is not a measure of landslide probability and the risks of landslides on the impacted areas are almost certainly underestimated. To his knowledge, no one has done a comprehensive landslide investigation of the rail corridor in the Columbia River Gorge although new research has identified a much more extensive landslide hazard than had previously been known.

A landslide that hits a train could cause a derailment by forcing trains to stop suddenly or by damaging tracks. Rapidly moving landslides have hit and derailed trains as they passed by. Creeping landslide movement can also affect the ground upon which the tracks are built and cause distortions that gradually build.

Taken together, this evidence supports a conclusion that landslides along the rail route pose a real albeit unquantifiable risk of hitting and derailing the VEDT's CBR unit trains or causing track distortions that could cause a derailment.

f. Emergency Response Capabilities Along the Rail Route

Vancouver. The ability to successfully respond to rail accidents is necessarily limited. Vancouver Fire Chief Joseph B. Molina testified that a two-alarm fire requires 75 percent of the on-duty firefighters, leaving just two engine companies to cover the rest of the City.[372]

[371] Tr. 3357, vol. 14.
[372] PFT of Molina 5.

Also, it would take an hour to recall off-duty personnel to staff the reserved engines.[373] Vancouver has 24 hazardous material (HAZMAT) technician responders, of which eight are typically on hand at any given time. HAZMAT personnel would require an hour to reach a fire site and set up.[374] The City of Portland is precluded from providing mutual aid for hazardous materials and may be delayed in providing conventional assistance by I-5 bridge congestion. Smaller jurisdictions north of Vancouver may be staffed largely by volunteers.[375]

Spokane. Spokane has 13 hazardous material technicians and specialists available on a daily basis, but no inter-local agreements for hazardous materials equipment or personnel aid.[376] The City's notification system is only able to make 7000 calls per hour. It has an evacuation plan, but nothing in it addresses the magnitude necessary for a city center event. Spokane lacks sufficient sheltering capacity that is needed for an oil train derailment and fire in the urban center. Firefighting capability is likely ineffective and inadequate to address an oil train accident. Hazardous materials personnel would likely be immediately overwhelmed if an incident occurred.[377]

Wildfires. DNR stated that adequacy of water supplies is particularly important in responding to fires along the rail route because of the unusually high danger of wild fire in the Columbia River Gorge and other dry areas of Washington State. DNR asserts more broadly that its firefighters are not prepared to address additional wildfires associated with the proposal at a time when resources have been demonstrated inadequate to address the existing wildfire threat.[378]

Tesoro Savage's Assessment. Tesoro Savage counters these concerns by asserting that first responders are, or can be, capable of responding to a rail-related incident, through a wide range of public and private responding entities, including railroad hazardous materials teams. Railroad response plans and assets include Geographic Response Plans (GRPs) for the Spokane, Lakeside, and Fallbridge subdivisions of the WA rail route; foam firefighting trailers in Vancouver, Pasco, and Spokane that are expected to be able to respond within a 150-mile radius; and HAZMAT contingents in Vancouver and Spokane.[379] Responder training is available online through training modules brought to local communities, or more extensive courses in Colorado or Texas.[380] BNSF has trained approximately 2700 first responders in Washington on overall HAZMAT training, and 250-260 on crude oil response in the past

[373] PFT of Molina 5.
[374] Tr. 2706, 2721, vol. 12.
[375] Tr. 2719, 2720, vol. 12.
[376] Tr. 2804-05, vol. 12.
[377] PFT of Schaeffer 2-3.
[378] DNR Post-Hr'g Br. 8.
[379] Tr. 2767, vol. 12.
[380] Tr. 2112, 2116, vol. 9.

3 years. Local entities and responders are reimbursed for the costs.[381] However, local entities are not reimbursed for the cost of backfilling positions while staff is at training.[382]

Mr. Rhoads said that recent major crude oil train incidents have been effectively managed using defensive or non-interventionist strategies. These typically involve applying water volumes to adjacent tanks in contact with flames, although this may spread spilled oil further from the scene and widen environmental impacts. Mr. Rhoads recommends non-interventionist strategies as most effective in the first several hours of an incident, emphasizing instead protection of adjacent persons through evacuation or shelter in place while letting the fire burn itself out.[383] He pointed out that Emergency Response Guide 128 recommends evacuating populations within 1/2 mile of a crude oil fire, and longer if multiple rail cars are involved.[384] However, the Emergency Response Guide does not identify crude oil as having high toxicity or immediate health risk, so evacuation may not be the first consideration for responders.[385] Responders must make quick decisions. Mr. Rhoads warned that offensive approaches such as suppressing the fire should only be attempted if there are sufficient water and resources to sustain an attack, including foam to provide vapor suppression by blanketing oil that has pooled. Foam is not effective in fighting three-dimensional or non-stationary fires.[386]

BNSF and its contractors have various personnel and equipment for responding to rail accidents, as do government agencies. However, the record also demonstrates that response necessarily will be limited by a range of factors. Testimony from Vancouver, Spokane, and DNR clearly established that even the largest of the first-responding agencies are staffed and equipped only for the risks they most typically face, not oil train fires. The evidence was plain that these agencies are always constrained by budget limitations. Mutual aid clearly allows for pooling of resources, but it has limits. For instance, Vancouver and Spokane lack mutual aid agreements for HAZMAT with nearby larger or better resourced public agencies because of legal limitations. Arrival of conventional mutual aid from governmental and railroad sources may be limited or delayed by distances involved, or transportation access.[387] Mutual aid may be unavailable on some days, as occurred in Mosier one month after the oil train derailment when there was no response to calls for aid on a structure fire because agencies were involved in a larger fire in a nearby city.[388]

Summary of the Council's Analysis of Emergency Response Capabilities along the Rail Route. As required by RCW 80.50.010, Washington citizens and the environment must

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381 Tr. 1499-1501, vol. 7.
382 Tr. 2765, vol. 12.
383 PFT of Rhoads 29; Tr. 2159-60, vol. 9.
384 Tr. 2146, vol. 9; Ex. 0196-000162-TSS, Ex. 0196-000166-TSS, Ex. 0196-000167-TSS.
385 Tr. 2085, vol. 9.
386 PFT of Rhoads 28.
387 Tr. 2716-21, vol. 12.
388 Tr. 2316-17, vol. 10.

be protected by ensuring minimal impacts to the environment. Even if emergency response personnel and assets are fully available, rapidly deployed to the incident, and seamlessly managed, there is insufficient analysis in the record demonstrating or purporting to demonstrate that this would necessarily be sufficient to fully mitigate impacts from the projected accidents over the life of the VEDT to satisfy that statutory standard. There is no evaluation or argument that recent oil train accidents that involved significant harm to persons, property or the environment would have had a better outcome had they occurred along the proposed rail corridor because of better emergency response in Washington. Conversely, with the exception of the Mosier accident, there is no evidence or argument provided that recent oil train accidents with "good" outcomes turned out that way because of an emergency response level that can be expected consistently in the future. With regard to the Mosier accident, Tesoro Savage's assertion that the outcome was "very good" appears based on the coordinated performance of the responders and lack of fatalities or injuries, not a full accounting of impacts.[389]

Similarly, Tesoro Savage describes incidents in Lynchburg, Virginia, and Mt. Carbon, West Virginia as having "successful outcomes" because fires were extinguished, without the use of foam in those cases, but with no mention of consequences.[390] In Lynchburg, the consequences included 3 trains entering the James River and releasing 30,000 gallons of crude oil.[391] In Mt. Carbon, consequences included a fire lasting 30 hours with multiple fire balls, destruction of a house 72 feet from the track, evacuation of 2400 residents, state of emergency declarations for two counties, and spills into a nearby river and creek.[392] Commendable performances by responders are not the same thing as safe, low impact outcomes.

Taken together, this evidence supports a conclusion that emergency response capacity may be insufficient along the rail route to ensure timely and effective response to rail emergency sufficient to protect lives, public safety, property, and the environment.

g. Non-Accident Rail Route Issues

At-Grade Crossing Impacts. As with accident-based impacts, new rail traffic created by the VEDT represents additional burdens on the system. As the new rail traffic will not displace existing traffic, each additional train generates additional vehicle delays at at-grade crossings. Tesoro Savage's analysis suggests that at the generally ten busiest at-grade rail crossings in the Washington corridor, sufficient queue space will likely exist for vehicles to wait during gate downtimes caused by oil trains associated with the proposal, and that there are other alternative crossing routes in the event a train is stalled at one of those crossings.

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[389] Tr. 2134, vol. 9.
[390] Tr. 2118, vol. 9.
[391] Ex. 3058-0199-VAN.
[392] Ex. 3029-000002-VAN; Ex. 3029-000013-15-VAN.

However, these ten at-grade crossings likely represent only a small fraction of at-grade crossings on the route, as BNSF indicates they have 25,900 such crossings on their full 32,500 mile network, suggesting there would be approximately 306 at-grade crossings on the inbound Washington route if it has a similar ratio, and perhaps a roughly comparable number on the outbound Washington route as well. There are a reported 111 at-grade crossings in Vancouver and Spokane alone, although some may be on other tracks not serving the terminal.[393] For the full Washington route serving the VEDT the record contains no information or estimates of the number of crossings, the estimated number of vehicles using them, or the approximate total vehicle hours of delay created by the proposal's inbound and outbound trains passing through each crossing.

Transportation planning consultant Brian Dunn of Kittleson and Associates projected that rail traffic from the VEDT would create no significant impacts in terms of additional crossing delays at the ten at-grade crossings he examined along the Washington route.[394] The crossings examined were in the cities of Washougal, Pasco, Spokane Valley, and Cheney. They all had at least 2500 vehicle crossings per day, a threshold chosen to capture crossings that functioned similar to an arterial or a collector street. Each had meaningful delays and vehicle queues.[395] Mr. Dunn concluded that, in all but one intersection, the projected delay from a crude oil train associated with the VEDT would not exceed the maximum single delay currently experienced from an existing train. In the case of the intersection in Pasco, adequate queueing space existed for impacted cars to wait.[396]

Nearby crossings were also examined to determine alternative route options for local drivers or emergency responders.[397] For seven of the intersections in Washougal, Pasco, and Spokane Valley, alternative routes could be used by emergency responders to reach the other side of the track from a blocked crossing in 5 to 13 minutes.[398] Each of the three Cheney intersections could serve as an alternative crossing if one of the others was blocked, and if a single stalled train were positioned to block all three, an alternate route through an adjacent town 30 minutes away is available.[399] Mr. Dunn noted that the protocol for emergency responders is to dispatch a second vehicle if the first one comes upon a blocked crossing. The protocol for derailed or stalled trains is to decouple and move portions of the train, potentially freeing up access.[400]

Mr. Dunn also noted that per BNSF testimony, trains serving the VEDT are not an additional burden to the system in terms of delays.[401] He said the testimony stating that the

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[393] Ex. 3088-0064-VAN.
[394] Tr. 2208-09, vol. 9.
[395] Tr. 2184, vol. 9.
[396] Tr. 2208-09, vol. 9.
[397] Tr. 2185, vol. 9.
[398] Tr. 2232, vol. 9.
[399] Tr. 2188, vol. 9.
[400] Tr. 2190, vol. 9.
[401] Tr. 2192, vol. 9.

trains associated with the VEDT would add 10-15 minutes to emergency response times was not consistent with feedback he received from responders. Mr. Dunn disagreed with Vancouver witnesses' testimony that there would be impacts at the downtown Waterfront development, because of the existence of three grade separated crossings.[402] Along the Old Evergreen Highway or East Old Evergreen Highway neighborhoods where access is limited to single at-grade crossing in some areas (because homes were built after the rail corridor), homes may include additional sprinkler requirements, and already experiences train delays as long as those anticipated from terminal traffic, and at Riverview Gateway development, as quarries have direct access to state highway without crossing the tracks, and the logging business on the south side of the tracks has an electrified train gate with advance warning signs.[403]

Mr. Dunn also disagreed with Washougal's concerns about impacts to its city, particularly at the 32nd Street crossing. He pointed to the existence of various at-grade and grade-separated crossings within Washougal and further west that provide alternatives, as well as existing and planned access management features. He acknowledged that the 32nd Street intersection queueing can extend back to a nearby signal, but opined that a train from the proposal would not create a longer delay than that from existing trains.[404] Tesoro Savage also argued that application of vehicular traffic Level of Service standards to delays at a rail crossing is inappropriate.[405]

Vancouver. Ryan Lopossa, Senior Civil Engineer for Vancouver, testified that there are 25 at-grade rail crossings along the corridor of the Evergreen Line, which is the main rail corridor that runs east to west through the southern portion of Vancouver along the north side of the Columbia River. The line enters Vancouver at the easternmost limit and ends at the intersection with the BNSF main north-south line located within the Port.[406] Twenty-one of the 25 crossings are private crossings with little or no protective measures.[407] Twenty of these crossings provide the only access to areas they serve, including one at 139th Avenue that accesses over 100 homes.[408] Five crossings are sufficiently close to others that a stalled train would likely block at least two.[409] Gate down times for proposal trains will average 5 minutes and 8 seconds, based on a 7800-foot long train travelling at 20 miles per hour, and gates coming down 30 seconds before arrival for the train, and going up 12 seconds after.[410]

He characterized the added delay as significant from a traffic engineering perspective, explaining that each individual train will create a five minutes and 8 second delay at each Vancouver at-grade crossing, and because there will be four trains delay at each at-grade

[402] Ex. 2197, vol. 9.
[403] Tr. 2198-99, 2204, vol. 9.
[404] Tr. 2202-03, vol. 9.
[405] Tr. 2241, vol. 9.
[406] PFT C. Johnson 2.
[407] PFT of Lopossa 2; Tr. 2274, vol. 10.
[408] Tr. 2280, 2282-83, vol. 10.
[409] Tr. 2283, vol. 10.
[410] PFT of Lopossa 3; Tr. 2285, vol. 10.

crossing, the total delay from inbound trans at each crossing is 20-21 minutes each direction. If trains go outbound through the Vancouver corridor (which is a possibility), the total delay of 42 minutes would occur at each Vancouver crossing, in comparison to the current 15 minutes at the Vancouver intersections.[411]

Implications of Rail Crossing Delays for Emergency Services. Tesoro Savage has not provided adequate information about impacts that rail-crossing delays have for emergency services. The 5 to 13 minutes of added response time projected by Mr. Dunn at the ten crossings he examined likely underestimates impacts for the balance of crossings along the corridor. The ten crossings he examined were by definition among the busiest, where alternative routes are more likely to be available and/ or closer than in areas that are more isolated.[412] Opponents are critical of the failure of the Tesoro Savage analysis to include intersections in Vancouver or Spokane, or any intersection anywhere that would serve as a sole access point.[413] Intersections that were included were primarily analyzed for queueing capacity as opposed to other impacts.[414] They argue that the assumed gate downtimes of anticipated oil trains in at least Vancouver and Washougal were too short. They were based on higher train speeds than likely, and for one intersection, Mr. Dunn said they were miscalculated.[415] Mr. Dunn concluded that, even using those assumptions, Tesoro Savage's estimated gate down time from a single oil train would result in a delay twice as long as Vancouver traffic Level of Service standards would consider to be a failure at a normal signalized intersection.[416]

Whatever the appropriate estimated delay along the route, Tesoro Savage has provided insufficient information about the resulting safety implications. As with other aspects of the project, the large volume of oil proposed to be moved over long distances can mathematically render low probability events into impacts that must be examined. For example, if hypothetically one in one million of the proposed oil trains that passes through Washington, at-grade crossings delay an emergency response to the point where an otherwise avoidable death occurs, approximately 21 added fatalities could occur over the 20-year project lifespan in Washington. That is potentially three times that in the full project corridor through to North Dakota.[417]

Frank James, M.D. is a physician and Clinical Assistant Professor at the University of Washington who also serves as a Health Officer for San Juan County and the Nooksack Indian Tribe. Dr. James testified that the additional train traffic from the VEDT could add 10-15 minutes to emergency vehicle response times generally along the route. He cautioned

[411] Tr. 2288, vol. 10.
[412] PFT of Dunn 3-4.
[413] Tr. 2290-91, vol. 10.
[414] Tr. 2291, vol. 10.
[415] Tr. 2215-16, vol. 9.
[416] Tr. 2222, vol. 9.
[417] BNSF system wide ratio of 0.8 at grade crossings per mile (25,900/32,500) applies to 385 mile inbound route and roughly assumed 385 outbound route = 602 at-grade crossings. 1713 annual trains x 602 = 1,031,226 passages of at-grade crossings in Washington generated by the proposal annually.

that, for emergency response vehicles such as police, fire and ambulance, health care providers, those in need of urgent or emergent care trying to get to a hospital, or the staff of the hospital being called in to respond to emergencies, these delays could have "especially grave consequences."[418] Dr. James characterized the increased traffic delays of 15 percent to 26 percent at 200 Washington intersections as a moderate to major impact, with potential moderate to major impacts on minority and/or low-income populations, and potentially major impacts on emergency responders and human health.[419]

Summary of the Council's Analysis of Rail Route Non-Accident Related Impacts and Railroad Crossing Delays. Brian Dunn analyzed the ten busiest at-grade rail crossings in the Washington corridor, and concluded there would likely be sufficient queue space for vehicles to wait during gate downtimes and alternative crossing routes existed and that projected rail traffic would create no additional crossing delays. In all but one intersection, the projected delay would not exceed the maximum single delay currently experienced from an existing train. In the case of the intersection in Pasco, adequate queueing space existed for impacted cars to wait. For seven of the intersections in Washougal, Pasco, and Spokane Valley, alternative routes could be used by emergency responders to reach the other side of the track from a blocked crossing in five to 13 minutes. Each of the three Cheney intersections could serve as an alternative crossing if one of the others was blocked, and if a single stalled train were positioned to block all three, an alternate route was available through an adjacent town 30 minutes away.

However, these ten at-grade crossings likely represent only a small fraction of at-grade crossings on the route. BNSF indicates it has 25,900 such crossings suggesting there would be approximately 306 at-grade crossings on the inbound Washington route. There are 111 at-grade crossings in Vancouver and Spokane alone, although some may be on other tracks not serving the VEDT. The record contains no information about the number of crossings, vehicle numbers, or potential delays on the full Washington route.

Ryan Lopossa says that Vancouver has 25 at-grade rail crossings along the corridor of the Evergreen Line, which is the main rail corridor that runs east to west through the southern portion of Vancouver along the north side of the Columbia River. Twenty-one of the 25 crossings are private crossings with little or no protective measures and 20 provide the only access to areas they serve, including one at 139th Avenue that accesses over 100 homes. Five crossings are sufficiently close to others that a stalled train would likely block at least two. Gate down times will average 5 minutes and 8 seconds, based on a 7800-foot long train travelling at 20 miles per hour, and gates coming down 30 seconds before arrival of the train, and going up 12 seconds after. This added delay is significant because each individual train will create a five minutes and 8 second delay at each Vancouver at-grade crossing, and because there will be four trains delay at each at-grade crossing, the total delay from inbound trains at

[418] PFT of James 6.
[419] PFT of James 11, 12-14.

each crossing is 20-21 minutes each direction. If trains go outbound through the Vancouver corridor (which is a possibility), the total delay of 42 minutes would occur at each Vancouver crossing, in comparison to the current 15 minutes at the Vancouver intersections.[420]

Mr. Lopossa also raises concerns about emergency response access to areas served by a single crossing, including Wintler Park, which he indicated had 240,000 visitors per year and frequently experiences current rail blockages. The 5 to 13 minutes of added emergency response time projected by Mr. Dunn at the ten crossings he examined likely underestimates impacts for the balance of crossings along the corridor because those ten crossings were the busiest so alternative routes are more likely to be available. Mr. Dunn did not examine intersections in Vancouver or Spokane, or any intersection anywhere that would serve as a sole access point. Intersections that were included were primarily analyzed for queueing capacity as opposed to other impacts.

Dr. James, testified that the additional train traffic from the VEDT could add 10-15 minutes to emergency vehicle response times along the route. These delays could have "especially grave consequences" for emergency responders such as police, fire, ambulance, health care providers, and those in need of medical care. The increased traffic delays of 15 percent to 26 percent at 200 Washington intersections is a moderate to major impact, with potential moderate to major impacts on minority and/or low income populations, and potentially major impacts on emergency responders and human health.

Whatever the appropriate estimated delay along the route, Tesoro Savage has provided insufficient information about the resulting safety implications. As with other aspects of the VEDT, the large volume of oil proposed to be moved over long distances can mathematically render low probability events into impacts that must be examined. For example, if hypothetically one in one million of the proposed oil trains that passes through Washington at-grade crossings delay an emergency response to the point where an otherwise avoidable death occurs, approximately 21 added fatalities could occur over the 20-year project lifespan in Washington. That is potentially three times that in the full project corridor through to North Dakota.

Taken together, this record supports a conclusion that Tesoro Savage has not sustained its burden of demonstrating that VEDT trains won't impact the public interest by blocking at-grade crossings in Washington and the rest of the rail route. The gate down-time projected by Mr. Dunn at the ten crossings he examined likely underestimates impacts for the rest of the crossings. He does not address the other crossings or any impacts on emergency services. The Oppenents offer evidence on these subjects. Mr. Lopossa, Vancouver's Senior Civil Engineer, calculates that the gate down times in Vancouver will average 5 minutes and 8 seconds, which creates 20-21 minutes delay each direction, for a total of 42 minutes in comparison to the current 15 minutes at the Vancouver intersections. Mr. Lopossa views this time delay as posing

[420] Tr. 2288, vol. 10.

risks to emergency responders. Dr. James confirmed that a 10-15 minute delay could have grave consequences for human life, health, and safety.

3. Vessel Operations

a. Introductory Information

Potential Impacts from New Vessel Traffic on the Columbia. The Department of Ecology (Ecology) identified laden oil tankers as posing one of the highest risks for a catastrophic oil spill in Washington waters. Because there are currently no large oil tankers carrying crude oil on this 105-mile stretch of the Columbia River, the VEDT raises a new risk.[421] The impacts of an oil spill include potential coating of the shorelines, oil in the water column, and oil that eventually sinks to the bottom. An oil spill in an area will impact any fish and much of the wildlife that uses the water near there, including salmon that are spawning or migrating, birds, and other water-oriented wildlife. In addition, there are social, cultural, and economic impacts for those who use or rely on the river and its resources and value the quality of a pristine environment.[422]

VEDT Opponents argue that Tesoro Savage minimizes the possibility of oil spills related to marine vessels. The modeled estimates of risk from a marine incident such as collision, grounding, or cargo loading were all presented separately and were not added together. Tesoro Savage's model uses data derived from the Automatic Identification System, so a number of smaller vessels were not included as part of the historical data set. They criticize the fact that Tesoro Savage used two different modeling methods for assessing oil spill risk and point out that the results produced by these methodologies were widely different.

Opponents criticize planned loading procedures as inadequate to prevent spills. They contend that pre-booming of a tanker during the loading process will rarely occur and the promised stand-by booming offered by Tesoro Savage is insufficient, and the conditions under which vessel loading would take place would still be unsafe. Opponents contend that, because of these shortcomings in the vessel safety plans, the amount of oil that can be spilled into the environment at the dock in loading operations, or in a vessel incident could be significant and hard to clean-up. Opponents also raise issues concerning wake stranding, ballast water management, and impacts to shorelines that are additional potential impacts that have not been adequately addressed.

Vessels at the VEDT. The VEDT may receive vessels of several sizes. Oil tankers are described either in terms of dead weight tons (excluding the weight of the ship) (DWT) or by the number of barrels of oil carried.[423] Articulated barges are smaller vessels of approximately 25,000 DWT that may call at the VEDT. It is much more likely, however, that the VEDT will

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[421] PFT of Harvey 5 (referencing Ex. 5502-000264-CRK; Ex. 5501-000071-CRK).
[422] Tr. 3577-78, vol. 15.
[423] PFT of Bayer 4.

receive larger tankers of 46,654 DWT with a cargo capacity of around 330,945 or of 105,278 DWT with a cargo capacity of 818,418.[424] Larger vessels may also call at the VEDT, with 164,746 DWT around 1,102,244.[425]

Notwithstanding the plan to have large vessels calling at the VEDT, the size of tanker vessels on the Columbia River is currently limited to 300,000 bbl of cargo. This limit is based on an umbrella plan provided by the Marine Fire and Safety Association, which is used by most commercial vessels on the Columbia to satisfy their response obligations. The 300,000 bbl limit is based on Marine Fire and Safety Association's response contingency plan.[426] Tesoro Savage is seeking to increase this carrying capacity limit from 300,000 bbl to 600,000 bbl. It also intends to work with the oil spill response organizations and the Marine Fire and Safety Association to purchase and stage the necessary equipment to respond to larger cargos. If implemented, the 600,000 bbl of oil will be the maximum loaded onto any vessel, regardless of the vessel's carrying capacity.[427]

According to Tesoro Savage, this increase in cargo capacity provides additional safety from grounding for tank vessels because, as vessels become larger, they have more under-keel clearance. A ship that can carry 600,000 bbl has a draft of about 39 feet, and a ship that can carry 319,000 bbl has a draft of 41 feet because the larger ship's greater surface area displaces less water even though it carries more weight.[428]

b. Vessels Traveling Upriver to the VEDT

Vetting of Vessels Coming to the VEDT. Tanker vessels will be vetted prior to calling at the VEDT. All tanker vessels arriving at the VEDT must comply with U.S. Coast Guard and International Marine Organization requirements, and be built in accordance with Oil Company International Marine Forum recommendations. All vessels will have a double hull, and be Jones Act U.S.-flagged vessels operated by companies familiar to Tesoro Savage.[429] All U.S.-flagged vessels are under the authority of the U.S. Coast Guard, which inspects and provides a Certificate of Inspection.[430] Ships may also only call at the VEDT if they confirm their compliance with parameters required by Tesoro Savage.[431]

Bar Pilots and River Pilots. Tesoro Savage will use local licensed Columbia River Bar Pilots and Columbia River Pilots to increase navigational safety. Pilots are experienced

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[424] PFT of Bayer 4-5.

[425] PFT of Bayer 6.

[426] PFT of Bayer 6; PFT of Haugstad 13.

[427] PFT of Bayer 6; PFT of Haugstad 13.

[428] PFT of Bayer 6-8; Tr. 869-70, vol. 4. Although that is the testimony, the Council notes that a larger ship would have to displace more total water. However, it would be spread out over a larger area and therefore, the ship would sit higher in the water.

[429] PFT of Bayer 12; Tr. 813, 828, 860, 862-63, vol. 4; Ex. 0120-000031-TSS.

[430] PFT of Bayer 14.

[431] Tr. 823, 829, vol. 4; Ex. 0128-000001-TSS.

mariners who have extensive navigational expertise. They know navigation areas, channel widths, points of land, depth contours, and buoy locations. They have local knowledge of the currents, tides, wind, and weather. Pilots must hold a federal license from the U.S. Coast Guard and a license issued by the Oregon Board of Pilot Commissioners who regulates both Columbia River Bar Pilots and Columbia River Pilots.[432]

Procedures for traveling upriver. Columbia River Bar Pilots and Columbia River Pilots require vessels to give advance notice of arrival in order to schedule pilot attendance and vessel transit times, as well as allowing time for the U.S. Coast Guard to conduct background checks and vessel evaluations. The advance notice must include vessel name and type, estimated time of arrival, fresh water arrival drafts, tentative docking schedule, docking instructions, bunkering or anchorage requirements, nominated tug company, estimated time of departure, and any additional information or instructions about the vessel and its arrival condition. The scheduling decision is based upon this information, along with additional factors such as pilot availability, vessel seaworthiness, weather conditions, tidal windows and river level conditions, anchorage availability, berth occupancy, and channel use.[433] Vessels traveling to the VEDT from along the outer Pacific coast will pick up a Columbia River Bar Pilot approximately 8 to 10 nautical miles southwest of the entrance to the Columbia River Bar. The Columbia River Bar Pilot will guide the vessel across the bar to Astoria. At Astoria, a Columbia River Pilot will board the vessel to guide it to the VEDT.[434]

c. Vessels at the VEDT Dock

(1) Procedures at the Dock

Procedures for Docking at the VEDT. About 3.5 miles from the VEDT at the confluence of the Willamette and Columbia Rivers, the vessel will be met by two docking tugboats, which will help the vessel maneuver alongside the VEDT dock. A "scoreboard" will help the pilots bring the vessel up to the dock by indicating the speed and angle of the approach. Line handlers will place the vessel's lines on the shore mooring hooks. Each mooring hook has a strain gauge that provides feedback on the amount of tension on each line. The mooring lines will be monitored in accordance with a mooring line management system to help maintain the proper line tension to keep the vessel tight alongside the dock during loading.[435]

Booming and Connection of Cargo and Vapor Hoses. Once a vessel is tied up at the dock, the Terminal-Person-In-Charge (TPIC) will instruct the booming contractor that mooring is complete and the boom is to be deployed around the vessel. Boom anchors and anchor buoys will be set in three locations on the offshore side of the ship to secure the boom. The boom is

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[432] Tr. 819-20, vol. 4; Ex. 0120-000159-172-TSS.
[433] Ex. 0121-000046-TSS.
[434] PFT of Bayer 8.
[435] PFT of Bayer 8; Tr. 791-92, vol. 4; Tr. 582, 584, vol. 3.

towed into position and secured to the anchors. The port (downriver) side of the boom and the section of the boom anchored on the starboard (upriver) bow are then connected to the permanent fence boom that runs on the inboard side of the vessel, which fully encapsulates the vessel by boom.[436] A portion of the boom (fence boom) is permanently installed because it is worked through all of the pilings.[437] (The pre-booming process is discussed in more detail later in this portion of the Order.) Once the boom is in place, the TPIC communicates with the Vessel-Person-In-Charge (VPIC) to connect the terminal cargo and vapor hoses to the vessel. The VPIC ensures that the hoses are properly connected with new gaskets and are fully tightened and supported. The TPIC and the VPIC then walk around the vessel deck to ensure all safety devices are in place and functioning.[438]

Key Meeting and Approval to Receive Cargo. Following the deck safety inspection, the TPIC and VPIC conduct a Key Meeting (pre-transfer conference), using a detailed template known as a Declaration of Inspection.[439] The TPIC and VPIC discuss the loading plan, start and stop procedures, topping off procedures, communication protocols, and expected time the vessel will be alongside.[440] After the Key Meeting is completed and the Declaration of Inspection is signed, the VPIC will check to make sure all valves are in proper position and, upon VEDT request, will communicate the vessel's readiness to receive cargo.[441]

Transfer of Crude Oil. At the start of the loading operation, oil will start flowing toward the vessel at a slow rate, and the VEDT will ask the vessel to confirm flow into the cargo tanks. Upon confirmation, the flow rate will gradually increase up to the maximum rate. During the loading process, the quantity of oil delivered and received is monitored between the VEDT and the vessel. The flow rate is slowed at the point where loading is almost complete. Once loading is completed, the cargo hoses are drained and blanked before returning them to the shore storage position.[442] It will take approximately 16-20 hours to fully load each vessel.[443]

There is a 30-second shutoff valve in case there is a problem during loading. In addition, there are valves at the dock, at the header, and one on the land side. As soon as an incident happens, the valves on the tank shut down. Because the pipeline is designed with vertical expansion loops, should the line rupture completely, it would only flow so much material before it was air gapped and stopped.[444]

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[436] PFT of Bayer 9; Tr. 793, vol. 4.
[437] Tr. 1407, vol. 6.
[438] PFT of Bayer 9; Tr. 796, vol. 4.
[439] WAC 173-180-235.
[440] PFT of Bayer 9; Tr. 793, vol. 4.
[441] PFT of Bayer 9-10; Tr. 796-97, vol. 4.
[442] PFT of Bayer 10; Tr. 796-800, vol. 4.
[443] Tr. 798-99, vol. 4.
[444] Tr. 610-12, vol. 3.

(2) Risk of Collision at the Dock

DNV GL Analysis. DNV GL evaluated the frequency of oil spills resulting from a passing vessel colliding with a vessel moored at the dock. DNV GL modified a methodology that was previously developed for vessels striking bridges.[445] The risk of an oil spill occurring from the strike of a vessel while it is at berth is very low and varies by type of vessel.[446] An oil spill of once every 25,000 years is predicted for a 47,000 DWT tanker. An oil spill of once every 100,000 years is predicted for a 105,000 DWT tanker. The predicted frequency of an oil spill from a 165,000 DWT colliding while at berth is once every 1.6 million years.[447]

The Council's Summary Analysis of Collision Risks at the Dock. Based on estimates that the risk of a vessel colliding with a vessel at the VEDT dock as being between once in every 25,000 years to once every 165,000 years, the Council concludes that the risk of a vessel colliding with a vessel at the VEDT dock is remote. The Council will therefore not move this issue into its balancing of public interest impacts in Section IV of this Order.

(3) Risk of Spills during Cargo Loading at the Dock

With regard to water quality impacts, Tesoro Savage references WAC 463-62-060,[448] which provides that site certification agreements shall require that wastewater discharges from the facilities comply with applicable state water quality, groundwater quality, and sediment quality standards, along with the requirements of the Federal Water Pollution Control Act. Tesoro Savage asserts that the VEDT will comply with these requirements during construction and normal operations.[449] For the purpose of this Order, the Council accepts that contention.

For other topics asserted to be subject to WAC 463-62, Tesoro Savage has taken the position that compliance with the WAC 463-62 rules ends the Council's analysis in this Order. For water quality impacts, however, Tesoro Savage concedes that the Council's ability to consider the impacts of non-routine oils spills is unconstrained by WAC 463-62-060 and Tesoro Savage's compliance with the rule.[450] Tesoro Savage argues instead that the Council may consider non-routine oil spills in this Order in a fashion unconstrained by the rule, but that such non-routine oil spills are adequately addressed by spill prevention and response measures.[451]

DNV GL's Analysis of Spills at the Dock. Vessel loading risk for dock spills could be significant. The evidence presented to the Council is inconsistent with regard to the amount of oil that could be spilled and how often a spill could be expected to occur.

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[445] Tr. 1341-42, vol. 6.
[446] Tr. 1342, vol. 6; Ex. 0120-000116-TSS.
[447] PFT of O'Mara 6; Tr. 1343, vol. 6; Ex. 0120-000008-TSS.
[448] Applicant Post-Hr'g Br. 43-44
[449] Applicant Post-Hr'g Br. 44.
[450] Applicant Post-Hr'g Br. 44
[451] Applicant Post-Hr'g Br. 44.

The first estimates were provided by DNV GL, which used two different methods to assess the frequency and volume of spills during loading. Method 1 made assumptions using standard quantitative risk assessment (QRA) methodologies and Method 2 was based upon actual spill data.[452]

Under Method 1, QRA methodologies assume certain failure rates for pipeline and components such as valves. A 30-second emergency shutdown capable of stopping the flow of oil at this facility is required under state regulation.[453] Every valve at the VEDT will close within 30 seconds. A secondary line goes back to the tanks, so that if there is a shutdown, an overpressure situation is not created.[454] The 30-second automatic shutoff for the ESD (emergency shutdown) valves was applied and drawings of the pipeline were reviewed to identify isolatable sections, so that if a leak occurred, the ESD valves would close and segregate the oil within those sections. In order to account for the volume of oil spilled, he assumed delay in response by one-hour.[455]

In Method 2, DNV GL applied U.S.-specific data as well as Tesoro Savage-specific operational data to consider factors such as containment affecting the likelihood of spilled oil reaching the river. Method 2 also considered that each loading hose would be replaced every 7 years on a mandatory basis as part of the spill frequency calculations. Method 1 strictly considered spill volume. There was only a small amount of data available for input into Method 2, but DNV GL used the spills that Ecology and Tesoro Savage had available. Method 2 assessment could conceivably be questioned because of data insufficiency.[456]

Under both Methods 1 and 2, DNV GL believes small spills are most likely. A spill of less than 50 bbl constituted about 60 percent of the release frequency. The release frequency differed from once every 1300 years under Method 1, and once every 7 years under Method 2.[457] For spill volumes between 50 and 100 bbl, the release frequency was the same under both methods: 1 spill every 42,000 years. For spill volumes between 100 and 500 bbl, Method 1 showed a recurrence level of once every 8 years, but Method 2 indicated a recurrence of such a spill level as once every 160 years. For spill volumes of 500 to 1000 bbl, Method 1 indicated a recurrence of once every 590 years, but Method 2 produced a recurrence of once every 1,500,000 years.[458]

DNV GL acknowledged the disparity in frequency intervals between Method 1 and Method 2. Mr. O'Meara indicated that he would give more credence to the assessment

[452] PFT of O'Mara 6-7; Tr. 1347-48, 1367-69, vol. 6; Ex. 0120-000009-TSS, Ex. 0120-000117-138-TSS, Ex. 0120-000173-210-TSS.

[453] WAC 173-180-250.

[454] Tr. 599-600, vol. 3.

[455] Tr. 1347-48, 1368-69, vol. 6; Ex. 0120-000009-TSS.

[456] Tr. 1348, 1368-69, vol. 6; Ex. 0120-000009-TSS.

[457] Tr. 1347-49, 1363, 1370, vol. 6; PFT of O'Mara 7; Ex. 0120-000010-TSS, Ex. 0120-000133-TSS.

[458] PFT of O'Mara 7; Ex. 0120-000010-TSS, Ex. 0120-000130-TSS.

produced under Method 1 simply because of the lack of data that was available for input into the calculations used in Method 2.[459] Likewise, the Council finds that data generated through Method 1 is more credible than conflicting data generated through Method 2, which may suffer from an insufficiency of input data.

Second, the DNV GL report also looked at potential releases based upon different sized holes in the pipeline and connecting equipment caused by facility operations.[460] The isolation time for a major loading hose failure is deemed to be 60 seconds. The likelihood of a full-bore rupture of a 36-inch loading pipeline would result in a spill quantity of 31,600 barrels, but according to the report is likely to occur only once every 4200 years.[461]

Third, Susan Harvey estimated that if Tesoro Savage is loading at 32,000 bbl per hour and the operator is able to respond within one minute to manually stop the transfer by pushing the emergency shutdown system button, and the emergency shutdown system takes at least 30 seconds to stop a transfer, over 33,000 gallons of oil (or 786 bbl) will spill in that one and one-half minute period. If an isolation device fails, the spill volume will increase proportionately until the leak is isolated.[462] In contrast, Tesoro Savage's David Corpron estimated that 267 bbl could spill in 30 seconds (or 801 bbl in one and one-half minute).[463]Although these are both estimates, the Council cannot discard Ms. Harvey's estimate given the fact that DNV GL's estimate was similar.

The DNV GL report defined consequences as the volume of oil spilled and did not look beyond that measure. Consequences such as human injury, environmental damage, or economic loss were not considered. Mr. O'Mara testified that an assessment regarding potential accidents and their severity does not include criteria for risk acceptance because no such criteria exist. Risk acceptance, which is the frequency of incidents and the consequences that could be tolerated would need to be determined by the Council in this case.[464]

Potential Impact of an Earthquake While Loading Oil at the Dock. The oil spill risk assessment associated with vessel loading does not appear to take into consideration pipeline failures due to earthquakes. The pipeline leading to the VEDT dock and the dock itself are located in areas that are highly susceptible to liquefaction. Pipeline infrastructure historically performs poorly in areas where differential settlement of the soil occurs. Besides the rupture of pipes, damage can include severing of valves and pipes at tank connections.465 The piping can only handle up to 12 inches of settlement.466 The ASC itself observes that:

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[459] Tr. 1371-72, vol. 6.
[460] Ex. 0120-000126-TSS.
[461] Ex. 0120-000126-127-TSS, Ex. 0120-000131-TSS.
[462] PFT of Harvey 47, 50-51.
[463] Tr. 630, vol. 3.
[464] Tr. 1365-66, vol. 6.
[465] Tr. 3016-17, 3029-30, vol. 13; PFT of Wartman 14-15.
[466] Tr. 605, vol. 3.

“Lateral spreading of the riverbank at the dock during a seismic event would induce large lateral forces on the in-water piles for the trestles and/or dock.”467 The ASC also states that “[p]otential sliding of portions of the shoreline embankment south of and downslope from the system of proposed ground improvements is not mitigated by these [seismic] improvements and, if this sliding occurs, it could deform the dock or displace a moored vessel.”[468] As noted earlier, it will take approximately 16 to 20 hours to load a tanker at the facility so it is reasonable to assume that a tanker would be in the loading process when an earthquake strikes.

The second control room, which will control the flow of oil as well as the VEDT fire systems, would be located adjacent to the dock.[469] It is not certain whether the 60-second assumed isolation time to seal off potential releases is realistic in the event of a major earthquake. Nor is it clear that the second control room will still be standing if there is a major earthquake. It is also not clear that the primary control room could shut down operations near the dock if the infrastructure is substantially damaged.

As noted by Worley Parsons in the Vessel Traffic Risk Assessment Traffic Impact Analysis, “[o]f all the data inputs needed to calculate spill volume probabilities during loading operations, emergency shutdown time is the most critical. . . . Failure to initiate emergency shutdown within one minute of commencement of a leak could result in a significantly greater spill quantity.”[470]

The Council is thus convinced that there is a significant risk of a substantial oil spill during the vessel loading process due to an earthquake. This finding is based upon: the 15 percent chance of a major Cascadia Subduction Zone earthquake during the 50-year design life of the project, a portion of the pipeline and the marine terminal being located in highly liquefiable soils, the poor performance of pipeline infrastructure during earthquakes, the likelihood of such an earthquake occurring during the vessel loading process, questions regarding the ability of the emergency shutoff systems to perform during a catastrophe, and the acknowledgement by the risk assessment co-authors that failure to achieve an emergency shutdown within the 60-second isolation time period could significantly increase the quantity of oil spilled.

The Efficacy of Spill Containment below the Dock Load-Out Structure. Oil spill containment measures at the dock address some spill scenarios, but may be insufficient in others. Tesoro Savage’s original proposal provided approximately 3 bbl of capacity for spill containment during cargo loading. The containment would be located below the load-out

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[467] Ex. 0001-000379-PCE.
[468] Ex. 0001-000383-PCE.
[469] Ex. 0121-000106-TSS.
[470] Ex. 0121-000114-TSS.

structure.[471] The oil would go to an oil-water separator, then to a pretreatment filter, and then to an activated carbon system.[472]

Three bbl of capacity for spill containment is at the low end of possible spill volumes discussed by the witnesses. DNV GL predicted that 60 percent of the spills would be less than 50 bbl, but also that spills up to 31,600 bbl could theoretically occur. Tesoro Savage later recognized that more than 3 bbl of oil could spill and committed to redesign the spill containment at the dock to include a sump attached to diversion piping to divert crude oil in a shutdown situation and increase the capacity of the three-barrel containment through the additional pumping capability.[473]

Summary of the Council's Analysis of Spill Risks during Cargo Loading. Spills of varying sizes could occur during cargo loading at the dock. DNV GL's most robust prediction of recurrence frequencies is that a spill less than 50 bbl will occur every 1300 years, a spill between 50 and 100 bbl will occur every 42,000 years, a spill between 100 and 500 bbl will occur every 8 years, and a spill between 500 to 1000 bbl will occur every 590 years. DNV GL predicted that a full-bore rupture of a 36-inch loading pipeline would result in a spill quantity of 31,600 bbl. The Council also takes into account evidence that if Tesoro Savage is loading at 32,000 bbl per hour and the operator is able to respond within one minute to manually stop the transfer by pushing the emergency shutdown system button, and the emergency shutdown system takes at least 30 seconds to stop a transfer, over 33,000 gallons of oil (or 786 bbl) will spill in that one and one-half minute period. If an isolation device fails, the spill volume will increase proportionately until the leak is isolated. This is similar to David Corpron's estimate that 267 bbl could spill in 30 seconds (or 801 bbl in one and one-half minute).

Oil spill containment measures may be sufficient for some spills but insufficient in others. Tesoro Savage's original proposal provided approximately 3 bbl of capacity of spill containment. Tesoro Savage recognized that its planned 3 bbl of containment capacity was insufficient and offered to include a sump attached to piping to divert crude in a shutdown situation and increase capacity through the additional pumping capability.[474] Tesoro Savage did not identify or demonstrate the capacity of such a system.

These analyses do not appear to take into account the oil spill risk associated with earthquakes that reasonably could occur while a vessel loading cargo for 16–20 hours at the dock. It is uncertain whether the 60-second assumed isolation time to seal off potential releases is realistic in a major earthquake. The second control room may not remain standing or if the shutoff infrastructure will remain functional.

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[471] Tr. 808-09, vol. 4; Tr. 588-89, vol. 3.
[472] Tr. 588, vol. 3.
[473] Tr. 5060, vol. 21.
[474] Tr. 5060, vol. 21.

Based on this record, Tesoro Savage has not demonstrated that spills are so unlikely and capture infrastructure so uniformly effective that oils spills—even spills of significant size—will not enter the Columbia River. The Council therefore moves this issue into its balancing analysis in Section IV of this Order.

(4) The Efficacy of Booming to Address Spills of Crude Oil into the Columbia River

(a) The Efficacy of Pre-Booming

Washington Requirements. Pre-booming of vessels is generally required by the State of Washington when a loading facility transfers oil to a tanker at a rate that exceeds 500 gallons per minute if it is safe and effective to pre-boom.[475] If it is not safe and effective to pre-boom, then the deliverer of the oil must follow alternative measures. The alternative measures include having boom and response equipment on hand.[476]

The Choice to Pre-Boom or Not Pre-Boom. Operators on the Columbia River consider certain personnel safety criteria when deciding whether to pre-boom. Tesoro Savage personnel may decide that it is unsafe for workers to deploy oil boom even though the environmental conditions are not exceeded.[477] The decision-making regarding pre-booming depends on the current wind and wave actions observed by the TPIC, forecasted weather information, and river current information when necessary. The TPIC and the boom boat captain must agree that pre-booming can occur in a safe and effective manner before pre-booming may occur.[478]

Tesoro Savage has developed a color-coded pre-boom decision tool it will use for deploying or not deploying boom. The tool uses three different ranges of environmental conditions to create a green, orange, and red category for decision-making regarding boom deployment.[479] If all environmental conditions are green, the boom will be deployed.[480] If one environmental condition is orange, then the TPIC and the boom boat captain consult to determine on a case-by-case basis whether the boom boat can operate safely in the existing and forecasted conditions, and whether the boom will operate to contain any potential oil.[481] If one environmental condition is red under the color-coded decision tool, then pre-booming will not

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[475] WAC 173-180-221(1); WAC173-184-110(2)(a).

[476] WAC 173-180-221(7).

[477] Ex. 0001-003182-PCE.

[478] Ex. 0001-003207-PCE.

[479] Ex. 0001-003181-PCE.

[480] The conditions within the green range are winds within 0 to 10 knots; wave height of less than 1 foot; wave type consists of low swells, ripples, or flat and calm; currents are less than 0.5 knot; and visibility is unlimited. Ex. 0001-003181-PCE.

[481] The conditions within the orange range are: winds between 10 to 20 knots; wave height of 1 to 3 feet; wave type consists of slight chop, steep swells, or white caps; currents between 0.5 to 1 knot; and visibility less than 2 miles but at least 1,000 feet. Ex. 0001-003181-PCE.

occur. [482] Personnel safety may also be compromised by icy conditions or floating debris in the water, which may result in a decision not to pre-boom.[483]

That same report sets forth different criteria for environmental conditions above which the TPIC will consider it not safe or effective to pre-boom. These are: sustained wind speed of greater than 30 knots; wave heights of greater than 2 to 2.5 feet; water current speed greater than 1.5 knots; low visibility; freezing and icy conditions; and the presence of large floating or barely submerged debris.[484] There was conflicting testimony on the threshold at which pre-booming would not be attempted: when current speeds exceed 1 knot vs. current speeds exceeding 1.5 knots. Based on the testimony taken as a whole, it appears that Tesoro Savage intends to use a current speed of 1.5 knots as the threshold over which it will not pre-boom.[485]

Effectiveness of Pre-Booming. When currents push against the boom, the oil may begin to slip under the boom skirt (entrainment). A generally accepted rule among the response industry is that current speeds between 0.8 to 1.0 knots will begin to result in product loss, and current speed that exceeds 1.5 knots will result in significant or complete product loss to the extent that the boom efficacy approaches zero. This applies when the long axis of the boom is perpendicular to the current.[486] As a boom angle is adjusted so that it is parallel with the direction of the current, less oil is lost due to entrainment. When the boom needs to surround a vessel, however, such as would be required during the proposed vessel loading operation, there are limited booming configurations. This is because some portion of the downstream end of the boom will be nearly perpendicular with the current, which will reduce the effectiveness of the boom in that location.[487]

The testimony of Tesoro Savage's expert, Eric Haugstad, was contradictory between his pre-filed and his live testimony. In his pre-filed testimony, Mr. Haugstad stated that conventional booms will fail at 0.75 to 1.0 knot of current.[488] In contrast, during his live testimony he stated that a contractor's boom will begin to fail at about 1.5 knots. Mr. Haugstad testified that above 1.5 knots, some oil will begin to collect, but then it gets entrained under the boom by the current and pops back up downstream.[489] It is possible that Mr. Haugstad was describing how a boom at the dock could be configured in a manner that it would still retain its efficacy at 1.5 knots, but this was not specifically stated.

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[482] The conditions within the red range are: winds in excess of 20 knots; wave height of more than 3 feet; wave type consists of steep, choppy, breaking waves; currents in excess of 1 knot; and visibility of less than 1000 feet. Ex. 0001-003181-PCE.

[483] Ex. 0001-003182-PCE, Ex. 0001-003186-PCE.

[484] Ex. 0001-003183-84-PCE, Ex. 0001-003199-200-PCE; PFT of Taylor 34.

[485] PFT of Taylor 34.

[486] Ex. 0001-003183-PCE, Ex. 0001-003199-PCE.

[487] Ex. 0001-003199-PCE.

[488] PFT of Haugstad 11.

[489] Tr. 1408, vol. 6.

Because it is a generally accepted rule among the response industry that the failure rate of a conventional boom is around 1.0 knot when the boom is perpendicular to the current, and at least a portion of the downstream boom will be perpendicular with the current, the Council finds that the boom which the VEDT will use for pre-booming will begin to fail when current speed exceeds 1.0 knot. It should also be noted that Tesoro Savage intends to deploy approximately 1600 feet of fence boom at the dock. Fence booms are less effective in rough water because wave and wind action can cause the boom to twist.[490]

Current Speeds at the VEDT. There is no continuous and long-term recorded river current speed data for the Columbia River at the Port. Mr. Haugstad maintains that the current will stay right at 1 knot or a little below it for much of the year.[491] However, based upon years of experience at its nearby dock and other data, there is an expectation that the surface current speed will exceed 1 knot on a frequent basis all months of the year, and will occasionally exceed 3 to 5 knots during spring flood flows.[492] Currents of over 1.5 knots at the dock are more seasonally driven by winter runoff, and by the amount of water, the upstream dams are releasing. According to modeled flow data taken for the area during the 2003 to 2006 time period[493] by the National Oceanic and Atmosphere Administration (NOAA) Northwest River Forecast Center in Portland, the monthly average current velocity ranged from 0.7 to 1.8 knots, with maximum current speed exceeding 1 knot part of the time in all months.[494]

Mr. Haugstad expects that current speed will be a deterrent to effective pre-booming at the terminal for a substantial portion of the year.[495] He used 2 knots as the average for planning purposes.[496] The VEDT Opponents' expert, Susan Harvey, who is a Petroleum and Environmental Engineer, agreed. She opined that current in the Columbia River can inhibit or prevent effective booming and said that pre-booming would rarely be implemented using the color-coded pre-boom decision tool.[497]

Wave Height and Period at the VEDT. Continuously recorded data regarding wave height and period does not exist for the Port. The terminal manager has reported that southeasterly and northwesterly winds exceeding 25 knots may occur, resulting in waves greater than 2 to 2.5 feet high that could affect pre-booming safety and the effectiveness of booming.[498] Another generally accepted rule in the response industry is that waves of 1.5 to 2.0 feet high will result in splash over of water and reduce the boom effectiveness by 10 to 20 percent. Waves that are over 2 feet high dramatically decrease the effectiveness of the boom through wash over. Waves that exceed 2.5 feet in height render the boom essentially useless

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[490] Ex. 0001-003198-PCE.
[491] Tr. 1408-09, vol. 6.
[492] Ex. 0001-003187-PCE, Ex. 0001-003199-PCE.
[493] The data did not include the entire 2003 to 2006 time period. Ex. 0001-003187-PCE.
[494] Ex. 0001-003182-PCE, Ex. 0001-003187-PCE; PFT of Harvey 49.
[495] Ex. 0001-003199-PCE.
[496] Tr. 1431, vol. 6.
[497] PFT of Harvey 48-49.
[498] Ex. 0001-003182-PCE, Ex. 0001-003187-PCE.

even when there is no current speed. Wave height will occasionally be a factor in limiting booming operations at the site.[499]

Wave steepness, or chop, is the main wave-related issue for boom effectiveness. If a wave is rolling, a boom will just glide over it and remain effective. A boom is less effective if there is chop with a lot of splash over because there is a lifting effect from the chop, and oil can be spilled over the top of the boom.[500] The boom is not as fluid as water, and gaps and spaces are created when the waves and the boom interact. Water will splash over and underneath the boom when wind and waves occur.[501]

Wind velocity data taken from Pearson Field Airport, which is about 2 miles east of Vancouver, indicate that wind in the area averages about 8 to 11 miles per hour during October through March, and approximately 8 miles per hour for April through September. Maximum sustained wind can occasionally exceed more than twice these averages.[502] Small craft advisory conditions may be considered when determining personnel safety in a pre-booming decision.[503] In the area of the facility, there are not high sustained winds or a significant wave chop much of the time.[504]

(b) The Efficacy of Stand-By Booming

Effectiveness and Locations of NOFI Current Buster Number 2 Stand-By Booms. Stand-by booming as a mitigation measure has limited effectiveness. Tesoro Savage will have a boom boat crewed up and in the water whenever there is a vessel alongside the dock, regardless of the weather conditions, current, or river conditions. The boom boat crew would be ready to deploy a NOFI Current Buster Number 2 boom as spill mitigation if pre-booming is not deployed.[505] The NOFI Current Buster Number 2 booms have been tested and can still contain oil in currents up to 5 knots.[506] Unlike conventional booms that are built by closed cell foam logs which are very rigid, the NOFI booms are air-inflated and have good wave conformity.[507]

Tesoro has purchased two NOFI Current Busters Number 2.[508] One is in Vancouver and the other is in Portland. Tesoro Savage intends to move the boom located in Portland to Pasco.[509] The Marine Fire and Safety Association either already have a NOFI Current Buster

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499 Ex. 0001-003199-PCE; PFT of Harvey 51.
500 Tr. 1818, vol. 8.
501 Tr. 4300-01, vol. 18.
502 Ex. 0001-003182-83-PCE.
503 Ex. 0001-003197-PCE.
504 Tr. 4395-96, vol. 19.
505 Tr. 1408, vol. 18; Tr. 5066, 5079-80, vol. 21.
506 PFT of Haugstad 11; Tr. 1399-400, 1402, vol. 6.
507 Tr. 1402-03, vol. 6.
508 Tr. 1399-400, 1408, vol. 6.
509 Tr. 5066, vol. 21.

or are purchasing one. The Marine Spill Response Corporation (MSRC) has three NOFI Current Busters. One is located in Astoria and the other two are located in Puget Sound.[510]

NOFI Current Buster would not be pre-deployed, and it takes approximately 20 minutes to deploy.[511] If the current is running at 2 knots, the oil is going to move about 2.3 miles downstream in an hour. If the current is at 5 knots, the oil will travel a good distance within the 20 minutes it takes to deploy the boom.[512] If fire were involved as part of the spill, the boom would not be deployed at all.[513]

VEDT Opponents question the efficacy of claims of the NOFI Current Busters. The NOFI Current Buster systems are deployed and operated typically by large, deep draft vessels in large open water areas and ocean. They are able to quickly collect oil over large areas when the water surface is very calm and the water surface speed is about 2 knots. The efficiency of the collection drops from approximately 91 percent to 68 percent when the water has a 6-to-12-inch wave chop. A 6-to-12-inch chop is relatively calm on the Columbia River.[514] The most significant wind conditions are in the Columbia Gorge area itself, but significant wind conditions can exist downriver to the ocean.[515]

For a marine open ocean situation, if 15 to 20 percent of the oil is recovered, the operation is going well. Percentage of recovery is typically higher on a river because it is confined.[516] A Tesoro Savage expert observed that in faster current, a boat can turn around and move in the direction of the current in advance of the oil with the boom trailing the boat.[517]

(c) The Efficacy of 13/30 Fuzzy Disc Skimmers

In addition to the oil containment at the dock and the booms, Tesoro has purchased two 13/30 fuzzy disc skimmers to remove oil from water to a nearby barge.[518] The discs are coated with a special fabric that increases the surface area that comes into contact with the oil. These skimmers are more efficient than traditional skimmers because they remove less water with the oil when it is removed. If the VEDT is approved, Tesoro expects to purchase mini barges that can store 100 bbl of oil that is recovered from the skimmers during an incident.[519]

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[510] Tr. 1402, vol. 6.
[511] Tr. 1450, 1457, vol. 6.
[512] Tr. 1457-58, vol. 6.
[513] Tr. 1458, vol. 6.
[514] Tr. 4301-03, vol. 18.
[515] Tr. 4308, vol. 18.
[516] Tr. 4403, vol. 19.
[517] Tr. 1821, vol. 8.
[518] Tr. 1400.
[519] PFT of Haugstad 12-13.

(d) Conditions When Tesoro Savage Will Stop Loading

Conditions that will shut down loading operations are very limited. Tesoro Savage has provided some guidance regarding when it would consider shutting down loading operations because of unsafe operating conditions. Conditions that may constitute unsafe operating conditions include high winds, electrical storms, and freezing conditions. When considering wind speeds, they must be sustained as opposed to gusts up to those speeds. Winds are sustained when the speed is constant for more than five minutes. When wind speeds reach 35 to 40 miles per hour, cargo operations are shut down and hoses are drained. If wind speeds are over 40 miles per hour, the hoses are drained, disconnected, and stowed if it is safe to do so. If wind speeds exceed 45 miles per hour, the vessel must prepare to sail if the vessel or wharf are in danger of sustaining damage.[520]

(e) Summary of the Council's Analysis of the Overall Effectiveness of Booming

Pre-Booming. The evidence establishes that pre-booming will either not occur or will be ineffective for much of the year primarily due to current speed. Wave steepness may also inhibit effective pre-booming. Even if Tesoro Savage chooses to pre-boom in currents up to 1.5 knots, conventional booms deployed perpendicular with the current tend to fail at 1 knot of current. Tesoro Savage expects that current speed will exceed 1.0 knot on a frequent basis during all months of the year. With spring flows approaching 3 to 5 knots, pre-booming would rarely occur or be effective during the entire spring season. Tesoro Savage also recognizes that current speed will be a deterrent to effective pre-booming at the terminal for a substantial portion of the year. According to Susan Harvey, the river current has a range of about one to six knots, depending on different factors. If the booms are only effective up to one or one and one-half knots, there is little overlap "[I]t's hard for me to conceive that booms are going to be effective."[521]

Stand-By Booming. Clearly, the proposed stand-by booming is a helpful mitigation measure, but with only limited effectiveness. The boom will not be pre-deployed and deployment takes about 20 minutes. Some oil will be able to travel for miles downstream before the NOFI Current Buster Number 2 boom is placed into service. Even if this type of boom is effective up to 5 knots of current, a 6-to-12-inch wave chop in the river will limit the boom's effectiveness. If fire were involved as part of a spill, the boom would not be used at all.

Stop Loading Decisions. No current or wave chop thresholds are listed that would shut down loading operations. It is possible, therefore, for loading to occur even during times when a small craft advisory has been issued because of conditions on the river. Assuming pre-booming would not take place when a small craft advisory has been issued, the Council finds it implausible that booming employed as a mitigation measure would be effective if a

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[520] Tr. 5071, vol. 21; Tr. 1409-10, vol. 6; Ex. 0001-003203-PCE.
[521] Tr. 4098, vol. 17.

spill occurred when there is a small craft advisory for wave conditions. The adverse conditions, which would be present during a small craft advisory, would likely increase the time it already takes to deploy a mitigation boom, and the effectiveness of the boom under such conditions would be questionable. The ability to boom downriver if a spill occurs during a small craft advisory issued for wave conditions is also questionable. It may be many miles before conditions would allow a boom downriver to be deployed. Even if the safety of the tanker that is being loaded is not in question, the Council must also be cognizant of environmental risks associated with a spill.

d. Vessels Departing the VEDT and Travelling Downriver

(1) The Decision to Depart the VEDT

Weather and river bar conditions are monitored during the loading process, and coordination is maintained between the vessel agents, Columbia River Pilots, and Columbia Bar Pilots to ensure that the loaded vessel does not leave the VEDT unless it can proceed directly to sea without anchoring in the river. Loaded vessels sit deeper in the water and are more affected by current than empty vessels, so they are more susceptible to dragging anchor and moving during periods of higher current or inclement weather.[522]

(2) Transit Risks on the Columbia River

Narrow stretches of the River. Using Google Earth software, Susan Harvey measured narrow channel sections of the Columbia River and testified that two vessels would have difficulty passing each other in two locations: Prescott, and Pearcy Island near Kelley Point.[523]

Mr. O'Mara testified that Google Earth is not a navigation tool and that the DNV GL model took the width of the river and the width of the shipping channel into consideration as part of its analysis.[524]

Captain Bayer also disagreed with Ms. Harvey's contention. Ms. Harvey points to the narrowness of the 1966-feet-wide channel at Prescott. However, the depth of the river is actually deeper than the maintained navigation channel almost from bank to bank. Therefore, there is a wide area to navigate a vessel near Prescott. Regarding Kelley Point, the whole area between the terminal and Kelley Point is designated as an anchorage area to allow deep draft vessels to anchor there to keep the navigation area clear. Moreover, the docking tugs come to meet the ship in the vicinity of Kelley Point. The docking tugs put the ship under the control of the pilot with the tugs.[525]

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[522] PFT of Bayer 10.
[523] PFT of Harvey 6-8.
[524] Tr. 1350, vol. 6.
[525] Tr. 836-38, vol. 4.

The Council finds Captain Bayer's testimony to be more credible than Ms. Harvey's because of Captain Bayer's extensive history in the maritime industry, his work to develop voyage plans for the Columbia River and Columbia Bar, and his experience transiting the river.[526]

1984 Mobil Oil Tanker Grounding. Laden tankers have grounded on the Columbia River in the past, including the Mobil Oil tanker loaded with oil that lost steering due to an equipment malfunction in 1984. This grounding occurred approximately one mile upstream from St. Helen's, OR, which is approximately 19 miles downstream from the VEDT. The grounding took place in a section of the Columbia River that is approximately 3200 feet wide. NOAA estimated that approximately 3925 bbl of oil leaked into the river. Most of the oil was rapidly transported down the river within two to three days and swept out to sea despite cleanup efforts. NOAA reported adverse impacts to birds, fish wildlife, and the shorelines as a result of this spill. Susan Harvey observed that the spill represents only 1.2 percent of the VEDT's most commonly planned tanker cargo size (approximately 360,000 bbl), and only 0.7 percent of the proposed maximum cargo size (600,000 bbl).[527]

The Mobil Oil spill was the equivalent of about 3 or 4 train cars spilling, but the oil got to the mouth of the Columbia in less than 3 days. The oil was medium weight, meaning it was not as thin as Bakken oil or as heavy as dilbit. The spilled oil mixed down into the water column and into the sediments, and NOAA Fisheries detected oil chemically in the mouths and tissues of sturgeon in that oil fingerprint.[528] Within the Columbia River there are swirls and eddies, and areas where the river has a lot of energy, which is how oil gets mixed into the water column.

Post-1984 Changes in Technology, Vessel Operations, and Design. Since the 1984 Mobil Oil tanker spill, there have been a number of changes in navigation technology, vessel operations, and vessel design. All tankers today are double-hulled. All tankers also subscribe to the International Safety Management System consisting of the policies, procedures, checklists, training, and the ability to track crew training. Direct engine control is now from the bridge, which reduces delays when emergency action needs to be taken. Steering motors have also improved.[529] The steering mechanism that was the causal factor in the 1984 Mobil Oil spill is no longer permitted. Redundant steering is now designed and constructed into vessels, which is reflected in the model developed by DNV GL.[530]

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[526] PFT of Bayer 1-4.
[527] PFT of Harvey 11-12.
[528] Tr. 4096-97, vol. 17.
[529] Tr. 843-46, vol. 4.
[530] Tr.1357, vol. 6.

Automated Identification System and TV-32. DNV GL prepared a "Quantitative Vessel Traffic Risk Assessment"[531] to evaluate the transport of Bakken crude oil down the river and across the bar on three representative types of vessels: 46,654 DWT tankers, 105,278 DWT tankers, and 164,746 DWT tankers. DNV GL identified marine vessel traffic and historical traffic routes through the Automated Identification System (AIS), an automatic tracking system that allows vessels to identify and locate each other. Each vessel has a transponder that sends a unique signal identifying the vessel's characteristics. All vessels exceeding 300 gross tons must have AIS transmitters pursuant to the International Convention for the Safety of Life at Sea. A large number of smaller vessels also have been fitted with AIS. The AIS, by itself, provides only a small benefit in reducing collisions.[532]

The proprietary model used by DNV GL, the Marine Accident Risk Calculation System, uses AIS data for typically one year, which is the previous year to the study, for the study area. The Marine Accident Risk Calculation System considered marine vessels fitted with AIS for July 1, 2013, to June 30, 2014. During this period, approximately 10,000 vessels crossed the Columbia River Bar, and roughly 6,600 of these vessels continued upriver from Astoria.[533] TV-32 is an AIS-based navigation system that was developed in cooperation with the U.S. Department of Transportation and the Columbia River Pilots to provide information directly to the pilot, including real time position, speed, under keel water depth, vessel draft, and vessel location in relation to other vessels in the system. When vessels pass on the Columbia River, the pilots communicate with each other, and can see each other through TV-32. This system allows passage coordination in a wider area of the river. TV-32 is capable of calculating the distance between any two points on its display. This "vessel traffic information service" is used by all pilots and is licensed to other commercial operators on the lower Columbia River. TV-32 has contributed substantially to increased safety on the Columbia River over the last decade. It provides more accuracy than a ship's own equipment. Ongoing, periodic enhancements and upgrades to the TV-32 system are expected to continue to accommodate reasonably foreseeable increases in river traffic.[534]

Under Keel Clearance Management and Cooperative Practices. Under keel clearance is the distance between the deepest point on the vessel and the bottom of the channel in still water conditions. Under Keel Clearance Management is part of a ship's safety management system and is required for all commercial vessels. Under Keel Clearance Management also takes into account the tide, weather, and vessel characteristics. Vessels associated with the VEDT may only enter the Columbia River when they can traverse the entire river with at least 2 feet of under keel clearance for the river and 10 feet of clearance

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[531] Prior to the completion of the Quantitative Vessel Traffic Risk Assessment, Tesoro Savage contracted with DNV GL to perform a qualitative risk assessment based upon information and analysis that was already completed or provided. This "Vessel Traffic Risk Assessment Traffic Impact Analysis" was completed jointly with Worley Parsons and released in September 2014. PFT of O'Mara 3; Ex. 0121-000001-188-TSS.

[532] Tr. 1362, vol. 6; Ex. 0120-000034-TSS, Ex. 0120-000054-55-TSS.

[533] Tr. 1344-45, vol. 6; PFT of O'Mara 4; Ex. 0120-000006-TSS.

[534] PFT of Bayer 17; Tr. 832-33, vol. 4; Ex. 0120-000051-TSS; Ex. 0121-000048-49-TSS.

across the Columbia Bar. DNV GL estimates that this management reduces the risk of groundings by 10 percent.[535] The river is dredged to provide a 43-foot fresh water draft at 0 river gauge, but the actual depth of the river at its lowest point with 43-foot fresh water draft and 0 river gauge is 45 feet.[536] The 165,000 DWT tankers will not load in excess of approximately 600,000 bbl in order to ensure sufficient keel clearance.[537]

Columbia River Pilots avoid overtaking or meeting other vessels in certain stretches of the Columbia River as a cooperative practice. These areas are: Miller Sands (river mile [RM] 22 through 23); Brookfield (RM 28 through 34); Bugby Hole (RM 39 through 40); Bunker Hill (RM 54 through 57); and Warrior Rock (RM 84 through 90). DNV GL assumed this cooperative practice reduces collisions by about 90 percent.[538]

Predicted Incident Rates. The smallest vessel that will receive cargo at the VEDT also has the highest potential frequency of accidents primarily because this size vessel has the highest number of transits. The 47,000 DWT tanker comprised 79 percent of the transits, the 105,000 DWT tanker comprised 20 percent of the transits, and the 160,000 DWT vessel comprised 1 percent of the transits.[539] If more large vessels frequent the VEDT, the frequency risk of an incident involving those vessels will increase. The model results were compared with historical averages, and found to over-predict collisions and groundings by a factor of two to seven. The model predicts that the VEDT will increase the risk of marine incidents for current traffic on the Columbia River by approximately two percent. An incident of any type (including those that do not result in a spill) for a 47,000 DWT tanker is estimated to occur approximately once every 0.8 years. The estimated incident rate for 105,000 DWT tankers is once every 3 years. The estimated incident rate for 165,000 DWT tankers is once every 57 years.[540] Many of the predicted incidents would not result in an oil release.[541] The combination of the three vessel types results in a predicted grounding, collision with other vessels, or allisions (collision with a stationary object in the river) every 0.6 years, just over 7 months.[542] With tug escorts reducing the risk of grounding by 91 percent, the estimated frequency of these incidents drops to once every 2.8 years. The estimated frequency of a loaded outbound vessel incident is approximately half this, once every 5.7 years.[543]

Transit risk associated with vessels from other sources is very low. Fire, explosion, and foundering are transit risks associated with vessels that were also considered by the risk assessment prepared by DNV GL. Because the frequency of one of these events happening is

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[535] Ex. 0120-000056-TSS.
[536] PFT of Bayer 7.
[537] PFT of Bayer 7-8.
[538] Ex. 0120-000042-44-TSS, Ex. 0120-000050-TSS.
[539] Tr. 1375-76, vol. 6; Ex. 0120-000006-TSS.
[540] Ex. 0120-000007-08-TSS.
[541] Tr. 1366, 1375-76, vol. 6.
[542] PFT of O'Mara 5.
[543] Ex. 0120-000090-TSS.

so low, DNV GL focused primarily on collision and grounding.[544] The vessels will not be taking on fuel (bunkering) in the river.[545] The Council is satisfied that other transit risks posed by vessels are largely speculative and do not warrant mitigation or further consideration.

Predicted Oil Spill Rates. Estimated spill volumes for a vessel incident can be significant. DNV GL estimated the potential volume of oil being released by a vessel. A commercial naval architectural model, NAPA, looks at the different type of vessels and estimates damage to the vessel based on Monte Carlo simulations. A Monte Carlo simulation is a random query of different damage scenarios that may have occurred. In this case, the Monte Carlo database consists of actual incident damage to vessels, and 50,000 different scenarios were run. The simulation produces estimates of the probability of damage to particular vessels significant enough to cause a particular volume of oil spill. A 90 percent probability was used in the case of collisions, and a 50 percent probability was used in the case of grounding.[546] Tidal flow will affect the outflow in a grounding situation, but won't affect the outflow caused by a collision.[547]

DNV GL looked at the risk of a tanker grounding or colliding.[548] The DNV GL vessel traffic risk assessment model concluded that a tanker collision has a high probability of releasing 102,500 bbl from the largest 165,000 DWT tankers, 100,000 bbl from the 105,000 DWT tankers, and 58,700 bbl from the 47,000 DWT tankers. The model assumed that two oil cargo tanks would be penetrated by the collision. The majority of the oil volume would be driven by washout effects from water flowing into the void spaces between the hull and cargo tank and into the cargo tank. DNV GL assumes that 17 to 18 percent of the oil is released in a collision case.[549] This same model concludes that in case of grounding, there is a probability of releasing 31,900 bbl for 165,000 DWT tankers, 30,600 bbl from 105,500 DWT tankers, and 20,200 bbl from 47,000 DWT tankers. The model assumed that two cargo tanks would be breached because of the grounding. When the tanks are full, oil will wash out as water enters. However, eventually the oil will rise in the cargo tanks, and only water will be washed in and

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[544] Tr. 1343-44, vol. 6; Ex. 0120-000061-TSS, Ex. 0120-000064-TSS, Ex. 0120-000068-69-TSS, Ex. 0120-000100-TSS.

[545] Tr. 602, vol. 3.

[546] A probability of P_{90} was used to estimate oil spill volumes from a collision. A probability of P_{50} was used to estimate the oil spill volumes from a grounding incident. When a probability of P_{90} is used in the model to estimate releases due to grounding, it represents a breach in six cargo tanks. The report authors concluded that P_{90} results overstate the potential release from grounding. Ex. 0120-000105-TSS.

[547] Tr. 1346-47, 1354-55, vol. 6.

[548] Transit risk from other sources is very low. Fire, explosion, and foundering are transit risks associated with vessels that were also considered by DNV GL. Because the frequency of these events is so low, DNV GL focused primarily on collision and grounding. Tr. 1343-44, vol. 6; Ex. 0120-000061-TSS, Ex. 0120-000064-TSS, Ex. 0120-000068-69-TSS, Ex. 0120-000100-TSS. In addition, the vessels will not be taking on fuel (bunkering) in the river. Tr. 602, vol. 3. The Council is satisfied that other transit risks posed by vessels are largely speculative and do not warrant mitigation or further consideration.

[549] Ex. 0120-000104-TSS; PFT of Harvey 13.

out of the tank because the oil is lighter than water. DNV GL assumes that 5 to 6 percent of the oil is released in a grounding case.[550]

When these potential spills are compared to the 3925 bbl released in the 1984 Mobil Oil tanker spill, they equate to a spill volume of approximately 5 to 26 times larger orders of magnitude.[551] Any of these volumes exceeds the million-gallon (23,809 bbl) catastrophic standard for Washington State. Therefore, even if only part of a tanker spills as a result of a collision or grounding, it is still a significant spill.[552] Mr. O'Mara was not aware of the 1984 Mobil Oil spill when he modeled oil spill probabilities on the Columbia River.[553] The oil from the Mobil Oil spill traveled approximately 50 miles to the mouth of the Columbia River within 3 days.[554] DNV GL evaluated potential spill sizes based upon risk. It was not asked to prepare a worst-case discharge analysis that is required for planning purposes.[555] Ms. Harvey stated that the worst-case discharge analysis was ignored, but the potential worst-case discharge was used during spill drills.[556]

Risk Impacts of Tethered Tug Escorts. Tug escorts will significantly lower the risk from groundings for outbound vessels. A tug escort is not required under current regulations, but will be implemented by Tesoro Savage for all loaded vessels leaving the VEDT, including vessels that are not chartered by Tesoro. Tesoro Savage did not propose to use escort tugs in its application, but included this measure after reviewing the results of the risk assessment.[557]

DNV GL prepared the assessment to evaluate the risk of outbound tankers accompanied by a tethered tug escort. The model assumed that the tanker would be tethered in a tug-bow-to-tanker-stern position from the terminal until they reached Astoria. At Astoria, the tug would be released from the tanker, but stand by until the tanker crosses the Columbia Bar and is safely underway in the open ocean.[558] The tug escort risk assessment assumed one outbound tanker per day tethered to an escort tug. The vessels were assumed to travel between 8-12 knots. The escort tug was assumed to have capabilities such that in wind speeds up to 20 knots, there is a 90 percent probability that the tug would prevent a tanker in distress from grounding. As the wind increased, the probability of a successful save was assumed to decrease. The study only assessed the performance of the 47,000 DWT tanker in its risk model, which will be the type of tanker most frequently visiting the terminal.[559]

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[550] Ex. 0120-000104-TSS; PFT of Harvey 13.
[551] PFT of Harvey 13.
[552] Tr. 3576, vol. 15.
[553] Tr. 1357, vol. 6.
[554] Tr. 4096, vol. 17.
[555] Tr. 1356, vol. 6.
[556] PFT of Harvey 29; Tr. 1405-06, vol. 6.
[557] PFT of Bayer 13; Tr. 824-25, vol. 4; Tr. 5060-61, 5080-81, vol. 21.
[558] Ex. 0120-000140-TSS.
[559] The study states that the average percentage reduction would be the same for 105,000 DWT and 165,000 DWT vessels because the escort tubs have equivalent capabilities to handle these larger ships. Ex. 0120-000140-41-TSS.

After running its model, the DNV GL concluded that the effect of using the escort tug will result in a 91.45 percent average percentage reduction in grounding.[560] DNV GL then assessed the potential reduction in oil spill risk if tethered escort tugs are used for outbound vessels. The model predicted a reduction in oil spill risk from groundings from a recurrence interval of once every 31 years[561] to once every 370 years. The use of a tug escort reduces the spill risk from transit, which includes both grounding and collision, by 48 percent.[562] Although the use of pilots and escort tugs reduce the risk of collision and grounding, the risk is not eliminated.[563]

The Efficacy of Booming to Address Spilled Crude. As discussed above, stand-by booming can be helpful to recover oil spilled in the river, but may not always be effective. Tesoro will have two NOFI Current Busters Number 2, one in Vancouver and the other in Pasco. The Marine Fire and Safety Association either already have a NOFI Current Buster or are purchasing one. MSRC has an NOFI Current Buster in Astoria. The booms will take about 20 minutes to deploy, so crude oil will be able to travel for miles downstream before the booms are in place and ready to work. If there is a fire or 6-to-12-inch wave chop, the booms will either not be deployed or will have only limited effectiveness.

For a marine open ocean situation, if 15 to 20 percent of the oil is recovered, the operation is going well. Percentage of recovery is typically higher on a river because it is confined.[564] A Tesoro Savage expert observed that in faster current, a boat can turn around and move in the direction of the current in advance of the oil with the boom trailing the boat.[565]

Summary of the Council's Analysis of the Transit Risks on the River. Based on the evidence in the record, the Council regards Captain Bayer's testimony as credible that, in the two narrow areas of the river identified by Ms. Harvey, sufficient navigation width exists because the depth of the river is deeper than the maintained navigation channel almost from bank to bank near Prescott. At Kelley Point, the area between the terminal and the Point is designated as an anchorage area for deep draft vessels.

The 1984 Mobil Oil tanker grounding spilled the equivalent of about 3 or 4 train cars that reached the mouth of the Columbia River in less than 3 days, mixed into the water column and sediments, and ended up in the mouths and tissues of sturgeon.

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560 PFT of Bayer 13; Ex. 0120-000140-TSS.

561 Ex. 0120-000100-TSS, Table 6-41, depicts the annual oil spill frequency per incident type for oil tankers in the study area based upon future marine traffic. The frequency for both powered groundings and drift groundings are each listed at 0.016. When added together (0.032), this translates into a recurrence level of once every 31 years for any type of grounding.

562 Ex. 0120-000140-42-TSS.

563 PFT of Harvey 8-9.

564 Tr. 4403, vol. 19.

565 Tr. 1821, vol. 8.

However, since 1984 there have been changes in navigation technology, vessel operations, and vessel design that increase safety. For example, tankers are now double-hulled and subscribe to safety policies, procedures, checklists, and training. Direct engine control from the bridge reduces delays in emergencies. Steering motors have improved and the steering mechanism that was the causal factor in the 1984 is now prohibited.

Additional safety is provided by use of TV-32, which provides important vessel information directly to the Columbia River pilot and is capable of calculating the distance between any two points on its display. When vessels pass, pilots communicate with each other, and can see each other through TV-32. This "vessel traffic information service" is used by all pilots and is licensed to other commercial operators on the lower Columbia River. TV-32 has contributed substantially to increased safety on the Columbia River over the last decade. Moreover, the use of Under Keel Clearance Management practices has reduced the risk of groundings by 10 percent. Columbia River Pilots also cooperatively avoid overtaking or meeting other vessels in five stretches of the river and DNV GL assumes this practice reduces collisions by about 90 percent.

Nonetheless, DNV GL predicts that the VEDT will increase the risk of marine incidents for current traffic on the Columbia River by approximately 2 percent. An incident of any type (including those that do not result in a spill) for a 47,000 DWT tanker is estimated to occur approximately once every 0.8 years. The estimated incident rate for 105,000 DWT tankers is once every 3 years. The estimated incident rate for 165,000 DWT tankers is once every 57 years.

Although many of the predicted incidents would not result in an oil release, estimates of spill volumes for a vessel incident can be significant. The DNV GL vessel traffic risk assessment model concluded that a tanker collision has a high probability of releasing 102,500 bbl from the largest 165,000 DWT tankers, 100,000 bbl from the 105,000 DWT tankers, and 58,700 bbl from the 47,000 DWT tankers. This same model concludes that in case of grounding, there is a probability of releasing 31,900 bbl for 165,000 DWT tankers, 30,600 bbl from 105,500 DWT tankers, and 20,200 bbl from 47,000 DWT tankers.

That being said, tug escorts will significantly lower the risk from groundings for outbound vessels. A tug escort will be implemented by Tesoro Savage for all loaded vessels leaving the VEDT. DNV GL assessed the risk of the 47,000 DWT outbound tankers accompanied by a tethered tug escort. DNV GL concluded that using the escort tug will result in a 91.45 percent average percentage reduction in grounding. DNV GL then assessed the potential reduction in oil spill risk if tethered escort tugs are used for outbound vessels. The model predicted a reduction in oil spill risk from groundings from a recurrence interval of once every 31 years to once every 370 years. The use of a tug escort reduces the spill risk from transit, which includes both grounding and collision, by 48 percent. Although the use of pilots and escort tugs reduce the risk of collision and grounding, the risk is not eliminated.

Because of the limited ability of stand-by booming to recover oil spilled in the river, booming may be ineffective in recovering oil that is spilled.

The Council is persuaded that the potential amount of crude oil that can be spilled under current loading limitations is significant, which could lead to very serious problems. Even after including the positive impact of tug escorts, the projected average spill volume of 63,463 bbl equates to 2.7 million gallons, approximately 95 percent of the entire contents of a 100-car oil train. There is no evidence in the record of a spill this size ever occurring on the Columbia River, and under the proposal it would have a 2/3 chance of occurring during the assumed 20-year life of the project. Such a spill would be 16 times larger than the 1984 Mobile Oil spill, which involved 3925 bbl and is the only other major Columbia River oil spill noted in the record.[566]

The Council notes that the above are estimates of future oil spills only from vessels travelling from the terminal, and do not include oil or other hazardous material spills from other non-project tankers involved in collisions with vessels travelling to and from the terminal. The sensitivity of collision rates to increasing volumes of river traffic is highlighted in the DNV GL, where project vessels are estimated to be involved in 57 percent more collisions if future increases in background vessel traffic are considered, in comparison to estimated collisions with just current background vessel traffic.[567] Estimated future Lower Columbia non-project vessel traffic with which the 365 annual in and outbound project vessels could collide include 326 annual vessel calls from liquid bulk carriers (methanol, propane, butane, food chemicals, crude petroleum, and liquefied natural gas) and 1469 annual calls from general bulk carriers (grain, coal, soda ash, and potash).[568]

The Council also notes that risks of project vessels experiencing collisions, groundings or spills in open seas beyond the Columbia River, or in their approach to Washington refineries in Puget Sound or other west coast refineries is not addressed in the adjudicative record.

e. Combined Vessel Traffic

When considering all future marine traffic, which consists of a combination of current traffic, vessels going to and from the VEDT, and traffic for future projects, the estimated frequency of an event causing an oil spill release, and the amount of such a release in numbers of bbl are listed in the following table:[569]

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[566] The average of the spill sizes reported in the DNL GV table is 63463 bbl, weighted according to the reported frequencies of each spill size, but with the frequencies of groundings for all three vessel types reduced 91 percent.

[567] Ex. 0120-000071-TSS, Table 6-10 indicates 0.14 annual collision incidents from VEDT vessels with current background traffic. Table 6-22 (Ex. 0120-000081-TSS) indicates 0.22 annual collisions from VEDT vessels with future background traffic.

[568] Ex. 0121-000062-TSS.

[569] PFT of O'Mara 5; Ex. 0120-000008-TSS; Ex. 0120-000102-108-TSS.

Vessel Size	Grounding Frequency	Grounding Release	Collision Frequency	Collision Release
47k DWT	1 every 40 years	20,200 bbl	1 every 43 years	58,700 bbl
105k DWT	1 every 150 years	30,600 bbl	1 every 170 years	100,000 bbl
165k DWT	1 every 2800 years	31,900 bbl	1 every 3100 years	102,500 bbl

Summary of the Council's Analysis of Cumulative Vessel Traffic. These risk figures are significant. For example, the 40-year return period for the 20,000 bbl spill means there is about a 40 percent chance at least one such spill would occur over 20 years (1/40 = 2.5 percent). DNV GL did not add up the various types of incidents and oil spill amounts to produce an overall estimate of risk and accompanying oil spill amount.[570] The Council therefore is convinced that the overall risk of an incident resulting in the release of oil was underestimated.

f. Ballast Water Management

Every vessel must have an approved ballast water treatment system or must have an approved ballast water management plan and conduct open ocean exchange to help prevent the spread of invasive species. Ballast water regulations are enforced by the U.S. Coast Guard. At this time, the Coast Guard has not approved any ballast water treatment systems. Therefore, all tankers exchanging ballast water must bring water on board from over 2000 meters of depth. Vessels are required to keep a ballast water exchange manual and keep records that are subject to audit. Vessels must report to the Coast Guard and Ecology on how they manage these ballast water exchanges as part of their Advance Notice of Arrival. Managing ballast water properly will be part of the vetting process used by Tesoro in reviewing each vessel for compliance before clearing the vessel for the terminal.[571] Vessel discharges must also meet state water quality standards.[572]

If a vessel is sailing to a port to pick up cargo, it carries water as ballast to maintain vessel equilibrium. The ballast water is frequently pulled from the port of origin, but then it must be either treated chemically or exchanged with other water before entering the port where cargo will be loaded. By transferring the original water of origin out through the exchange, the salinity and other chemical factors of the water are changed which affects the ability of the microorganisms in the original ballast water to survive.[573] A residual of 10 organisms per cubic

[570] Tr. 1361, vol. 6.
[571] PFT of Bayer 11; Tr. 858, vol. 4.
[572] PFT of Gunderson 13.
[573] Tr. 3874-75, vol. 16.

meter are allowed to survive pursuant to federal regulations after an open ocean exchange. Therefore, opportunities exist for organisms to persist and be transported and released. The San Francisco Bay system has more than 280 invasive species currently found in the Bay and surrounding waters.[574]

Summary of the Council's Analysis of Ballast Water Management Issues. The Council finds that, notwithstanding VEDT compliance with ballast water management requirements, there is some increased risk for the introduction of invasive species into the Columbia River ecosystem. The Council therefore moves this issue into its public interest balancing analysis in Section IV of this Order.

g. Wake Stranding of Fish

Vessel Traffic on the River. There is a significant amount of year-to-year variation of vessel traffic on the Columbia River. The highest number of deep-draft vessel traffic recorded on the river was 2413, which was in 1995. There has been a persistent long-term decrease in deep-draft vessel traffic since then.[575] An analysis of vessel transits during 2014 on the Lower Columbia River indicates that there were 2762 deep-draft vessels recorded at Astoria, and about one-third of these (925) sailed upriver as far as Vancouver.[576] The ships that would call at the VEDT would be of similar size to the ships that currently use the Columbia River vessel corridor. Assuming one tanker per day visited the VEDT, when compared to the 2014 data, the additional 365 tanker transits per year translates into a 13 percent increase in deep-draft vessel traffic to Astoria and a 39 percent increase of deep-draft vessel traffic to Vancouver. Assuming that the additional deep-draft vessels are piloted at similar speeds to existing deep-draft vessel traffic, the wakes from the tankers calling at the facility will be similar to the wakes produced by current vessel traffic.[577]

Wake Stranding of Juvenile Salmon by Deep-Draft Vessels. Deep-draft vessels such as oil tankers can produce wakes that strand juvenile salmon. Wake stranding occurs when juvenile fish in the shallow margin of a shoreline become entrained in a rapidly moving wave, which travels up a beach and recedes rapidly, resulting in the deposit of fish on the dewatered beach. Wake stranding typically results in death unless another wave carries the fish back into the water. The stranding of juvenile salmon is known to occur in portions of the lower Columbia River.[578] Wake stranding has been observed in the Columbia River for almost 40 years.[579]

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[574] Tr. 3875-76, 3902-03, vol. 16.
[575] PFT of Earle 8, 14.
[576] PFT of Earle 8, 14; Ex. 1036-000005-POR, Ex. 1036-000016-POR.
[577] PFT of Earle 13-14.
[578] PFT of Grette 5; Ex. 0116-000005-TSS, Ex. 0116-000007-TSS; Ex. 0233-000007-TSS.
[579] Ex. 0116-000008-TSS.

Vessel wake is related to vessel speed, channel depth, distance from the shore, and vessel draft.[580] Ship wake effects are only significant when in close proximity to the shipping channel. This is because as the distance from the channel increases, wake effects are rapidly overwhelmed by the effects of wave energy derived from tides and wind-generated waves.[581]

Vessels produce wake profiles of similar shape, but the magnitude of wakes varies. In general, a deep-draft vessel causes a rise in water level ahead of the bow and a drawdown of water level along the flanks of the vessel along the length of the hull to the stern. As the vessel moves through the water, water surges in off the stern to fill the drawdown area where the ship has been, which produces a subsequent wake action. Studies have shown that tugs, in contrast, show no evidence of drawdown and much less wake action than deep-draft vessels because tugs are smaller, draft less water, and move more slowly than deep-draft vessels.[582]

Increasing the size and speed of a vessel increases the extent of the drawdown of the water level along the vessel and subsequent run-up of the wave. Higher speed by itself does not necessarily increase the stranding rate. A larger vessel with a deep draft can produce higher kinetic energy than a smaller vessel moving at a higher speed.[583] The lowering of the water surface below the still-water level is a function of ship speed, and ship speed is the dominant factor influencing drawdown. Ship speed is expected to have the greatest effect on ship-wave generation, including short-period waves, drawdown, and run-up.[584] Relatively small changes in ship speed could result in significant changes in the incidences of wake stranding.[585]

Species Subject to Wake Stranding. There are 12 different stocks of salmon, steelhead, and bull trout in the Columbia River listed under the federal Endangered Species Act. Eulachon (smelt) and green sturgeon are also listed as threatened species under the Endangered Species Act.[586] Upper Columbia spring Chinook are listed as an endangered species. The spawning populations of some of these very small tributary groups sometimes number in the hundreds of fish. A majority of these fish can pass Bonneville and other projects within just a couple of weeks. Under certain scenarios, a substantial portion of these aggregates of fish can be in a narrow geographic area for a very short time period. A wake-stranding incident could potentially significantly affect a small population of fish such as this while they are migrating.[587]

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[580] Ex. 0159-000009-TSS; Ex. 0233-000007-TSS, Ex. 0233-000028-TSS; Ex. 1038-000073-85-POR; Ex. 1039-000004-POR; PFT of Earle 10-11.

[581] PFT of Earle 4, 11; Ex. 1038-000008-POR.

[582] PFT of Earle 8; Ex. 0116-000006-07-TSS; Ex. 0233-000020-TSS; Ex. 1039-000001-POR, Ex. 1039-000004-05-POR; Ex. 1034-000001-16-POR.

[583] Ex. 1039-000009-POR.

[584] Ex. 1038-000082-POR, Ex. 1038-000107-POR.

[585] Ex. 1039-000010-POR.

[586] Tr. 3809, vol. 16; PFT of Earle 6.

[587] Tr. 3801-02, 3810, 3812-13, vol. 16.

Various species of fish respond differently to wake stranding. Upper Columbia spring Chinook were rarely present in estuarine and tidal freshwater sites in the Lower Columbia River in a study conducted between January 2002 and September 2007.[588] It appears that Upper Columbia spring Chinook are at a very low risk of stranding because of their near absence from shallow water near the shoreline during the seasons when stranding occurs.[589] These fish appear to be more at risk of an oil spill rather than wake stranding.

Eulachon (smelt) do not appear to be at risk of wake stranding in the Lower Columbia River. Adult eulachon are not likely to spawn in the margin where fish are susceptible to stranding. Fertilized eulachon eggs are expected to settle out of the water column in areas where active currents occur, rather than slow-moving waters along the shoreline. The majority of the eulachon larvae are expected to emerge from deep-water areas of the Columbia River main stem and be rapidly transported in mid to deep portions of the river. The larval eulachon are unlikely to be located in the shoreline habitat and have not been observed being stranded or in beach seines. Furthermore, adult eulachon are strong swimmers.[590][591] Sturgeon are also unlikely to experience stranding because they are larger fish that remain near the river bottom.[592]

h. Several Studies Have Examined Wake Stranding on the Columbia River[593]

2006 Pacific NW National Laboratory Study. In a 2006 study conducted by the Pacific Northwest National Laboratory,[594] 126 ship passages were observed at the same three study sites observed in the 2002 Ackerman study.[595] Forty-six of the 126 vessel passages resulted in the stranding of 520 fish of all species. The large majority of stranded fish, 82 percent, were small sub-yearling Chinook salmon. An additional 15 juvenile chum or Coho salmon were stranded, for a combined total of 441 juvenile salmon, or 85 percent of all fish. Sub-yearling Chinook salmon were also the species and life stage that was most commonly captured in beach seine nets at the study sites, indicating that they are highly available for

[588] Ex. 1040-000002-POR, Ex. 1040-000011-POR.

[589] Ex. 0116-000025-27-TSS.

[590] Dr. Earle believes that there is some stranding risk of eulachon because they do use the shallow river margins and are similar in size to juvenile salmon. PFT of Earle 6.

[591] PFT of Grette 6-7; Ex. 0116-000027-28-TSS.

[592] PFT of Earle 6.

[593] In 1994, the National Marine Fisheries Service conducted a juvenile salmon stranding study on beaches on the Lower Columbia River. Ex. 1033-000001-43-POR. The authors concluded that stranding is the result of complex interactions dependent upon both physical and environmental criteria. Ex. 0116-000014-TSS; Ex. 1033-000001-POR. In 2002, a wake stranding study of juvenile salmon focused on three particular sites in the Columbia River. Ex. 0233-000001-53-TSS. The 2002 study confirmed that stranding events occurred at County Line Park, Barlow Point and Sauvie Island when deep-draft vessels passed within close proximity to low-slope beaches, and that juvenile salmon could be stranded by vessel wakes in the Columbia River. Ex. 0116-000009-TSS.

[594] Ex. 1038-000001-206-POR.

[595] PFT of Grette 7; Ex. 0116-000009-TSS.

stranding. Yearling (age 1+) Chinook salmon were detected in beach seine nets at the study sites in very low numbers but were not involved in any stranding events.[596] Yearling fish are most likely to use deep-water areas.[597] The majority of stranding events observed in the 2006 study occurred at Barlow Point (57 percent), which also had the highest percentage of stranding events to vessel passage (53 percent).[598] Stranding at Barlow Point was significantly lower in the summer as compared to the winter and spring.[599] The authors of the 2006 study determined that stranding events typically occur within certain "hot spots" at the site rather than the entire site. This effect was especially pronounced at Barlow Point, which was also heavily influenced by complex waves.[600] Barlow Point also had the greatest width and lowest slope (2.2 percent) between the three sampling sites. The beach at Barlow Point also had the beach sediment with the slowest water infiltration rate and the finest average sediment grain size.[601]

2008 Entrix Study. A 2008 study[602] examined the characteristics of the Lower Columbia Shoreline from river mile 0 to river mile 104. It concluded that not all shorelines in the Lower Columbia River present a stranding risk to juvenile salmon. The criteria used in the 2008 study to assess whether a shoreline poses a high potential stranding risk included the presence of a confined channel, the proximity of the shoreline to the sailing channel, exposure of the shoreline to the sailing channel (cannot be shielded from vessel wakes), beaches with very flat slopes of less than 2.5 percent, and offshore underwater berms[603] at or below the six-foot contour. The study concluded that only four percent of the 208 miles of shoreline in the Lower Columbia River, or approximately eight miles of disconnected shoreline, has a high potential to strand fish.[604] When a shoreline has these conditions as listed above, a high-energy wave is able to propagate far up onto the beach slope because there is no mechanism to dissipate the wake energy.[605] The 2008 study noted that County Line Park and Marshall Beach on Sauvie Island have been studied by four different sets of investigators over 20 years. These two beaches consistently show stranded juvenile Chinook salmon. The authors suggest that when the geomorphology of a beach promotes stranding and remains stable, the potential for fish stranding endures for long time periods.[606]

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[596] PFT of Grette 7; Ex. 0116-000009-10-TSS; Ex. 1038-000133-134-POR.

[597] Ex. 0116-000017-TSS.

[598] By contrast, Sauvie Island had a 37 percent stranding percentage produced by vessel passage, and County Line Park had a 15 percent stranding percentage produced by vessel passage. Ex. 0116-000009-TSS.

[599] Ex. 0116-000009-10-TSS.

[600] Ex. 0116-000010-TSS.

[601] Ex. 1031-000014-POR; Ex. 1039-000002-03-POR.

[602] Ex. 1031-000001-74-POR (Pearson, et al. [Entrix, Inc.] prepared for Port of Vancouver, "Spatial Analysis of Beach Susceptibility for Stranding of Juvenile Salmonids by Ship Wakes" (2008)).

[603] Submerged berms are bathymetric breakpoints between the rising river bottom and the shallow gently-sloped areas on the margins of the channel, and can greatly influence wave activity that leads to stranding. Ex. 1031-000032-POR.

[604] Ex. 1031-000009-10-POR; Ex. 0116-000011-12-TSS; PFT of Grette 8-10; PFT of Earle 11.

[605] PFT of Grette 11; Ex. 0116-000030-TSS; Ex. 0159-000021-TSS; PFT of Earle 11 n.4, 15-16.

[606] Ex. 1031-000041-POR.

Glenn Grette's Study of Wake Impacts on Juvenile Fish, Fish Habitat, and Vegetation. Biologist Glenn Grette, Ph.D.,[607] examined the potential for wakes to cause stranding of juvenile fish and smelt, along with the potential for vessel wakes to impact fish habitat and shoreline vegetation.[608] His review of the 2006 and 2008 studies and an examination of juvenile Chinook salmon use of the Lower Columbia produced five key findings:

(1) Not all juvenile fish are susceptible to stranding. Most fish stranded are small sub-yearling Chinook salmon. Few other species are at risk.[609]

(2) Wake stranding is typically limited to when sub-yearling Chinook are present in the shallow river margin, which is limited largely to the spring, with relatively low abundance in the winter and early summer. Sub-yearling Chinook are largely absent from the shallow river margin during the late summer and fall and are not exposed to stranding risk at that time.[610]

(3) Stranding is a complex interdependent process. Factors include a ship's size and speed, tide height, the location of the site, wave travel up the beach, and the abundance of fish in the shallow water margins. Wake stranding does not typically occur when only one criterion is present.[611]

(4) Most shorelines in the Lower Columbia River were found not to pose a stranding risk to sub-yearling Chinook salmon. The 2008 study found that for the area between river miles 0 and 22, the shorelines are too far distant from the Columbia River channel for wake energy to pose a stranding risk. Dr. Grette expanded the extent to which the Lower Columbia River does not pose a stranding risk to the lower 33 miles of the river. He said the banks are too distant from the navigation channel and the waves do not interact with the beach the same way as they would in a more confined channel.[612]

(5) Fine-scale characteristics of the beach, which cause wave energy to congregate, transport, and trap fish are important in determining the stranding risk at a particular location.[613]

2010 Pearson & Skalski Study. A study published in 2010 discussed wake stranding at County Line Park, Sauvie Island, and Barlow Point.[614] At all three sites, cross waves were

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[607] Dr. Grette earned a Master of Science degree in Fisheries from the University of Washington in 1985. His Master's thesis pertained to the rearing habitat of juvenile salmonids. PFT of Grette 1; Ex. 0305-000001-02-TSS.

[608] PFT of Grette 3; Ex. 0116-000005-TSS, Ex. 0116-000008-TSS.

[609] PFT of Grette 3, 7-8; Ex. 0116-000015-TSS.

[610] PFT of Grette 4, 6; Ex. 0116-000015-TSS.

[611] PFT of Grette 4; Ex. 0116-000010-11-TSS, Ex. 0116-000017-TSS.

[612] PFT of Grette 4, 8, 17; Ex. 0116-000015-TSS.

[613] PFT of Grette 10; Ex. 0116-000015-TSS.

[614] Ex. 1039-000001-11-POR.

observed, but they were particularly observed at Barlow Point. Fish tend to strand at Barlow Point in an area where there are strong cross waves and an eddy has formed. Fish also stranded towards the downstream portion of the site in vegetation patches.[615] Barlow Point had the highest average number of fish stranded per stranding event at 14.9 fish. Chinook salmon sub-yearlings were the predominant fish stranded over all sites and seasons.[616]

2016 Coast & Harbor Engineering Study. A 2016 study[617] reviewed three stranding sites studied by Pearson in 2006. The 2016 study found that beaches with a wide upper beach and a small and/or steeply sloped lower beach had a low potential for fish stranding but shorelines with a wide and flat lower beach with no or a very small upper beach and typically with an armored backshore, do not have a mechanism for dissipating wake energy. This type of shoreline morphology has a higher potential for stranding fish. County Line Park and Sauvie Island both represent morphologies with a lower potential for stranding, compared to Barlow Point, while the morphology of Barlow Point is associated with a very high risk of stranding.[618] The 2016 study further observed that the upstream portion of Barlow Point is located close to the outside bend of a turning point in the river, which forms a concave shape of shoreline. The authors noted that some data indicates that this shape of shoreline may result in amplification of wave energy and the site is likely affected by unique hydrodynamics related to passing boats and river flow, which likely increases the vessel wake effect.[619]

Grette's Study of VEDT Vessels. Dr. Grette also assessed the impact of vessels calling at the VEDT with the wake stranding of juvenile fish. In the lower part of the study area, from River Mile 33 to River Mile 74, fall-run Chinook salmon from the Lower Columbia River ESU generally comprise more than 90 percent of all Chinook salmon present in the shallow water area. In the upper part of the study area, from River Mile 86 to River Mile 102, Chinook salmon from the Lower Columbia River ESU make up at least one-half to three-quarters of sub-yearling Chinook salmon in shallow water areas, depending on the season. The presence of sub-yearling Chinook salmon in the shallow margin is limited largely to the spring, with low relative abundance in the winter and summer. Based upon genetic stock analyses, the majority of sub-yearling Chinook salmon present in the shallow margin during all seasons are fall-run stocks from the Lower Columbia River ESU.[620] Smaller sub-yearling out-migrants use shallower water areas closer to the shore.[621] The reason the presence of sub-yearling Chinook decreases during the summer is that higher temperatures reduce the availability of shallow water habitat and fish choose deeper water to occupy. In addition, lower water levels of the

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[615] Ex. 1039-000005-06-POR; PFT of Grette 9-10.
[616] Ex. 1039-000007-POR.
[617] Ex. 0159-000001-22-TSS.
[618] PFT of Grette 11.
[619] Ex. 0159-000009-TSS, Ex. 0159-000011-12-TSS, Ex. 0159-000021-TSS; Ex. 0117-000001-TSS.
[620] PFT of Grette 5-6; Ex. 0116-000025-27-TSS.
[621] Ex. 0116-000018-TSS.

Columbia River during the summer may limit access to the shallower shoreline areas that can be occupied during the spring.[622]

Grette Additional Conclusions. Dr. Grette provided additional conclusions as part of his pre-filed testimony. Because fish are typically stranded on beaches with slopes flatter than about five or six percent, and not all very flat beaches strand fish, he concludes that many beaches have very limited to no stranding risk.[623] Areas with shallow underwater berms and very flat slopes (less than 2.5 percent) had the highest predicted potential susceptibility for stranding. When considered together, these factors translate to approximately 8 miles of shoreline that is highly susceptible to stranding. Other researchers noted the importance of fine-scaled beach features, such as coves, inlets, and shoreline depressions, which redirect the wave energy to congregate, transport, and trap the fish.[624]

Dr. Grette placed particular emphasis on the unique aspects of Barlow Point that make it much more susceptible to wake stranding that tends to occur in "hotspots" at the site rather than the entire site. The magnitude of stranding at Barlow Point suggests that something more complex and unique is happening there than at Sauvie Island or County Line Park. Stranding at the latter two sites tends to be a function of season, likely due to water levels that alter the location of the water's edge and also modify the beach morphology. Stranding susceptibility on a single beach can vary greatly over a very short distance and is likely to be associated with fine-scale features of the beach.[625] The uniqueness of Barlow Point appears in all three studies in which that site has been the focus of study. As the 2006 study found that the majority of stranding events occurred at Barlow Point, and this site also had the highest percentage of stranding events to vessel passage, the 2016 study followed up on Barlow Point. It noted that Barlow Point has a wide, flat lower beach with backshore. Therefore, it has no mechanism for dissipating wave energy. This beach morphology is associated with a very high risk of stranding. In addition, the wide underwater terrace at Barlow Point was found to have little capacity to dissipate vessel wakes. This means that residual wake energy breaks on the upper part of the riverbank.

Summary of the Council's Analysis of Fish Wake Stranding Issues. As Dr. Grette noted, the unique aspects of Barlow Point make it very susceptible to wake stranding. Scientists have noted the unique characteristics of both the beach and the river in this area. Wake stranding can also be a seasonal issue at Sauvie Island and County Line Park. The Council previously noted the effects of vessel speed and wakes. Increasing the size and speed of a vessel increases the extent of the drawdown of the water level along the vessel and subsequent run-up of the wave. The lowering of the water surface below the still-water level is

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[622] Ex. 0116-000025-TSS.

[623] PFT of Grette 9. This point has been made by other witnesses. "Steeply sloped beaches rapidly dissipate wave energy, so they pose little risk with regard to either stranding or other wake-related effects on the shoreline." PFT of Earle 11, n.4 (citation omitted).

[624] PFT of Grette 9-10.

[625] PFT of Grette 10-11.

a function of ship speed, and ship speed is the dominant factor influencing draw-down. Ship speed is expected to have the greatest effect on ship-wave generation. It is therefore reasonable that relatively small changes in ship speed could result in significant changes in the incidences of wake stranding. Slowing tankers down before they reach Barlow Point could significantly reduce the wake stranding of juvenile Lower Columbia Chinook salmon. These fish are listed as threatened under the Endangered Species Act.

The Council is persuaded that, where scores of fish are observed to be stranded by a single vessel-passing event, this avoidable impact should outweigh the very slight cost to shipping speed. The burden to oil shipping efficiency would be minimal if there were a mandatory slowing of the vessels carrying oil from the VEDT facility. This translates into a matter of minutes of extra travel time down the Columbia River. The benefits to a fish species listed under the Endangered Species Act would be significant.

Tesoro Savage has not, however, proposed to require the vessel owners or operators with whom it contracts to slow speeds at Barlow Point to protect fish nor has it worked with affected stakeholders such as the Washington Department of Fish and Wildlife, the Columbia River Pilots, the Coast Guard, and others to develop protocols for slowing speeds. The Council must therefore consider the unmitigated impacts to fish as a result of wake stranding when it considers the overall net benefits of the proposed facility.

i. Other Wake Impacts

Bank erosion and vegetation. It appears from the evidence presented that the incidence of vessel wake impact on shoreline bank erosion and vegetation would be a minimal.

Apparently, no studies have been performed that specifically address vessel wake impacts on vegetation, but the fish stranding studies provide some indication of this potential. For impacts to vegetation to occur, the site must support functionally valuable native vegetation communities. Previous analyses indicate that most sites are either beach or riprap and therefore do not meet this criterion.[626] The streambanks at the VEDT site are well armored and not particularly sensitive to erosion.[627] The Army Corps of Engineers (Army Corps) stated in its EIS for Channel Deepening in 1999 that the natural shorelines of the Columbia River have remained very stable over the past 100 years. These natural shorelines consist largely of erosion-resistant sand, silt, and clay deposits. In contrast, approximately one-half of the shoreline between River Miles 21 and 106 are dredge disposal sites, which are not natural shorelines, and are highly susceptible to erosion.[628]

The Lower Columbia River has been subject to many engineered modifications, including the placement of fill and installation of riprap over a large portion of the river. In

[626] PFT of Earle 12-13.
[627] PFT of Gunderson 13.
[628] PFT of Grette 16.

addition, there has been extensive filling of wetlands, construction of railroad embankments along much of the riverbank, construction of highways on the floodplain and on the banks of the river, dredging of a navigational channel, and placement of dredged material on the shoreline or within the channel. Little native vegetation remains and it tends to be on island margins that do not face the navigation channel, or along secondary channels that are distant from the navigation channel.[629] All of the native vegetation communities contain a substantial number of non-native, often invasive species. Few plant species along the river are considered rare or sensitive.[630]

Tesoro Savage maintains that, because the shorelines have little susceptibility to erosion, an incremental increase in vessel wakes that are not currently causing erosion will not result in erosion impacts in the Lower Columbia River.[631] There is no testimony in the record that contradicts the Proponents' assertion that increased vessel traffic will not result in increased erosion or loss of vegetation.

Species other than fish. Tesoro Savage's expert notes the dynamic nature of the Columbia River, which naturally moves sand and benthic material through the system. The benthic habitat adjacent to the VEDT dock already is subjected to a baseline level of propeller scour. Tesoro Savage's expert concludes that propeller scour from vessels may result in a minor impact to water quality, but no long-term change to the benthic community.[632] Therefore, increased vessel traffic is unlikely to impact other animal species other than fish.

Historic and cultural sites. Tesoro Savage hired Stephanie Butler, an archaeologist, to assess the potential for project-related vessel wakes to impact cultural resources in Oregon and Washington along the Columbia River from River Mile 1 to River Mile 107.[633] Ms. Butler used data from a previous study performed for the Millennium Coal Export Terminal Project that looked for potential identical types of impacts from River Mile 1 to River Mile 63.[634] The methodology for the shoreline erosion study included: a review of previous environmental studies analyzing the causes of shoreline erosion along the river; a review of previously recorded cultural resources along the river; a review of existing human-made features such as shoreline armoring, pile dikes, road fill, and rip rap, which can affect the intensity of wave erosion; a review of geomorphic surfaces and bank soil texture in the vicinity of the previously recorded cultural resources to determine relative susceptibility to erosion and sediment transport; and measuring the distance from the river ship channel to known cultural resource locations.[635] Ninety-four cultural resources were identified along the Columbia River shoreline from River Mile 0 to River Mile 107 in Oregon and Washington. Using three variables (soil

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[629] PFT of Earle 3-4.
[630] PFT of Earle 6-7.
[631] PFT of Grette 17; PFT of Earle 13.
[632] PFT of Gunderson 18-20.
[633] PFT of Butler 2.
[634] PFT of Butler 2-3.
[635] PFT of Butler 3.

types, distance from the ship channel, presence/absence of human-made features) to screen, 22 of the 94 cultural resources were determined to be potentially susceptible to shoreline erosion from vessel wakes.[636]

A field team consisting of a geo-archaeologist, archeologist, and historian visited the 22 cultural resource locations to assess relative susceptibility to damage from boat wake-induced erosion. The team concluded that there is a low probability that project-related vessel wake would impact these identified cultural resources. Many of the cultural resources were already impacted by shoreline erosion, development, recreation, looting, or the placement of dredge spoils. Many of the sites also had some form of shoreline protection such as vegetation, forebeaches, riprap, or pile dikes that would tend to inhibit or reduce boat wake wave energy. No additional work or mitigation was recommended. The field team considered a number of additional variables that were not considered in the preparation of the draft EIS. In addition, the field team observed that existing sites had already been impacted. Therefore it was determined that the mitigation measures identified in the DEIS would not be effective.[637]

Summary of the Council's Analysis of Wake Impacts on Bank Erosion, Vegetation, Species Other than Fish, and Historic and Cultural Resources. Given the nature of the shoreline and the vegetation that exists along the shoreline, there does not appear to be an impact on the vegetation from vessel wakes. The Council also concludes that an increase in vessel wakes will not contribute to additional shoreline erosion. The testimony from Tesoro Savage supporting this premise was not rebutted. Further, although there may be minor impacts to the benthic community it does not appear that the additional vessel wakes will have a long-term impact. The Council therefore does not move this issue forward to its balancing analysis in Section IV of this Order.

C. EVALUATION OF LONG TERM IMPLICATIONS FOR WASHINGTON'S NATURAL ENVIRONMENT

1. Protection of Water Quality

Tesoro Savage's Position. Tesoro Savage points out that there is extensive federal and state regulation of oil spill planning and response. It expresses an intention to comply with existing robust standards for oil spill planning and prevention, which it considers are adequate measures to minimize any adverse effects from a spill. Tesoro Savage contends that, if an oil spill does occur, the impacts would be minimal because of the resources and equipment that can be quickly mobilized.

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[636] PFT of Butler 3.
[637] PFT of Butler 4-5.

Tesoro Savage references WAC 463-62-060,[638] which provides that wastewater discharges from projects under the Council's jurisdiction comply with applicable state water quality, groundwater quality, and sediment management standards, along with Federal Water Pollution Control Act requirements. Tesoro Savage asserts that the VEDT will comply with these requirements during construction and operations of the facility.[639] For the purpose of this Order, the Council accepts that statement as true.[640] Tesoro Savage suggests that oil spills that are not permitted discharges will be adequately addressed through existing spill planning and response activities that occur outside of the permitting processes.[641] In making this argument, Tesoro Savage invites the Council to consider unpermitted oil spills outside of the scope of WAC 463-62-060, thereby conceding that the Council's current analysis is not limited by this rule.

Opponents' Position. The Opponents voice concern that Tesoro Savage minimizes the potential consequences of an oil spill into the Columbia River or other waters of the state. They argue that once oil is submerged into the water column, many containment efforts are largely ineffective. Currents can and do inhibit or prevent effective booming, which greatly diminishes the effectiveness of spill recovery efforts.[642] And the opponents point out that dilbit is not properly characterized as an oil that can be easily managed in a spill and charge that its challenges are under-acknowledged by Tesoro Savage.

Project Opponents cite to scientific reports that identify shortcomings in the current planning regime. They say that, despite all the planning, and even accounting for evaporation, after a spill, a significant amount of oil will be left in the water. For fish, wildlife, the economy, the environment, members of Indian tribes and other people who fish and use the resources, crude oil spilled in the water would have negative impacts that are far greater than Tesoro Savage assumes.

a. Oil Spill Liability

The primary objective of Washington's Oil and Hazardous Waste Substance Spills Act (OHSSA), RCW 90.56, is to achieve a zero spills strategy and prevent oil or hazardous substances from entering waters of the state. OHSSA's purposes include protecting Washington's waters and natural resources from oil spills and ensuring that responsible parties are held liable and having sufficient resources and ability to respond and provide compensation for costs and damages.[643]

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[638] Applicant Post-Hr'g Br. 43-44.

[639] Applicant Post-Hr'g Br. 44.

[640] The Council's ultimate decision about Tesoro Savage's compliance with these water quality permit requirements will occur during an environmental permitting process that occurs outside the scope of this adjudication.

[641] Applicant Post-Hr'g Br. 44.

[642] Tr. 4097-98, vol. 17.

[643] RCW 90.56.005.

With some very limited exceptions, a person who has control over oil that enters into waters of the state is strictly liable for the damages to persons or property.[644] Any person causing the entry of oil in the water is directly liable to the state for the necessary expenses for the oil cleanup.[645] The director of Ecology may also impose penalties for the release of oil into waters of the state.[646] OHSSA directed Ecology to adopt rules establishing standards for onshore facility equipment and operations for the transfer, storage, and handling of oil to ensure the best achievable protection of the public health and the environment. Ecology must also inspect these facilities regularly to ensure compliance with standards. Ecology must also adopt rules regarding training and education for supervisory and key personnel in charge of oils transfer, storage, and handling.[647]

b. Oil Spill Prevention Plan Requirements

Federal Requirements for Spill Prevention, Control, and Countermeasure Plans. The Oil Pollution Act (OPA), 33 U.S.C. §§ 2701-2720, requires onshore oil storage facilities to prepare facility response plans as such facilities could reasonably be expected to discharge oil in quantities that would be harmful to navigable waters of the United States or its adjoining shorelines. The owner or operator must prepare and implement a Spill Prevention, Control, and Countermeasure Plan (SPCCP).[648] The SPCCP must include a description of the physical layout of the facility, the type of oil, discharge prevention measures, and include a contact list for key personnel.[649]

State Requirements for Oil Spill Prevention Plans. Tesoro Savage must submit an oil spill prevention plan pursuant to RCW 90.56.200. The spill prevention plan must comply with the federal OPA, and, among other requirements, describe the facility's maintenance and inspection program; the spill prevention technology, and the procedures to contain and recover any oil spills that occur during the transfer of oil to or from the VEDT.[650] As a Class 1 facility, the VEDT must comply with numerous detailed requirements about design and operation of equipment, personnel training, preparation of spill prevention plans and contingency plans, as well as protocols for the transfer of the oil.[651]

Tesoro Savage's Preliminary SPCCP and Operations Facility Oil Handling Manual. Tesoro Savage submitted a preliminary SPCCP in June 2015.[652] The preliminary SPCCP describes the facility operations and physical layout of the dock, marine, and loading

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644 RCW 90.56.370.
645 RCW 90.56.380, .350, .360.
646 RCW 90.56.330.
647 RCW 90.56.220.
648 40 C.F.R. § 112.1(e).
649 40 C.F.R. § 112.7.
650 WAC 173-180-630.
651 WAC 173-180.
652 Ex. 0001-002475-PCE.

areas.[653] It also provides countermeasures for a spill within the VEDT for a tank overfill, or from a valve or a minor spill.[654] The storage tanks are equipped with high-level alarms. The control room is continuously staffed, which allows for immediate manual pump shutdown and valve closures.[655] When pumping oil to the storage facility or to the marine terminal, operators can manually stop the process by pressing an emergency shutdown button, located at the dock or in the storage tank area. A vessel can also initiate an emergency shutdown of oil flow.[656]

In June 2015, Tesoro Savage also submitted a separate Operations Facility Oil Handling Manual.[657] It contains descriptions of the duties of various personnel, the oil types that will be transferred at the facility, the monitoring devices and oil spill containment equipment, transfer procedures, and the emergency and shutdown systems.

c. Oil Spill Contingency Plans

(1) Contingency and Response Planning

Federal Requirements—Contingency Planning. The National Oil and Hazardous Substances Pollution Contingency Plan[658] (NCP) implements the OPA.[659] Pursuant to the NCP, the VEDT is required to submit a facility response plan[660] to facilitate response to a worst-case discharge,[661] and be consistent with applicable Area Contingency Plans (ACPs) prepared pursuant to the federal Clean Water Act.[662] The plan must include the development of facility response drills, exercises, and evaluation procedures.[663]

The NCP requires the development of Regional Contingency Plans (RCPs). The RCPs extend the NCP to a narrower regional focus, which in turn, act as the umbrella for development of ACPs.[664] ACPs provide for the pre-approval of specific countermeasures or removal actions to minimize adverse impacts. An ACP must also review its compatibility with non-federal response plans.[665] As part of its facility response plan, a facility owner is required to identify an oil spill removal organization (OSRO) capable of responding to a shoreline cleanup operation for a worst-case discharge of oil that might impact the shoreline.[666] The

[653] Tr. 1393, vol. 6; Ex. 0001-002475-PCE.
[654] 40 C.F.R. § 112.7; WAC 173-180.
[655] Ex. 0001-002508-PCE.
[656] Ex. 0001-0002509-10-PCE.
[657] Ex. 0001-002993-PCE.
[658] 40 C.F.R. pt. 300.
[659] 40 C.F.R. § 300.2.
[660] 40 C.F.R. § 112.20(a).
[661] 40 C.F.R. § 300.211(c).
[662] 40 C.F.R. § 112.20(g)(1).
[663] 40 C.F.R. pt. 112, App. F, § 1.8.2.
[664] 40 C.F.R. §§ 300.205, .210.
[665] 40 C.F.R. § 300.210.
[666] 40 C.F.R. pt. 112, App. E, § 5.8; 40 C.F.R. § 112.2.

OSROs in the Southwest Washington area are Clean Rivers and MSRC.[667] The OSROs also contract with environmental contractors like Global and NRC Environmental that do submerged oil recovery.[668]

Northwest Area Contingency Plan. The Northwest Area Contingency Plan (NWACP) is the statewide master oil and hazardous substance spill prevention and contingency plan.[669] The NWACP addresses the prevention of and the assessment, containment, and cleanup of a worst case oil spill or hazardous substance spill.[670] It establishes the respective responsibilities of state agencies, local governments, appropriate federal agencies, facility operators, potentially affected property owners, and other parties identified by Ecology as having an interest in or the resources to assist in containment and cleanup of an oil or hazardous substance spill and a process for immediately notifying tribes of any oil spill.[671]

Geographic Response Plans. GRPs are response strategies for sensitive areas published in the NWACP.[672] GRPs protect sensitive shoreline areas by diverting or blocking oil movement.[673] The location of GRPs must be included as part of the training of spill management teams.[674] Each plan must contain a field document with time-critical information for initial emergency response, including significant steps for spill response.[675] The plan must also provide for immediate spill notification of appropriate entities.[676] OSROs are familiar with the GRPs because they routinely practice them.[677]

Facility Contingency Plans. Each onshore facility must submit a contingency plan for the containment and cleanup of oil spills from the facility and for the protection of fish, wildlife, shellfish, natural resources, and public and private property. Factors considered include containment and cleanup equipment adequacy, personnel, communications equipment, notification procedures, response time, and logistical arrangements for coordination and implementation of response efforts. Other factors include the nature and amount of vessel traffic in the area, the volume and type of oil being transported, and the sensitivity of fisheries, shellfish beds, wildlife, and other natural resources covered by the plan.[678]

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667 Tr. 1321, 1401, vol. 6; PFT of Bayer 6.
668 Tr. 1398, vol. 6.
669 WAC 173-182-230; PFT of Taylor 7-8.
670 WAC 173-182-220.
671 RCW 90.56.060.
672 NWACP, http://www.rrt10nwac.com/nwacp/; WAC 173-182-030(20).
673 WAC 173-182-510; PFT of Taylor 9.
674 WAC 173-182-280(2).
675 WAC 173-182-240.
676 WAC 173-182-260; Ex. 3088-0114-VAN.
677 Tr. 1391, vol. 6.
678 RCW 90.56.210.

Class 1 facilities must have an approved contingency plan as required by WAC 173-182.[679] The plan must state the size of the worst-case spill, include a tank inventory with capacity information; identify all oil handled by name density, gravity, API, oil group number, and sulfur content. The plan must also include a description and map of the site; its infrastructure, topography, and drainage; and a description of the geographic area that could be impacted from a spill from the facility based upon a 48-hour worst-case spill trajectory analysis.[680]

Each contingency plan must also contain the contact information for the primary response contractor[681] (PRC) that provides spill response support, including a document that summarizes the terms of the contract signed by the PRC.[682] In order to be approved as a PRC, a response contractor must have a 24-hour per day contact process for spill response, and commit to begin mobilization efforts immediately, or no later than one hour following notification of a spill.[683] Plan holders and PRCs are required to maintain response equipment in a state of constant readiness.[684]

The plan identifies contractors with different levels of response capabilities. The contractors must be registered with the state and be able to meet state planning standards. Certain equipment must be available to respond to a worst-case spill.[685] The list of resources and equipment each contractor has available, as well as the equipment pre-staged location, must be available on the internet.[686]

Tesoro Savage's Preliminary Oil Spill Contingency Plan. Tesoro Savage submitted a Preliminary Oil Spill Contingency Plan (POSCP) to the Council for review.[687] Revisions to the POSCP were submitted to the Council to incorporate two tabletop exercise drills.[688] Tesoro Savage considers the POSCP as a preliminary plan.[689] The Northwest area of the GRP identifies key sensitive areas in, around the VEDT, and down river and specific response strategies for each of those sites. After the sensitive areas are identified, the GRPs describe the equipment that is needed and where it needs to be deployed in order to protect sensitive areas.[690] The POSCP includes notifications to state, federal, and local agencies. The incident management team structure follows the National Incident Management System.[691]

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[679] WAC 173-180-710.
[680] WAC 173-182-230.
[681] A PRC may also be an OSRO.
[682] WAC 173-182-230.
[683] WAC 173-182-800.
[684] WAC 173-182-270.
[685] Tr. 1824-25, vol.8.
[686] Tr. 1825, vol. 8.
[687] PFT of Haugstad 7; Ex. 0001-002561-PCE.
[688] Tr. 1392, vol. 6; Ex. 0001-002927-PCE; Ex. 0001-003213-PCE; Ex. 5509-000001-451-CRK.
[689] PFT of Haugstad 8; Tr. 1394, vol. 6; Ex. 0001-002573-PCE.
[690] Tr. 1390-92, vol. 6; Ex. 0053-000001-788-PCE.
[691] Tr. 1389, vol. 6.

Tesoro Savage has contracts with the MSRC and the Clean Rivers Cooperative, Inc., which allows it to access oil spill response equipment and personnel.[692] MSRC is a national OSRO and is one of the largest in the United States[693] with the highest rating an OSRO can receive.[694] Both MSRC and Clean Rivers Cooperative, Inc. have contracts with environmental contractors like Global and NRC Environmental that do submerged oil recovery.[695] Tesoro Savage maintains that, during the transfer process, once the oil has passed from the flange of the cargo hose into the ship's manifold, it no longer has responsibility for a spill because the care and custody of the oil has transferred. Workers would respond to a spill at the berth under these circumstances.[696]

Tesoro Savage's Trajectory Analysis. Tesoro Savage's POSCP contains a trajectory analysis as required by WAC 173-182-230(4)(c)(v).[697] A trajectory analysis looks at how far the spilled oil would travel, and where it would end up during the 48-hour time period. The spill is presumed to be unabated with no booming or recovery efforts made.[698] It must provide a description of the geographic area that could be impacted from a spill from the VEDT based upon a 48-hour worst-case spill trajectory analysis. Average current speeds in the Columbia River range from one to six knots and vary seasonally. Tesoro Savage's POSCP used an average of 2 knots as the value for average current speed of the Columbia River for planning purposes.[699] However, in its VEDT trajectory analysis, Tesoro Savage used a current speed of 1.2 knots instead. The 1.2 knot current speed was based upon 2013 U.S. Geological Survey data. It is unclear why Tesoro Savage chose a different current speed for purposes of its VEDT trajectory analysis. Using the current speed of 1.2 knots, Tesoro Savage projected the oil would travel from river mile 105 to river mile 47 within 48 hours after the release,[700] a distance of 58 miles.[701] Clearly current speed affects how much of the river and shoreline will be impacted by a release of oil. Current also affects the deployment of responder equipment and personnel, and the effectiveness of booming.[702]

Tesoro Savage's trajectory analysis also did not include wind speed in determining the trajectory. The analysis states that "[w]ind is likely to result in spilled oil beaching rather than continuing down river."[703] However, this statement is contradicted by Figure 2.10 within the

[692] Ex. 0001-003137-42-PCE; Ex. 0001-002716-17-PCE; PFT of Taylor 30-31, 35.
[693] Tr. 1401, vol. 6.
[694] PFT of Haugstad 13-14.
[695] Tr. 1398, vol. 6.
[696] Tr. 1422, vol. 6.
[697] Ex. 0001-002893-PCE.
[698] Tr. 1429, vol. 6.
[699] Tr. 1431, vol. 6.
[700] Ex. 0001-002899-900-PCE; Ex. 0001-002578-PCE; Tr. 1428-30, vol. 6.
[701] During the hearing, the witness was asked whether the oil traveled 47 miles in 48 hours, and he responded affirmatively. It is clear that both the attorney and the witness confused river mile 47 with the distance that the oil traveled. PFT of Haugstad 43.
[702] Tr. 1428, vol. 6.
[703] Ex. 0001-002899-PCE.

POSCP. Figure 2.10 provides examples of how wind affects oil movement on water surfaces. For example, if a wind of 12 knots is directly aligned with water current of 0.5 knots, the oil will move downstream at 0.9 knots.[704]

The Council considers the trajectory analysis completed as part of the POSCP an understatement of the distance an oil spill will travel from the facility within a 48-hour period. Absent a detailed oil spill model showing otherwise, the Council is convinced that a different scenario is much more likely. If the average speed of 2 knots were used in the trajectory analysis, spilled oil would travel approximately 2.3 miles per hour downstream. This is about 55 miles per day. Unless oil is recovered or trapped by response equipment, or some other factor such as high winds blowing up river comes into play to slow the oil's movement downstream, oil would reach the Pacific Ocean within two days.[705]

Tesoro Savage's Tabletop Exercise. In January 2016, Tesoro Savage conducted a weeklong hypothetical tabletop exercise to determine how well different entities involved in an oil spill response would be able to deploy their resources in the event of a worst-case spill, and to identify any gaps in the response. This tabletop drill utilized Clean Rivers Cooperative, Inc. and MSRC, its national OSROs, to do the drill.[706] A tabletop exercise is largely an on-paper exercise. It includes verifying that the facility has all the names of responders, and determining what responder is going to come from what location and how well the deployment would go.[707]

Two different spill scenarios were evaluated. One scenario evaluated an assumed spill of Bakken crude oil and the second scenario evaluated an assumed spill of dilbit.[708] As part of both scenarios, the loss of an entire storage tank that was full to capacity was presumed. No secondary or tertiary containment was considered and the entire contents of the storage tank were presumed to reach the Columbia River.[709] The loss of the contents of a storage tank and failure of the secondary containment system as the result of a large earthquake does not appear out of the question.[710] Low probability, high consequence spills do occur.[711]

Each of the two different spill scenarios identified protection strategies for sensitive areas and used the October 2015 GRPs for the Lower Columbia River as the foundation information. For each geographic area, spill response actions, resources, and approximate timing were documented for the GRP priority protection sites, oil collection and recovery, and storage capacities for recovered oil and oily water.[712] The assumed weather for both scenarios

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[704] Ex. 0001-002614-PCE.
[705] PFT of Harvey 27.
[706] Ex. 5509-000006-CRK.
[707] Tr. 1432, vol. 6; Tr. 1826-27, vol. 8.
[708] PFT of Haugstad 14; Tr. 1397-98, vol. 6; Tr. 1827-28, vol. 8; Ex. 5509-000006-CRK.
[709] PFT of Haugstad 14; Tr. 1826, vol. 8.
[710] PFT of Harvey 21.
[711] PFT of Harvey 29.
[712] Ex. 5509-000456-CRK.

was based upon monthly average conditions.[713] The conditions assumed for the Bakken spill scenario assumed the release of 380,000 barrels of crude Bakken oil with an API of 41 that was allowed to flow freely into the Columbia River. It was assumed that the spill occurred on October 3, at 8:30 a.m., with a temperature at 64 degrees Fahrenheit, wind at 6.5 mph out of the ESE, and the river current at 0.8 knot. October 3 was selected for the release date to model moderate temperatures, and thereby allow for the assumption of moderate vaporization of the spilled oil.[714] The Automated Data Inquiry for Oil Spills program for oil spill fate and transport modeling was used in the exercise.[715] The dilbit spill scenario was assumed to occur on January 3, at 8:30 a.m., with a temperature at 40 degrees Fahrenheit, wind at 10 mph out of the ESE, and the river current moving at 0.9 knots. January 3 was selected for the release date because dilbit has the greatest propensity to sink in the water column under cold conditions.[716] The dilbit scenario includes a section to address potential submerged oil.[717]

The data package for the Bakken spill scenario lists unknown values for aromatics and adhesion properties, and indicates that 44 percent of the Bakken oil will have evaporated in the first 48 hours.[718] The data package for the dilbit spill scenario likewise lists unknown values for aromatics and adhesion. The sediment load was assumed to equal 50 g/m3 (average river/estuary). It indicates that 20 percent of the dilbit will have evaporated in the first 48 hours.[719]

Tesoro Savage did not identify any gaps during the drill. It contends that adequate personnel and equipment were identified and would be on-hand during such an incident in accordance with OPA 90 and Ecology oil spill planning standards.[720] Tesoro Savage also states that resources could be deployed in a sufficient timeframe to complete recovery of dilbit before the oil would begin to weather and sink.[721] As discussed later in this order, Tesoro Savage makes assumptions about the ability of dilbit to float. The Council seriously questions this assumption. The efficacy of response equipment is measured by the level of oil recovery before it sinks. As the Council discusses later, the weight of recent scientific studies illustrate the shortcomings in existing planning.

Mr. Haugstad acknowledged that Tesoro Savage dropped the river current speed down to 0.8 to 0.9 knots for the two spill scenarios.[722] As stated earlier, the Columbia River has average current speeds from one to six knots, which vary seasonally. Tesoro Savage's POSCP used an average of 2 knots as the value for average current speed for planning purposes. The

[713] Ex. 5509-000457-CRK.
[714] Ex. 5509-000007-CRK.
[715] Ex. 5509-000007-CRK; Tr. 1828, vol. 8.
[716] Ex. 5509-000007-CRK; Tr. 1827-28, vol. 8.
[717] Ex. 5509-000007-CRK; Tr. 1827-30, vol. 8.
[718] Ex. 5509-000007-CRK; Tr. 1827-30, vol. 8.
[719] Tr. 1827-30, vol. 8.
[720] Ex. 5509-000456-CRK; PFT of Haugstad 14.
[721] PFT of Haugstad 15.
[722] Tr. 1432, vol. 6; Ex. 5509-0000457-CRK.

assumption of current speeds of less than one knot for both spill scenarios in the tabletop exercise minimizes the calculation for the spread of oil. Under predicting the spread of oil also under-predicts the estimated impacts on habitats and species that would be expected to be exposed to spilled oil. It also underestimates the response needed to address the spill.[723] Because of this, the Council is convinced that the tabletop exercise understates the distance an oil spill will travel from the VEDT. There is also no recognition of the unique properties of spilled dilbit. Therefore, this exercise has limited persuasive or planning value.

(2) The Significance of the Properties of Different Types of Crude Oil

Past practices to determine whether oil will sink or float for planning purposes may no longer be sufficient.

Diluted bitumen ("dilbit"). Standard industry practice looks at API gravity to determine whether oil will sink or float.[724] Bakken crude oil generally has an API gravity of 36.7 to 46.3. Dilbit generally has an API gravity of 18.0 to 39.0.[725] The API gravity of the oil that the VEDT will accept ranges from 15 to 45.[726] Water has an API gravity of 10.0 so oil with an API gravity of 9.0, 10.0, or lower would sink.[727] There is considerable variability associated with dilbit[728] and differences between dilbit and weathered dilbit are notable.[729] Bitumen is a highly viscous form of petroleum so to transport bitumen, a diluent of lower-density hydrocarbon mixture (often gas condensates) is added to create dilbit.[730] After dilbit spills, rapid evaporative losses of lighter components increases viscosity and density of the remaining oil,[731] which oil can exceed that of freshwater and become submerged or sink to the bottom.[732]

Multiple reports suggest that current practices do not adequately take dilbit into account. A National Academies of Sciences, Engineering, and Medicine report[733] concluded: "Broadly, regulations and agency practices do not take the unique properties of diluted bitumen into account, nor do they encourage effective planning for spills of diluted bitumen."[734] The report stated that a more comprehensive and focused approach by federal agencies and the oil industry is necessary to improve oil spill preparedness for dilbit spills and increase cleanup

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[723] PFT of Rice 6.
[724] Tr. 1397, vol. 6.
[725] Ex. 0149-000001-TSS.
[726] Tr. 1397, vol. 6.
[727] Tr. 1399, vol. 6.
[728] Ex. 0106-000001-TSS.
[729] Ex. 5515-000189-CRK.
[730] Ex. 5515-000196-CRK.
[731] Ex. 5515-000214-CRK.
[732] Ex. 5515-000213-CRK.
[733] Ex. 5515-000166-CRK.
[734] Ex. 5515-000024-CRK.

effectiveness.[735] The report recommended that the Coast Guard revise its oil-grouping classifications to more accurately reflect dilbit's properties, and recognize dilbit as a potentially non-floating oil after the diluent has evaporated. The report also recommended that EPA, the Coast Guard, and state and local governments should increase their coordination to improve contingency planning and strengthen response preparedness.[736]

The Northwest Area Contingency Emerging Risks Task Force Report recognized that increased rail transport of midcontinent crude requires a change in response strategy and resource utilization.[737] The report concluded that there is "increased recognition that current fate and effects predictive modeling does not adequately address all aspects of the heavier Group IV (API ranges from less than 17.3 to 10) oils and more work in this area is warranted."[738]

Modeling for guiding response activities is typically done for short durations. The NOAA Automated Data Inquiry for Oil Spills program is designed to provide oil-weathering information for five days.[739] Non-floating oils tend to weather slowly and can affect resources for long periods of time and at a great distance from the spill site.[740] Spill modeling and supporting information systems are not commonly used in response to non-floating oil spills because of limited data and observations of oil suspended in the water column or deposited on the seabed. Models are also not routinely used with non-floating oil spills because of the lack of supporting data on three-dimensional currents and concentrations of suspended sediments.[741]

OSROs self-certify that they have Group V (heavy oil) response capability but no programming validates these assertions and field equipment is not verified. Self-certification without verification results in an unknown national ability to respond to Group V oil spills.[742] Some OSROs have subcontractors connected or contracted to them that provide niche expertise for detecting, containing, and recovering sinking oils.[743] Most of the techniques and tools for tracking subsurface oil, however, have not been used in response to actual oil spills. Visual observations by divers are widely used, but they are labor intensive and slow. Technical constraints limit more sophisticated approaches such as remote sensing to zones very near the sea surface. Many of the more sophisticated systems are prone to misuse and produce ambiguous data that can be misinterpreted.[744] There are technologies available for containing

[735] Ex. 5515-000191 -CRK.
[736] Ex. 5515-000193-CRK.
[737] Ex. 3088-0116-VAN; Ex. 3085-0059-VAN.
[738] Ex. 3085-0059-VAN.
[739] Ex. 5515-000261-CRK.
[740] Ex. 3085-0042-VAN.
[741] Ex. 3085-0041-VAN.
[742] Ex. 3085-0038-VAN.
[743] Ex. 3085-0040-VAN.
[744] Ex. 3085-0041-VAN.

and recovering subsurface oil, but few are effective and most can only work in very limited environmental conditions.[745]

The 2014 Washington Marine and Rail Oil Transportation Study observed that response and contingency planning has focused on containing and recovering oil floating on the water's surface. This study states that increased handling of oils that may sink requires updates to oil spill response procedures in the Northwest, and further states that there are limitations on the ability to model, track, locate, and recover submerged oil.[746] There are gaps in GRPs for marine areas.[747] Importantly, GRPs do not address responses for submerged or sinking oils, which is a concern for dilbit. Ecology does not have sufficient resources to update and maintain the GRPs or to test GRP strategies through response equipment deployment.[748] Scientific reports and other studies advising that the current regulatory regime with respect to oil spill planning and response is in need of updating are very persuasive.

First responders lack relevant information about oil characteristics needed to effectively respond to a spill. The Washington State Marine and Rail Oil Transportation Study[749] criticized the current placarding system for railcars for not providing meaningful assistance to first responders and found that specific information regarding the oil involved in an incident is often not provided to first responders in a timely manner.[750] The National Academies of Science Report stated that responders do not have the information they need to respond to oil spills because Material Safety Data Sheets[751] (MSDS) are usually generically written and do not provide information such as the type of crude oil, its chemical composition, density after weathering over time, and adhesion properties.[752]

The MSDS for the crude oil that would be transferred through the VEDT are in Exhibit 0001-003059-PCE. None of the MSDSs discuss adhesion, and the MSDSs for heavier crude oils do not describe how the oil may become denser after weathering nor do they contain specifics about the diluent that will be part of the dilbit. A Roundtable Report produced by the PHMSA[753] following a series of oil train derailments found that the usefulness of MSDS varied in formulating an effective response strategy and managing an incident because the MSDSs were not necessarily applicable to the specific product involved in the incident and some were outdated. The Roundtable Report emphasized that responders need product-specific

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[745] Ex. 3085-0042-VAN.

[746] Ex. 3088-0115-VAN.

[747] GRPs have also not been developed for most of the rail corridors through which the crude oil railcars will transit. Ex. 3088-0115-VAN.

[748] Ex. 3088-0115-VAN.

[749] Ex. 3088-0001-570-VAN.

[750] Ex. 3088-0095-VAN.

[751] Material Safety Data Sheets accompany shipments of hazardous chemicals to inform employees about the hazardous chemicals to which they are exposed. *See* WAC 296-901.

[752] Ex. 5515-000260-61-CRK; *see, e.g.*, Ex. 3017-000001-05-VAN.

[753] Ex. 0261-000001-TSS.

information for their decision-making.[754] In addition, the MSDSs for products involved in a spill are not always made available to the incident commander in the early phases of an incident.[755]

The Council finds these reports regarding the lack of relevant information being available to first responders, including the MSDS for the crude oil that will be transferred through the facility, to be very persuasive.

Dilbit poses unique challenges in the environment. As part of the National Academy Report, the National Academies of Sciences, Engineering, and Medicine determined that:

> In comparison to other commonly transported crude oils, many of the chemical and physical properties of diluted bitumen, especially those relevant to environmental impacts, are found to differ substantially from those of the other crude oils. *The key differences are in the exceptionally high density, viscosity, and adhesion properties of the bitumen component of the diluted bitumen that dictate environmental behavior as the crude oil is subjected to weathering (a term that refers to physical and chemical changes of spilled oil.)*[756]

A key finding in the report is: "[T]he density of the residual oil does not necessarily need to reach or exceed the density of the surrounding water for [submerging or sinking] to occur. The crude oil may combine with particles present in the water column to submerge, and then remain in suspension or sink."[757] As the volatile compounds in oil begin to evaporate, dilbit forms a dense, viscous material that has a strong tendency to adhere to surfaces.[758] In a diluted bitumen spill subject to weathering, there is much more residue and its density is much closer to that of water. This combination will likely increase oil-particle aggregate formation and the submergence of oil relative to other commonly transported crude oils.[759] Oil-particle aggregate formation is enhanced by salinity.[760]

Differences in the chemical and physical properties of dilbit affect environmental impacts and "warrant modifications to the regulations governing diluted bitumen spill response plans preparedness, and cleanup."[761] The difference in spill hazards between dilbit, weathered dilbit, and commonly transported crude oils are set forth in Figure S-1 of the National Academy Report. One of these properties, biodegradability, indicates that both dilbit and

[754] Ex. 0261-000009-TSS.
[755] Ex. 0261-000011-TSS.
[756] Ex. 5515-000023-CRK (alteration in original).
[757] Ex. 5515-000023-CRK.
[758] Ex. 5515-000023-CRK.
[759] Ex. 5515-000232-CRK, Ex. 5515-000235-CRK.
[760] Ex. 5515-000233-CRK.
[761] Ex. 5515-000189-CRK.

weathered dilbit are more likely to have increased persistence in the environment over commonly transported crude oils.[762]

The National Academy Report says that when dilbit begins to weather, it reverts to the properties of the initial bitumen. The time windows for implementing strategies are significantly shorter for dilbit. When traditional removal or containment techniques are not immediately effective, the possibility of submerged and sunken oil increases. This creates problems for spill response because there are few effective techniques for detecting, containing, and recovering oil that is submerged in the water column, and the available techniques for responding to oil that has sunk to the bottom have shown variable effectiveness and depend upon the conditions of the spill.[763]

The report also states that crude oils contain polycyclic aromatic hydrocarbons (PAHs) and naphthalenes that are toxic.[764] Heavy crude oil and dilbit also contain resins and asphaltenes that tend to cluster together in multimolecular aggregates,[765] which makes dilbit residue more strongly adhesive than light or medium crude oils.[766] Resins and asphaltenes may accumulate as residues in the environment after a spill because they evaporate, dissolve, and degrade poorly.[767] This strong adhesion following evaporative loss of volatile compounds can impede recovery efforts and is expected to increase the tendency of the residue to adhere to particulate matter and to sink.[768]

Water temperature and salinity are important determinants of the propensity of residual dilbit to submerge. The density of bitumen increases faster with decreasing temperature than the density of the water, and it may sink in colder water but float in warmer water. The salinity stratification of fresh water overlying saltwater is particularly common at freshwater inlets to coastal marine zones, and submerged oil may accumulate at density beneath the surface.[769]

In addition, dilbit has an abundance of volatile components that may be flammable for a day or more after a spill.[770] The two most relevant processes for chemical decomposition are photochemical oxidation and biodegradation. These processes tend to occur slowly over a period of weeks to years. Photochemical oxidation is the process by which sunlight causes the cleavage and formation of shared molecular bonds. Because PAHs are transformed more rapidly than alkanes within the oil, more resins, and asphaltenes are present in the residue. Biodegradation can occur both aerobically or anaerobically, but aerobic processes occur more rapidly and extensively. For dilbit, the deposits from which it is extracted are already residues

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[762] Ex. 5515-000190-CRK.
[763] Ex. 5515-000188-CRK, Ex. 5515-000191-CRK, Figure S-2.
[764] Ex. 5515-000209-CRK.
[765] Ex. 5515-000210-CRK.
[766] Ex. 5515-000216-CRK, Table 2-6.
[767] Ex. 5515-000218-CRK.
[768] Ex. 5515-000231-CRK.
[769] Ex. 5515-000234-CRK.
[770] Ex. 5515-000215-CRK.

remaining after extensive anaerobic biodegradation, so a spill of dilbit may be less susceptible to biodegradation.[771]

Oil spill models can be used for responses to spills of dilbit, but the main parameters of the models are typically calibrated to conventional oils. For example, the windage (transport speed) factor for oil is typically three to four percent in the early stages of a conventional oil spill. It decreases as the oil weathers and forms emulsions. Dilbit does not promote the formation of emulsions, so the windage factor does not decrease further with time. The windage factor of diluted bitumen is approximately three percent.[772]

Closures of affected water bodies as a result of oil spills are likely to be longer when the spilled oil sinks in the water column and generates chronic sheening. The Kalamazoo River and the Morrow Lake reservoir were closed for nearly two years following the Enbridge Pipeline spill in July 2010.[773]

Floating oil is usually detected by aerial observations, ground and water surveys, and depending on the spill—remote sensing. However, these methods do not work when the crude oil submerges or completely sinks. There are detection methods that can be used after the oil is no longer floating, such as diver observations and underwater cameras, but these methods are not well established, are relatively slow, and only provide a snapshot of a small area. Such methods also can be limited by wave height, water depth and currents, water turbidity, and the ability to detect buried crude oil.[774] Sunken oil is unlikely to be detectable from the air or by using visual observations or sensors unless it is present in very shallow, clear water. Many detection techniques are low technology, which rely on sorbents suspended in the water or dragged along the bottom. There is little documentation of the effectiveness of these techniques. Sonar systems need further testing to refine data analysis techniques to reduce false positives and false negatives, and to improve data availability.[775]

Weathered diluted bitumen may increase in viscosity and no longer float under real world conditions. This is not addressed by most spill response plans. Weathered diluted bitumen adheres strongly to shorelines, vegetation, and debris and will be more difficult to remove from these surfaces. The adhered oil will also pose a threat of fouling habitat and wildlife because it more quickly weathers into a viscous sticky residue.[776] Viscosity makes recovery of sunken oil difficult because it impacts pumps. The contaminated water and sediment associated with dredging and pumping are big constraints on recovery. No "off the shelf" solutions for sunken oil recovery have been used in any case studies.[777] Suction

[771] Ex. 5515-000221-CRK, Ex. 5515-000223-CRK.
[772] Ex. 5515-000261-CRK.
[773] Ex. 5515-000262-CRK.
[774] Ex. 5515-000267-68-CRK.
[775] Ex. 0259-000024-TSS.
[776] Ex. 5515-000104-CRK.
[777] Ex. 5515-000142-CRK

dredging is used to remove sediments from the bottom of a water body, and it has been used to recover sunken crude oil in at least five spills. This method generates large volumes of sediment and water that must be treated and disposed of properly. Suction dredging works best for removal of small concentrated areas of sunken crude oil.[778]

Diver directed pumping is the method most frequently used for removing bulk crude oil that has accumulated at the bottom of a water body. Divers can be effective if visibility is adequate, but it is labor intensive and slow, and requires specialized gear for diving in contaminated water and for decontaminating the divers.[779] Because weathered dilbit is already highly degraded, natural attenuation of residual dilbit is less likely to be effective, which can mean that more aggressive removal actions are needed.[780]

Sunken oil recovery in rivers should focus on low-flow areas, including areas where the river widens or deepens resulting in reduced current and turbulence, and at the mouths of streams entering a river where deeper areas may exist as a result of scouring during high-flow events. Under low-flow conditions, sunken oil can spread into depressions up river of the release site.[781] Techniques for sunken oil containment have rarely been attempted, and few have been documented as effective. They include: artificial depressions (trenching), bottom booms, sheet piling nets or curtains attached to the bottom or suspended from the surface, air curtains, filter fences, gabion baskets stuffed with sorbents, and other structures intended to slow bottom currents and promote deposition of oil in front of the structure for removal.[782]

The National Academy Study notably concludes that "[t]here are no known, effective strategies for recovery of crude oil that is suspended in the water column, particularly where it occurs as droplets or oil-particle aggregates."[783] Nets with various size meshes and towed at varying speeds have been used for diluted bitumen and its residues. Submerged material adhered to the nets, but the weight of the nets when full made them difficult to recover by hand. In addition, 25 percent to 50 percent of the oil leaked out when the nets were removed from the water. The oil stuck so firmly to the nets that they could not be reused. Submerged oil that was deeper in the water column was swept under the nets. Other tactics for removing oil such as filter fences, and wire cages stuffed with sorbents have not been effective.[784]

The API gravity or density of the oil relative to the receiving water determines whether the oil will initially sink after its release into the water. Floating oils that may sink are generally very heavy crude oil, heavy fuel oils, and dilbit products. Over time, weathering or

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[778] Ex. 5515-000271-CRK.
[779] Ex. 5515-000271-CRK.
[780] Ex. 5515-000272-CRK.
[781] Ex. 0259-000048-TSS.
[782] Ex. 0259-000055-57-TSS.
[783] Ex. 5515-000270-CRK.
[784] Ex. 5515-000270-CRK.

interaction with sediment also can cause a floating oil to sink.[785] Some oils are lighter than water initially but become close to, or heavier than, the density of freshwater after the lighter fractions of the oil are lost through evaporation. These oils can sink as either bulk oil or oil-particle aggregates on the bottom.[786] In freshwater, oils with an API of less than 10 or a density greater than 1.0 g/cm will sink if currents are weak or the turbulence is low.[787] In an estuary, oil may be suspended in the water column in the freshwater part of the river, and then refloat once it reaches the higher salinity water closer to the mouth of the estuary. Conversely, oil that floats or is submerged in an estuary may sink or become submerged if it is transported into less dense freshwater.[788] If the currents or turbulence is strong, heavier oils will become suspended in the water column and sink only in low-flow areas down current of the release, so, when searching for sunken oil, the work must focus on low-flow, low-energy areas.[789]

Oil can sink if it has been stranded onshore and mixed with sand or after mixing with sand suspended by wave action. Oil can then refloat after it separates from the sand.[790] Floating oil that mixes with sediment after being stranded on a beach can be reworked and moved seaward by wave action and sink in the nearshore water. Floating oil can also mix with sand in the surf zone and sink without ever washing onshore.[791] Although oil generally floats, heavy oil can quickly form tar balls. Tar balls can re-concentrate in convergence zones and on shorelines far from a spill site.[792] Formation of oil-particle aggregates can sink quicker as turbulence decreases. Oil sinks slower as turbulence decreases over larger areas.[793] Highly viscous oils can have an increased risk of sinking over time because they can entrain a lot of free water, which can increase their density. Highly viscous oils also tend to be stickier, which can increase the amount of sediment uptake if they are stranded on a shoreline or mixed with sediments in the water column.[794]

Response operations on rivers are challenging because of, among other factors, limited access points for equipment and worker deployment, variable flow rates and water depths, vessel wakes that can cause equipment to fail in addition to posing safety hazards, seasonal constraints associated with cold water and icy conditions, and bottom debris in rivers which can interfere with sunken oil detection and snag equipment.[795] The API Technical Report refers to the 2010 Enbridge Pipeline spill into the Kalamazoo River as the best recent example of difficulties of trying to contain sunken oil that is remobilized by increased turbulence and

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[785] Ex. 0258-000008-TSS.
[786] Ex. 0258-000010-TSS.
[787] Ex. 0258-000008-TSS.
[788] Ex. 0258-000009-TSS.
[789] Ex. 0258-000009-TSS
[790] Ex. 0258-000009-TSS
[791] Ex. 0258-000010-TSS.
[792] Ex. 0258-000009-TSS.
[793] Ex. 0258-000009-TSS.
[794] Ex. 0258-000010-TSS.
[795] Ex. 0259-000048-TSS.

current.[796] During the summers of 2012 and 2013, actions were taken to prevent the spread of oiled sediments through trapping methods. Partial curtain deployments were the most effective means to trap oiled sediments, and gabion baskets were the most effective method of removing oil from the water column.[797] None of these techniques are considered effective in areas of higher flows.[798] The scientific reports discussing the properties of crude oil and the difficulties these properties pose in recovering spilled dilbit and heavy submerged oils are very persuasive.

Tesoro Savage acknowledges that the weathering process will result in the formation of oil particulate aggregates that can become suspended in the water column and sink.[799] Tesoro Savage asserts, however, that the formation process of oil particulate aggregates is oversimplified, which: "drastically overestimates the amount of oil that would sink, and thus the impacts of the sunken or submerged oil."[800] Tesoro Savage contends that very high sediment loads are required for oil-sediment interaction, and those conditions are not present on the Columbia River.[801] Tesoro Savage believes that both Bakken crude oil and dilbit will float in the event of a spill.[802] In support of its position, Tesoro Savage cites to wave tank tests in laboratories to show dilbit resists natural dispersion and is more likely to break into fragments rather than disperse.[803] Tesoro Savage also refers to lab studies, which concluded that the formation of oil particulate aggregates were unlikely under most conditions characteristic of the lower Fraser River. Because the Columbia River tends to carry a smaller sediment load than the Fraser River, Tesoro Savage believes that there is a low chance that the required oil-sediment interaction would occur on the Columbia River.[804] It points to flume studies conducted over a 10-day period where no sinking of two dilbit products was observed,[805] and contends that the response to a spill of dilbit would be similar to a conventional response to most oil spills, which is the deployment of boom in order to contain, redirect, and concentrate the oil for skimmer recovery.[806]

Evidence about actual oil spills. Actual oil spills demonstrate the potential for oil to sink, depict difficulties in recovery efforts, and portray impacts to the environment.

As described above, the Mobil Oil spill is instructive because it was a spill on the Columbia River. In March 1984, the tanker Mobil Oil grounded on the Columbia River near St. Helens, OR, approximately 10 miles downstream from Portland.[807] Approximately

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[796] Ex. 0259-000055-TSS.
[797] Ex. 0259-000056-TSS.
[798] Ex. 0259-000057-TSS.
[799] PFT of Taylor 18.
[800] PFT of Taylor 18.
[801] Tr. 4397, vol. 19.
[802] Tr. 4417, vol. 19.
[803] PFT of Taylor 18.
[804] PFT of Taylor 19.
[805] PFT of Taylor 19.
[806] PFT of Taylor 25.
[807] Ex. 0269-000007-TSS, Ex. 0269-000013-TSS; Ex. 0268-000001-TSS.

3925 bbl of heavy residual oil, industrial fuel oil, and No. 6 fuel oil were released.[808] The Coast Guard, Mobil's Marine Transportation office in New York, and a clean-up contractor Environmental Emergency Services (EES) were notified of the grounding within minutes. EES began to implement the Columbia River Oil Spill Protection Plan to protect natural resources and to conduct clean-up operations.[809]

The river current in the St. Helens vicinity was just under 2 knots when the grounding occurred. A boom was employed immediately downstream of the grounded vessel, but was ineffective because the river current was in excess of 3 knots.[810] The incident occurred in a turbulent area of the river that experiences some tidal influence.[811] During the first week after the Mobil Oil spill, river-flow volumes resulted in an average current at St. Helens of just under 2 knots.[812] Due to swift current conditions, much of the oil escaped under booms placed downstream. The distribution of oil throughout the water column made oil recovery difficult.[813]

Some of the oil was heavier than water.[814] No. 6 fuel oil is a heavy product with an API gravity that ranges from 7 to 14.[815] The No. 6 fuel oil that was released had an API of 12.6. The industrial fuel oil that was released had an API of 5.5; and the heavy residual oil that was released had an API of 11.3.[816] Dr. Taylor noted on behalf of Tesoro Savage that it wasn't a surprise that there was oil in the water column because one of the tanks that ruptured contained oil with a 5.5 API. An API of 10 is the same as fresh water, so this oil was clearly going to sink.[817] However, Dr. Stanley Rice described the swirls and eddies and the high energy level of the Columbia River.[818] Overall, the Council is more persuaded by Dr. Rice's explanation of how river activity influences the sinking behavior of oil.

Ocean tides move up the Columbia River and cause an oscillating tidal current of approximately 0.5 knots. During periods of low water, when the tidal currents and river flow are added together, expected currents would then be 2.5 knots if the river current was 2.0 knots without the tidal current. During the high water period as the wave progresses up the river, the 0.5 tidal current is subtracted from the expected river current of 2.0, which results in a downstream current flow of 1.5 knots, or less.[819] Oil reached the mouth of the Columbia River in 3 days.[820] Most of the oil was swept out to sea, moved north, and deposited along outer

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[808] Ex. 0268-000001-TSS; Ex. 5923-000244-CRK.
[809] Ex. 0268-000001-TSS; Ex. 0269-000019-TSS.
[810] Ex. 0268-000002-TSS.
[811] Ex. 5923-000244-CRK.
[812] Ex. 0269-000069-TSS.
[813] Ex. 5923-000244-CRK.
[814] Ex. 0268-000002-TSS.
[815] Ex. 5923-000244-CRK.
[816] Ex. 0269-000017-TSS.
[817] Tr. 4382-83, vol. 19.
[818] Tr. 4097, vol. 17.
[819] Ex. 0269-000069-TSS.
[820] PFT of Rice 7.

beaches of Washington in the form of small tar balls. The most noticeable impact was on seabirds. Dead birds numbered up to 2 per mile per day on the outer beaches. Of the 698 birds treated at a rescue center, 475 (68 percent) survived. Fringe marsh oiling also occurred in the river.[821]

It became clear from preliminary sampling "that some fraction of the oil, *perhaps the bulk of the spill*, had become incorporated into the water column and river bedload sediments, posing a much greater risk to natural resources than would have been the case if oil impacts had been restricted to surface contamination."[822] NOAA was concerned about releasing juvenile salmon from hatcheries, as well as for migrating adult salmon in the river. Studies have shown that juvenile salmon are particularly sensitive to oil impact. In addition, approximately 600–700 harbor seals were present. They are protected under the Marine Mammal Protection Act. There was a possibility that marine mammals would need to be relocated, which would have been even more difficult because they were mostly pregnant females that were preparing to pup.[823] A number of areas were considered sensitive habitats during the time of the grounding. These include, but are not limited to, Baker Bay and Youngs Bay,[824] the Lewis and Clark National Wildlife Refuge,[825] and the Columbian White-Tailed Deer National Wildlife Refuge.[826] In addition, the outer beaches of Oregon and Washington to Grays Harbor are habitat for marine birds, migrating waterfowl, anadromous fish, oyster and razor clam shellfish beds, and recreational beaches.[827]

By the first evening, oil from the Mobil Oil spill had moved 25 miles downstream and was mainly flowing in the navigation channel. Some sensitive areas were boomed, but the oil was not behaving in a manner that was expected. Where booms would normally be effective, the oil was observed moving easily under the boom. It is also possible that an unrelated diesel spill upstream may have impacted the oil's behavior. The only black oil was in the form of tiny specks that clung to small debris. Most of the oil floating on the surface dissipated by the time it reached the mouth of the Columbia River. Moving down the Columbia River, the effect of the river currents diminished because the channel widens and the cross-sectional area increases. The effects of the tidal currents increased because there as the tidal signal strengthened. Around River Mile 42, near Puget Island, the tidal currents were strong enough to temporarily overcome the river flow. This resulted in a temporary reversal in the currents, in which the river flow comes to a halt and shows some upstream motion. This reversal in current because of the tidal influence created a strong surface convergence in the Columbia River, as is

[821] Ex. 0269-000007-TSS; Ex. 0268-000001-02-TSS.

[822] Ex. 0269-000031-33-TSS.

[823] Ex. 0269-000033-TSS; Ex. 5923-000246-CRK.

[824] Both of these bays are nursery areas for Chinook, chum, and coho salmon, and are feeding and nursery areas for Dungeness crab and various fish. Baker Bay also has large waterfowl concentrations. Youngs Bay also has large concentrations of benthic organisms. Ex. 0269-000045-TSS.

[825] The Lewis and Clark National Wildlife Refuge has a number of feeding and nursery areas, including harbor seal.

[826] Elochoman Slough, which is where a state fish hatchery location, is part of this Refuge.

[827] Ex. 0269-000045-TSS.

typical. NOAA advises that, at approximately River Mile 35, some convergence of floating surface oil is to be expected. The strength and duration of the current reversal continues from this location all the way to the mouth of the river.[828]

NOAA is aware that the intrusion of saltwater from the Pacific Ocean is recognizable in the Columbia River near River Mile 20. This saltwater intrusion creates a classical, two-layer circulation system that is superimposed on the outflow of the river. The result is that there is a strong convergence zone in the lower layer of the river, which is associated with the maximum turbidity observed in the suspended sediment distribution. This convergent zone has the potential to create higher concentrations of oil to move along the bottom of the river, either as bed load or as suspended pollutant within the deeper section of the water column.[829]

Wind effects were a secondary factor in the Mobil oil spill as they influenced which bank of the river received the most oil. Much of the wind during the first week came predominately from the south, which led to higher concentrations of oil on the northern bank, or Washington side of the river.[830] When bends occur in the river, there is a slight tendency for surface water to move to the outside of the curve and bottom water to move to the inside of the curve. Floating pollutants therefore tend to accumulate on the outside curve of a river channel.[831] Subsurface oil is expected to flow at a slower rate than the floating oil in the lower part of the Columbia estuary where the intrusion of saltwater leads to a two-layer system. Oil in the lower part of the water column would be slowed in the last 20 miles of the river and would exit the river system later than oil floating on the surface.[832]

Oil in the water column contaminated the filters of a water intake system at one industrial facility. Oily debris disposal was a major problem. The amount of this debris was tremendous, yet there was only a slight amount of oil recovered.[833] The problem wasn't solved until the State of Oregon agreed that one of its disposal sites could be used for disposal of the debris. Bird cleaning required great quantities of clean water, which delayed operations.[834] Following the spill, data indicated that naphthalenes could be dissolved in the water.[835]

Oil was chemically detected in the mouths of bottom dwelling sturgeon following the spill. This indicates that the oil was able to mix down into the water column and into the sediments.[836] Five days after the spill, sturgeon were collected both upriver and downriver of the spill to determine whether fish subject to the spill were impacted by aromatic hydrocarbons from the petroleum. The sites for collecting the fish were established state Ecology sampling

[828] Ex. 0269-000069-71-TSS.
[829] Ex. 0269-000071-TSS.
[830] Ex. 0269-000071-73-TSS; Ex. 5923-000244-CRK.
[831] Ex. 0269-000073-TSS.
[832] Ex. 0269-000073-75-TSS.
[833] Ex. 0268-000003-TSS; Ex. 5923-000244-45-CRK.
[834] Ex. 0268-000003-TSS.
[835] Ex. 5923-000244-45-CRK.
[836] Tr. 4097, vol. 17.

sites that had no known previous petroleum contamination.[837] Sturgeon were collected from sites both 13 miles and 38 miles upstream from the spill, and also collected 57 miles downstream, at a site where oil and tar balls were found throughout the water column and in the sediment.[838] The sturgeon sampled downstream of the spill had significantly higher concentrations of aromatic hydrocarbons in their bile than the sturgeon caught upriver from the spill.[839] Bird carcasses were collected and disposed of, but the numbers of birds and the types of species was not recorded.[840] Recovery of the spilled oil was hindered by difficult access to the shoreline, and river current in excess of 3 knots. Some of the spilled oil was heavier than water, and communications were hindered by difficult terrain and distance. The cleanup area extended over 120 miles and large amounts of debris existed along many parts of the river, making disposal of such a large volume of contaminated material difficult.[841]

These river current and tidal effects in the Columbia River are not contested. It is noteworthy that Tesoro Savage's Facility Oil Spill Contingency Plan recognizes that tidal influence can produce current reversals in the river and that saltwater can create a layered circulation pattern. The Plan also states that the flow rates during the spring and early summer may result in the Columbia River water level being higher than the Willamette River level, which results in the Columbia River pushing up the Willamette River until it reaches the Multnomah Channel where they converge with the mainstream of the Columbia River.[842]

Another instructive event involved the Barge E2MS 303, which was involved in the first known instance of a large-scale release of Bakken crude oil into a navigable waterway.[843] The spill was from a double-hulled barge that had collided with a boat in February 2014.[844] Barge E2MS 303 released 750–800 bbl of oil from a gash, which was swept downstream as far as 65 miles over the next two days, and resulted in a closure of the lower Mississippi River for two days. The low viscosity of Bakken crude oil was noted at this time. The Bakken crude oil flowed much more like a diesel or gasoline than crude oil and it quickly spread and evaporated. Less than one percent (2 or 3 bbl) of the spilled oil was recovered.[845]

The evaporation estimates for the E2MS 303 spill were estimated to be 40 percent after 8 hours (320 bbl), 43 percent after 24 hours (344 bbl), and 46 percent after 48 hours (368 bbl). The dispersion caused by river turbulence and flow was not accounted for in the estimates.[846]

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[837] Ex. 5064-000001-2-TRB.

[838] Ex. 5064-000004-TRB.

[839] Ex. 5064-000001-TRB, Ex. 5064-000005-6-TRB; *see also* Ex. 5923-000245-CRK (heavy aromatics found in the tissue of sturgeon).

[840] PFT of Rice 10.

[841] Ex. 0268-000002-TSS; Ex. 5923-000245-CRK.

[842] Ex. 0001-002680-PCE.

[843] Ex. 5215-000001-2-TRB.

[844] Tr. 1847, vol. 8.

[845] PFT of Rice 4-5; Ex. 5215-000008-TRB, Ex. 5215-000010-TRB, Ex. 5215-000012-TRB.

[846] Ex. 5215-000011-TRB.

Because of the quick spreading and evaporation of Bakken oil, recoverable product may only persist for four to eight hours, depending on the size of the spill.[847]

In September 1969, the barge *Florida* ran aground near West Falmouth, Massachusetts, and spilled between 650,000 and 700,000 L of No. 2 fuel oil into Buzzards Bay. This particular spill, and its long-term effects on the environment, has been studied because the spill location is near an oceanographic institute and a marine biological laboratory.[848] After the barge began to release oil, strong winds mixed the oil into the water column and drove it towards Wild Harbor. Both the subtidal and intertidal areas of Wild Harbor were heavily oiled despite the use of oil booms. Oil covered vegetation died within a few weeks of the spill, and animals were highly impacted.[849]

An analysis conducted 20 years after the *Florida* West Falmouth oil spill showed elevated levels of PAHs in both sediments and marsh animals. The persistence of the oil was attributed to heavy contamination of the area, the depletion of oxygen from the marsh sediments that hindered microbial degradation, and the low-energy environment that lowers the amount of flushing and water-washing.[850] The lack of oxygen in the sediments in particular has permitted little or no anaerobic degradation of petroleum compounds, *which contrasts with laboratory experiments* showing that anaerobic degradation of petroleum compounds can occur at significant rates.[851] The persistence of oil in wetlands is quite significant.[852] "[P]etroleum residues from the *Florida* spill continue to persist in Wild Harbor sediments after 30 years and they will likely remain indefinitely."[853]

The Enbridge spill involved a pipeline that spilled dilbit into the Kalamazoo River in 2010. Although the dilbit initially floated, the evaporation of light hydrocarbons coupled with the mixing of the oil with sediments resulted in some oil sinking. The NWACP Task Force Report observed that: "[T]here were periods during the response when the dilbit was simultaneously floating, submerged in the water column, and on the bottom of the river."[854] The fast moving water of the river and the creek impeded all oil removal efforts. And because the spill occurred at night, initial responders were unaware of the type of oil spilled or the severity of the spill, which impaired decision-making.[855] The Enbridge spill is the largest land-based spill in the U.S. at close to one million gallons spilled.

The EPA conducted dredging activities through 2013 and discovered that there was still much oil on the bottom, about 15 percent to 18 percent, which translates into 150,000 to

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[847] Ex. 5215-000013-TRB.
[848] Ex. 5085-000001-TRB.
[849] Ex. 5085-000001-TRB.
[850] Ex. 5085-000001-TRB.
[851] Ex. 5085-000001-2-TRB.
[852] PFT of Rice 7-8.
[853] Ex. 5085-000007-TRB.
[854] Ex. 3085-0016-VAN.
[855] Ex. 3085-0017-VAN.

180,000 gallons on the bottom of a million gallons spilled. Another round of dredging activity was ordered, and about 500,000 cubic yards were removed over a 40-mile stretch of river. EPA confirmed that there is still about 160,000 gallons there, and more dredging may do more harm than good. The dilbit is going to be there for a very long time, which is going to have ongoing effects on the habitat. The persistence of the oil will be on the order of decades. Sturgeon live on the top of the sediments, and have a life expectancy up to 80 or 100 years, which is a lot of long-term exposure potential for this animal.[856]

The Burnaby, British Columbia, Canada spill occurred on July 24, 2007. This incident is significant because there was an initial failure to fully shutdown the Westridge Pipeline by the operator after it had ruptured. This was contrary to Kinder Morgan's standard shutdown procedure and significantly increased the amount of oil spilled.[857]

The experiences from these spills demonstrate the unique nature of each spill based upon a variety of factors. They also show how containment and recovery efforts were frustrated by the nature of the oil and the location of the spill. And they demonstrate the potential damage that can occur to wildlife and the environment. The Burnaby and Enbridge spills are instructive to the Council because they illustrate the importance of the human element in spill response. Training and drills may not always be enough for operators to make the correct decisions, and a lack of information can lead to responders not being aware of the scope of the problem they face.

Summary of the Council's Analysis of Protection of Water Quality. Many federal and state laws were enacted following the Exxon Valdez oil spill in 1989 that expanded protection of water quality by adding new requirements for oil handling.[858] These planning requirements provide a general framework for coordination among federal, state, and local authorities.[859] Tesoro Savage asserts that, because of the protections provided by these new laws and the development of GRPs, a spill at the VEDT would have largely successful response and would be effective to preserve water quality.[860]

Tesoro Savage performed a trajectory analysis to identify where spilled oil will end up during a 48-hour time period. However, its oil spill model was flawed. Although the Columbia River has average current speeds from 1 to 6 knots, Tesoro Savage assumed a current speed of 1.2 knots and did not include wind speed in determining spill trajectory, which is contradicted by a figure in the analysis containing examples of how wind affects oil movement on water surfaces.[861] If the average speed of 2 knots had been used in the analysis, it would have shown

[856] Tr. 4099-4101, vol. 17; Ex. 3085-0016-VAN.
[857] Ex. 3085-0018-19-VAN.
[858] PFT of Taylor 4.
[859] PFT of Taylor 5.
[860] Tr. 4392-93, vol. 19.
[861] Ex. 0001-002899-PCE.

that oil would have reached the Pacific Ocean within two days. These omissions make Tesoro Savage's predictions that spilled oil would travel just 58 miles within 48 hours unconvincing.

Tesoro Savage's tabletop exercise to determine how well different entities involved in oil spill response would deploy their resources in the event of a worst-case spill failed to identify gaps in the response and concluded that adequate personnel and equipment could be deployed in sufficient time to recover dilbit before it would weather and sink. However, Tesoro Savage made incorrect assumptions about the ability of dilbit to float, which invalidates its conclusions about the efficacy of the planned response. After a spill of dilbit, the rapid evaporative losses of lighter components increases the viscosity and density of the remaining oil and the denser remaining oil can become submerged or sink to the bottom. The Council considers this significant because regulations and agency practice do not take into account the unique properties of dilbit. The NWACP Task Force Report recognized that there is "increased recognition that current fate and effects predictive modeling does not adequately address all aspects of the heavier Group IV oils and more work in this area is warranted."[862]

The Council notes that Tesoro's tabletop exercise understates the distance oil would travel from a spill by understating Columbia River's current for the two spill scenarios and it failed to consider the unique properties of dilbit, which minimizes the expected spread of oil. It fails to address the likely impacts on habitats and species, and also understates the required responses. Therefore, this exercise has limited persuasive or planning value.

There are limitations on the ability to model, track, locate, and recover submerged oil because of limited data and observations, and also the unsuitability of available techniques for oil spill response. Few technologies are available or effective for containing and recovering subsurface oil and most can only work in very limited environmental conditions. GRPs have not been developed for most of the rail corridors through which the crude oil railcars will transit, and there are gaps in GRP availability for marine areas.

Lack of relevant information to responders is another problem. Tesoro Savage failed to take into account the fact that the current placarding system for railcars does not provide meaningful assistance. Critical information such as the specific oil involved in a spill is often not provided to first responders in a timely manner. Material safety data sheets are usually generically written and do not provide information about a spilled oil's chemical composition, density after weathering, or adhesion properties. This information is particularly important for dilbit because different diluents vary in ways that strongly affect the behavior of the spilled oil, which dictates the appropriate response strategies. Dilbit may combine with particles in the water column, submerge, and then remain in suspension or sink. Both dilbit and weathered dilbit are more likely to have increased persistence in the environment than current commonly transported crude oils and it is much more strongly adhesive than light or medium crude oils. Adhered oil will pose a special threat of fouling habitat and wildlife because it more quickly weathers into a viscous sticky residue. For these reasons and the failure to consider factors

[862] Ex. 3085-0059-VAN.

such as the inadequate information provided to responders there are serious flaws in Tesoro Savage's spill planning.

Experiences from actual oil spills demonstrates the potential for oil to sink and the difficulties encountered in recovery efforts, and they illustrate how oil spills impact the environment. In the Mobil Oil spill even though cleanup efforts began immediately, much of the oil escaped, and much of it became incorporated into the water column and riverbed sediments, posing a much greater risk to natural resources than would have been the case if oil impacts had been restricted to surface contamination. The Barge E2MS 303 spill in 2013 was a large-scale release of Bakken crude oil in a navigable waterway from a double-hulled barge that had collided with a boat and released 750–800 bbl of oil. The oil was swept downstream as far as 65 miles over the next two days, and resulted in a closure of the lower Mississippi River for two days. Less than one percent (2 or 3 bbl) of the spilled oil was recovered. The Enbridge illustrated the way spilled dilbit can behave. Although it initially floated, the evaporation of light hydrocarbons coupled with the mixing of oil with sediments caused simultaneous floating and sinking oil that submerged into the water column and ended up sinking to the bottom of the Kalamazoo River. The fast moving water of the river impeded oil removal efforts and because the spill occurred at night, initial responders were unaware of the type of oil spilled or the severity of the spill. The EPA conducted dredging activities and discovered that large amounts of oil remained on the bottom. After more dredging occurred over a 40-mile stretch of river, about 160,000 gallons remained, which will have ongoing effects to the habitat for decades. The Council considers these actual experiences with oil spills more instructive about what would happen with an oil spill into the Columbia River or other waters than Tesoro Savage's flawed modeling.

The shortcomings in Tesoro Savage's predictive modeling, its failure to take into account all relevant factors in making predictions about the effects of different kinds of oil, and situations in which oil spills occur, including the experiential value of past oil spill incidents, demonstrates the impact to the public interest of oil spill management and planning. The Council therefore moves this topic to its balancing analysis in Section IV.

2. Protection of Wetlands

Tesoro Savage's Argument about the Applicability of WAC 463-62-050. Tesoro Savage contends that WAC 463-62-050 sets the decisional standard for the Council's current consideration of wetlands impacts and limits the Council's decisional analysis in this Order.[863] WAC 463-62-050 states that with regard to site certification agreements:

> (1) The council's intent is to achieve no net loss of wetland areas. Wetland impacts shall be avoided wherever possible. Where impacts cannot be avoided, the applicant shall be required to take one or more of the following actions (in the following order of preference): Restore wetlands on upland sites that were

[863] Applicant Post-Hr'g Br. 44-45.

> formerly wetlands; create wetlands on disturbed upland sites; enhance significantly degraded wetlands; and preserve high-quality wetlands that are under imminent threat.
>
> (2) Wetland mitigation actions proposed to compensate for project impacts shall not result in a net loss of wetland area except when the lost wetland area provides minimal functions and the mitigation action(s) will clearly result in a significant net gain in wetland functions as determined by a site-specific function assessment.

As discussed elsewhere in this Order, WAC 463-62-050 does not apply to the Council's present analysis but only to the terms of site certification agreements for projects that have been approved by the Governor. The Council will nonetheless consider whether Tesoro Savage has demonstrated compliance with this rule.

Tesoro Savage contends that the scope of the rule is limited to the general footprint of the VEDT itself and that Tesoro Savage is in compliance because no on-site wetlands will be filled and three wetlands in the vicinity will not be affected by the VEDT's routine operations.[864] Tesoro Savage also contends that non-routine spills are not covered by this rule but instead are addressed by other spill prevention and response measures.[865]

Tesoro Savage's reading of the rule is incorrect. The rule makes no distinction between wetland impacts resulting from normal facility operations and wetland impacts resulting from an abnormal event like an oil spill. In all situations, the Council's intent is to achieve no net loss of wetlands. In all situations, wetland impacts are to be avoided whenever possible and, if they cannot be avoided, the impacts must be corrected by restoration, replacement, or preservation of threatened wetlands. Wetland mitigation actions must compensate for impacts without resulting in a net loss of wetland area (unless the lost wetland was of low value), and must result in a net gain of wetland functions. Nowhere does the rule default to other processes such as oil spill prevention and response measures to fully address wetland impacts.

Tesoro Savage has not attempted to demonstrate how it would address wetland mitigation if oil spills associated with the facility impact wetlands or how Tesoro Savage would comply with this rule. The Council thus concludes that Tesoro Savage has not met its burden of demonstrating compliance with this rule.

Definition of wetlands. Oil spilled into the Columbia River has the potential to cause long-term damage to unique habitat as well as to fish and animal life. In general, marshes are wetlands that are inundated with water for extended periods of time or on a regular basis. Marsh plants have adaptions that allow them to grow in waterlogged soils.[866] *On the West*

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[864] Applicant Post-Hr'g Br. 45.
[865] Applicant Post-Hr'g Br. 45.
[866] Ex. 0277-000009-TSS.

Coast, extensive tidal freshwater marshes are only found in the Columbia River, Puget Sound, and the San Francisco Bay Delta.[867]

Biological benefits of tidal freshwater marshes. Tidal freshwater marshes support a diverse community of emergent grasses, sedges, rushes, and herbaceous flowering plants. Because these marshes contain such a wide diversity of habitats and plant communities, they support many species of birds, mammals, reptiles, amphibians, fish, and invertebrates. Tidal freshwater marshes are used by more birds for breeding, nesting, rearing, and feeding than any other type of marsh. Numerous species of fish likewise use these marshes for breeding, spawning, and nursery grounds, including anadromous fish such as salmon.[868] Tidal freshwater marshes can experience significant tidal ranges, often of a greater amplitude than the tides found at the mouth of a river because of the constriction of the water as it moves inland.[869]

How and when oil impacts wetlands. Oil type is one of the major factors determining impacts on marshes. Heavy refined oils and most crude oils affect marshes by physical smothering of leaves and soils. The weathering and emulsification of the oil prior to it reaching land reduces the oil's toxicity. The extent of oiling of the vegetation is a key factor. If only parts of the leaves receive oil, the marshes often can expect to recover within one growing season. Exposure to waves and currents that speed oil removal is another key factor.[870] Spills in confined waterways, where the oil does not have an opportunity to spread out and strands on the shoreline quickly, have the greatest risk of impact.[871] Crude oils can have acute, short-term toxicity if relatively fresh oil comes in contact with the plants and most of the plant surface is covered by oil.[872] Marshes are likely to become oiled following an oil spill when the spill threatens a shoreline because marshes are located in the upper intertidal zone where the oil usually strands. It is difficult to summarize the impacts of crude oils on marshes because of the range of spill conditions and the importance of other factors.[873]

If oiling occurs during the fall or winter when the plants are in senescence, the recovery period is likely to be relatively short (one or two growing seasons).[874] Plants are very physiologically active when they are growing. If oil interrupts these physiological functions, more stress is placed on the plants and plant health may suffer. Damage to the stomata of the leaves can reduce transpiration, which can lead to overheating and death of aboveground vegetation. Oil coating can also reduce oxygen transport to the roots, which can kill the below-ground vegetation. Oil can also reduce photosynthetic rates, which can slow plant growth and affect its survival.[875]

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[867] Ex. 0277-000013-TSS.
[868] Ex. 0277-000014-TSS.
[869] Ex. 0277-000013-TSS.
[870] Ex. 0277-000022-TSS.
[871] Ex. 0277-000026-TSS.
[872] Ex. 0277-000027-TSS, Ex. 0277-000039-TSS.
[873] Ex. 0277-000039-TSS.
[874] Ex. 0277-000030-TSS.
[875] Ex. 0277-000036-TSS.

Impacts of oiling are more persistent when the oil penetrates into marsh soils.[876] Marsh plants have variable degrees of tolerance to oil being present in soils. Manual or mechanical treatment in oiled marshes actually increases the risk of mixing oil into the marsh soils.[877] Sometimes treatment will result in more rapid recovery to a marsh, and sometimes treatment will work to slow the recovery.[878] Oil spills into the marsh interior are likely to result in thicker oil residues and greater impacts because of the lack of weathering prior to the oil reaching the marsh, and slower natural removal rates. This type of spill often requires intensive work to remove the oil.[879]

Impacts and effectiveness of cleanup of oil in a wetland. Mechanical containment and collection of oil spilled on the water through the use of booms and skimmers are the primary initial clean-up methods. Numerous factors may limit the effectiveness of mechanical recovery. Mechanical recovery rates greater than 20 percent are rare.[880] Booms are particularly hard to keep in place along shorelines that are exposed to waves and currents.[881]

Manual removal involves the use of hand tools and manual labor to remove any oiled debris and the thick accumulations of viscous oil from the surface of the marsh. Work in soft sediments and in vegetated areas requires the use of walking boards to prevent damage from trampling, although trampling is very hard to avoid and often causes long-lasting damage. This is mostly due to the activity driving oil deep within the soils and the damaging of vegetation.[882] The strongest justification given for cutting vegetation manually is for the protection of wildlife.[883] The marsh fringe is an important zone that is used by fish, invertebrates, and birds, so there are ecological benefits for removing oil as a contact hazard as opposed to the survival of vegetation.[884] Based on a study of 19 spills, researchers found that cutting vegetation intensified harm 79 percent of the time. Cutting has not been used very often recently because of such study results. Marsh cutting that has produced positive effects has almost always involved a spill of heavy fuel oil or heavy crude oil where the oil was a thick, emulsified mousse.[885]

Flushing can be used to push stranded oil into the water where it can be collected so long as the oil is not too viscous to be mobilized by the flushing.[886] Flushing is difficult because it is pushing a liquid on a liquid surface, and the water surface is flat. It requires large volumes of water of the same salinity as in the treatment area, and it must be applied at low

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876 Ex. 0277-000040-TSS.
877 Ex. 0277-000031-TSS.
878 Ex. 0277-000040-TSS.
879 Ex. 0277-000040-TSS.
880 Ex. 0277-000049-TSS.
881 Ex. 0277-000053-TSS.
882 Ex. 0277-000055-TSS.
883 Ex. 0277-000060-TSS.
884 Ex. 0277-000067-TSS.
885 Ex. 0277-000063-TSS.
886 Ex. 0277-000065-TSS.

pressure. Flushing operations need to take tidal currents and wind into account. Flushing should be done on a falling tide and the wind should not be pushing any released oil back to the shoreline.[887] Marshes that are severely impacted by either oiling or response operations may be more susceptible to habitat loss due to enhanced erosion during the time it takes for the vegetation to naturally recover. Restoration actions may be necessary as part of a response.[888]

Tesoro Savage's expert witness, Greg Challenger, recognized that the impacts to wetlands vary depending on the level of oiling and the response actions. He stated that recovery of less than five years is typical for wetlands and marshes in most instances when good response decisions have been undertaken.[889] As the Council has observed throughout this Order, important information may not always be available to first responders to allow them to make the correct decision.

Oil spills have left unsafe chemical concentrations in wetlands. The Deepwater Horizon spill into the Gulf of Mexico from April 20 to July 15, 2010, released an estimated 4.9 million bbl of South Louisiana crude oil. Most of the heavily and moderately oiled areas were in Louisiana. Oil cleanup occurred on 8.9 percent of the oiled marsh shoreline. Three years after the spill, wetland soil samples from three different estuaries were collected to examine the changing composition of the oily residues in the coastal marshes and to examine biodegradation and weathering of the oil. The study found PAH levels were 374 times the baseline levels. PAHs include such compounds as benzene and naphthalene.[890] Some PAHs are carcinogenic and also may cause genetic mutations. The concentration of PAHs were at levels that affect the reproduction and growth of resident fish.[891] Concentrations of the 43 PAH compounds examined in the study remained fairly stable, and five of them, including naphthalene, increased.[892] The legacy of the PAHs in the marsh ecosystem appears to be a continuing stressor on the emergent plants, which has a cascading effect on the ecosystem's structure and function. The study also found shoreline erosion was accelerated and insect communities were depressed.[893] The study found that it may take many decades for PAHs to reach baseline levels if no additional oiling occurs.[894] More sensitive environments such as wetlands or sandy tidelands take longer to recover, especially if they are located in quiet areas that are not exposed to weather.[895]

In some sediments, many years after an oil spill, the weathering status of the oil is the same as 10 to 15 days after the oil spill because there is no oxygen in the sediments. Because

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[887] Ex. 0277-000064-65-TSS.
[888] Ex. 0277-000078-TSS.
[889] PFT of Challenger 18.
[890] Naphthalene is a known insecticide. Ex. 5098-000001-4-TRB.
[891] Ex. 5098-000001-02-TRB.
[892] Ex. 5098-000005-7-TRB.
[893] Ex. 5098-000001-TRB.
[894] Ex. 5098-000001-02-TRB.
[895] Tr. 4086-87, vol. 17.

the soil is anaerobic, microbes do not have access to the oil to degrade it.[896] After the Exxon Valdez spill, embryo mortality studies were conducted in streams that had been oiled, and they were surprisingly high, even after year four. Studies confirmed that there is still oil in the streambanks. A study using dye confirmed that oil can move from the bank down into salmon redds (individual salmon spawning places).[897] For toxicity studies, the PAH levels were lowered down into parts per billion and an exposure time of several months was used because that is how long pink salmon incubate in the ground. An exposure of 18 parts per billion of PAH resulted in a 40 percent decline in adult returns. An exposure of 5 parts per billion resulted in a 20 percent decline in adult returns.[898]

Summary of the Council's Analysis of Wetland Impacts. The Council believes that the impact on wetlands from an oil spill can be significant. Wetlands support a wide diversity of habitats and plant communities that support many species of birds, mammals, reptiles, amphibians, fish, and invertebrates.

Oil spilled in the Columbia River has the potential to damage wetlands. Most crude oils affect wetlands by physical smothering of leaves and soils. Wetlands are likely to become oiled after a spill because wetlands are located in the upper intertidal zone where oil usually strands.

As discussed in the Council's discussion of water quality, because of the deficiencies in Tesoro Savage's trajectory analysis and tabletop exercise, it is difficult to determine the potential geographic scope of wetland impacts or the capability of responders to address a spill. This is particularly true with regard to dilbit. Booms and skimmers are the primary initial clean-up methods but recovery rates greater than 20 percent are rare. Manual removal involves work in soft sediments and trampling is very hard to avoid and often causes long-lasting damage. Flushing can be used to push some stranded oil into the water where it can be collected but doing so is difficult and requires large volumes of water. As the Council has observed throughout this Order, important information may not always be available to first responders to allow them to make correct decisions.

Oil spills have left unsafe chemical concentrations in wetlands as demonstrated by results after the Deepwater Horizon spill where, 3 years after the spill, PAH levels were 374 times the baseline levels, a level that affects fish reproduction and growth. The legacy is continuing stress on emergent plants, which affects the ecosystem's structure and function. Shoreline erosion was accelerated and insect communities were depressed. It may take many decades for PAHs to reach baseline levels if no additional oiling occurs. After the Exxon Valdez spill, embryo mortalities remained high, even after year four and there is still oil in the streambanks. That oil can move from the bank down into salmon redds (individual salmon spawning places) and significantly impact mortality.

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[896] Tr. 4074, vol. 17.
[897] Tr. 4089, vol. 17.
[898] Tr. 4089-91, vol. 17.

Wetlands impacted by oiling or response operations may also be more susceptible to habitat loss due to enhanced erosion during the time it takes for the vegetation to naturally recover. Restoration actions may be necessary as part of a response.

The Council cannot find, based on the evidence presented, that the restoration of wetlands is feasible in the event of a large spill.

Based on this evidence, the Council believes that potential wetland impacts may create an impact on the public interest and moves this topic into its balancing analysis in Section IV.

3. Biological and Ecological Impacts of Oil Spills

Among its rich biological resources, Washington's fish species play a critical role in the economic and cultural life of the people of the state. In particular, the salmon is of iconic importance to Washington's various cultural communities, especially its tribal peoples. In Washington, salmon has historic and cultural value far beyond its economic value in the marketplace and as a food source. Salmon is very much treasured as part of the state's identity and history.[899] Biologically, the Columbia River is habitat for a rich diversity of species, including salmon and other endangered and threatened fish. Therefore, the health of the river is of critical importance in the Council's task of balancing the considerations involved in energy facility siting. It is important that the ecology of Washington's unique riverine environment not be damaged and that the Columbia River, in particular, remains as healthy and productive as possible.

Tesoro Savage contends that it has met its burden with regard to fish and wildlife impacts by demonstrating compliance with WAC 463-62-040,[900] which states:

> The council's intent is to achieve no net loss of habitat functions and values by maintaining the functions and values of fish and wildlife habitat in the areas impacted by energy development.
>
> (1) The council encourages applicants to select sites that avoid impacts to any species on federal or state lists of endangered or threatened species or to priority species and habitats.
>
> (2) Standards.
>
> (a) An applicant must demonstrate no net loss of fish and wildlife habitat function and value.
>
> (b) Restoration and enhancement are preferred over creation of habitats due to the difficulty in successfully creating habitat.

[899] PFT of Ellis 4; Ex. 5022-000001-192-TRB.
[900] Applicant Post-Hr'g Br. 36.

> (c) Mitigation credits and debits shall be based on a scientifically valid measure of habitat function, value, and area.
> (d) The ratios of replacement habitat to impacted habitat shall be greater than 1:1 to compensate for temporal losses, uncertainty of performance, and differences in functions and values.
> (e) Wetlands shall be replaced at ratios following the wetland standard established by the council in WAC 463-62-050.
> (f) Fish and wildlife surveys shall be conducted during all seasons of the year to determine breeding, summer, winter, migratory usage, and habitat condition of the site.

As discussed elsewhere in this Order, WAC 463-62 does not apply to the Council's present evaluation of Tesoro Savage's ASC but the Council will nonetheless evaluate Tesoro Savage's contention.

Tesoro Savage first focuses its argument on the VEDT site, emphasizing that the site is industrial and largely devoid of vegetation and native species.[901] Tesoro Savage is correct about what is present on the site but the Council's rule does not limit its requirements to fish and wildlife impacts within the specific footprint of a facility site. To the contrary, the rule describes the Council's intent to maintain fish and wildlife habit and values "in the areas impacted by energy development,"[902] i.e., regardless of whether those impacts are within a facility footprint or elsewhere.

Tesoro Savage next suggests that in the event of a spill, the existing oil spill planning and prevention regulatory regimes are adequate to minimize the adverse effects of the spill.[903] Tesoro Savage asserts that the regulatory regime requires the VEDT to be prepared for a worst-case spill (380,000 barrels) and that the probability of a spill this size is low.[904] As discussed elsewhere in this Order, existing oil spill planning and prevention regimes do not take the properties of dilbit into account. Cleanup technology may not work in some situations and may arrive too late to prevent impacts. The rule is clear that applicants are to select sites that avoid impacts to endangered, threatened, or priority species and, as this Order concludes, the choice of this particular site for the VEDT is ill-advised because of the potential for oil spills, fires, and explosions that could impact fish and wildlife resources. The rule also requires 1:1 mitigation for impacted habitat, which, as this Order points out elsewhere, is unlikely to be possible for large oil spills. Finally, the rule requires Tesoro Savage to demonstrate no net loss of fish and wildlife habitat, which this Order concludes that Tesoro Savage has not done.

As a result, even if WAC 463-62-040 applied to the Council's current analysis, Tesoro Savage has not demonstrated compliance.

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[901] Applicant Post-Hr'g Br. 36-37.
[902] WAC 463-62-040.
[903] Applicant Post-Hr'g Br. 38-39.
[904] Applicant Post-Hr'g Br. 37.

a. Salmon

Salmon life cycles. Because salmon are anadromous, they exist in the Columbia River in various phases of their life cycle. Therefore, they utilize different portions of the river during their life cycle. An oil spill during a smolt migration could have severe consequences to all populations of salmon and steelhead in Washington, Idaho, and Oregon.[905] Juvenile early life stages of fish are more susceptible to toxic effects. Most salmonid spawning is done up in the tributaries or the upriver main stem, although some spawning exists near Sauvie Island.[906] As the Council noted elsewhere in this Order, Upper Columbia Spring Chinook are listed as an endangered species because of their very small numbers. These fish also have very narrow timing window in that most of the fish pass through Bonneville Dam and other projects in just a couple of weeks. It is possible that an oil spill at the time this group of fish is migrating would in fact have an impact on the whole population of these fish.[907]

Geographic impacts of spilled oil can be widespread. Real life experience with the Mobil Oil spill demonstrates that a spill can contaminate many miles of river in a short period of time because of river current.

Crude oil can persist in the environment. The time it takes for oil to be transported downstream is sufficient time to impact embryos and other tiny organisms in the water column. Once habitat is contaminated, the persistence in shorelines, particularly wetlands is significant. For example, the oil in wetlands contaminated from the *Florida* spill at West Falmouth, Massachusetts, has persisted more than three decades. Oil from the Exxon Valdez spill continues to persist in contaminated beaches after 25 years.[908] Once oil is in the water column, cleanup operations will do little or nothing to protect exposed aquatic organisms.[909]

Early exposure to oil produces life-threatening impacts to fish. Stanley Rice, Ph.D., is a biologist with extensive experience studying the effects of oil spills on fish species at NOAA. Oil exposure to early-life stages of salmon causes life-threatening impacts. Oil may disappear from the surface and no longer be subject to evaporation, but mixed into the water column by the current and available to organisms. "Disappearance from the surface does not translate to disappearance from the river ecosystem."[910] Oil can persist for decades below the surface, particularly in wetlands. Similarly, the effects of oil can last for decades, particularly in long-lived species such as sturgeon.[911] Limiting the discussion of effects to areas where oil is reported as present at a thickness of .05 mm is flawed because it will only show acute toxicity impacts to species, and relate primarily to birds, marine mammals, and certain

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[905] PFT of Penney 5-6.
[906] Tr. 1922-23, vol. 8.
[907] Tr. 3801-02, 3812-13, vol. 16.
[908] PFT of Rice 7-8.
[909] PFT of Rice 9.
[910] PFT of Rice 7 (example omitted).
[911] PFT of Rice 18.

shoreline habitats.[912] Sub-lethal effects from exposure to oil can be misleading because they often can result in death to an organism.[913]

Dilbit causes cardio toxic effects in juvenile salmon. Dilbit exposure to juvenile salmon can impact their viability. A study was conducted to examine the sensitivity of early life-stage salmon to dilbit and its specific cardio toxic effects, which were unknown at the time of the study. The study exposed sockeye salmon parr[914] to the water-soluble fraction of dilbit for one-week and four-week periods.[915] Like other crude oils, dilbit contains numerous chemicals that are known to be toxic to fish, such as naphthenic acids (NA), PAH, and metals.[916] Oil and PAH can induce cardiotoxicity in embryonic fish, such as pericardial edema, heart malformations, and reduced heart rate, which can reduce future aerobic performance. Seaward migrations to the ocean are very rapid and active once the juvenile sockeye reach the smolt stage. After spending up to four years maturing in the ocean, mature fish return to their natal spawning grounds to reproduce before dying. Cardiovascular performance is critical to fish during the up-stream migration.[917]

One study tested the hypothesis that juvenile sockeye salmon exposed to sub-lethal and environmentally relevant concentrations of dissolved contaminants from dilbit would experience performance-impairing cardiotoxicity.[918] Exposure durations of one week and four weeks at relatively low contaminant levels were used to simulate what might occur following a pipeline failure near a lake. The timeframes were chosen in recognition of the challenges of cleaning-up after a dilbit spill and the resulting potential for extended environmental contamination.[919] The study demonstrated that sockeye are sensitive to the water-soluble fraction of dilbit. Biomarkers were induced in both the liver and heart depending on the concentration exposure. Cardiac remodeling (alteration in the heart structure) was induced by exposure to the water-soluble fraction of dilbit, resulting in fewer myocytes (muscles cells) in the fish heart muscle. As a result, swimming performance was impaired in four weeks. In this way, cardiac sensitivity to dilbit exposure could directly impact sockeye migratory success.[920]

Critical swimming speed was reduced in juvenile Pacific herring in a study testing exposure to total dissolved PAH from Alaska North Slope crude oil. Similarly, juvenile mahi-mahi displayed reduced critical swimming speed after exposure to total dissolved PAH from

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[912] PFT of Rice 5-6.

[913] PFT of Rice 11-12.

[914] The parr stage of juvenile salmon is between the fry and smolt stages. Parr have developed a pattern of spots and vertical bars for camouflage and are large enough to feed on small invertebrates in the river. Parr have not yet undergone the physiological process that allows them to transition to saltwater.

[915] Ex. 5332-000003-TRB.

[916] Ex. 5332-000005-TRB.

[917] Ex. 5332-000004-TRB.

[918] Ex. 5332-000005-TRB.

[919] Ex. 5332-000005-06-TRB.

[920] Ex. 5332-000003-TRB.

Deepwater Horizon oil.[921] Impairment of swimming performance can reduce a fish's ability to capture prey and escape fish species.[922]

Exposure to oil causes elevated mortality for years after exposure. Pink salmon exposed to the Exxon Valdez spill experienced elevated mortality rates for four years after the oil spill. More importantly, gametes[923] taken from surviving salmon that returned to contaminated streams produced offspring with lower survival rates than gametes taken from salmon that returned to uncontaminated streams. The reduced reproductive ability of the exposed fish may have resulted from genetic damage or impaired gonad development.[924] The salmon that were exposed to the spill experienced elevated mortality rates for four years after the Exxon Valdez oil spill. Some long-term effects following the Exxon Valdez spill have been startling. For example, two pods of killer whales lost 40 percent of their population in approximately a year. In one pod, there are no more reproductive females left, so this pod is on the route to extinction.[925]

Natural resource impacts elsewhere are instructive. The impacts to the ecosystem-scale crash of the herring fishery in Prince William Sound several years following the Exxon Valdez spill suggested that fish species may have experienced a form of delayed mortality that went undetected in early toxicity assessment studies.[926] To test this theory, salmon and herring embryos were exposed to water-soluble components of Alaska North Slope crude oil (ANSCO) beginning shortly after fertilization and ending after key steps of early heart development. Only low levels of visibly malformed embryos were evident in hatched fish.[927] Oil exposure reduced the growth rate for juvenile pink salmon.[928] Critical swimming speed was reduced for both the pink salmon and the herring, which was not entirely explained by differences in fish size.[929] In addition to decreased swimming performance, the embryonic exposure affected the shape of the juvenile fish hearts.[930] The study indicated that embryonic exposure to very low levels of crude oil caused permanent structural and functional changes to the fish hearts. These development defects lead to reduced cardiorespiratory performance much later in the juvenile fish. Thus, crude oil exposure was shown to lead to irreversible impairment. The impacts of the Exxon Valdez oil spill on nearshore spawning fish populations are likely to have been considerably underestimated.[931]

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[921] Ex. 5332-000005-TRB.

[922] Ex. 5332-000015-TRB.

[923] A mature sexual reproductive cell, as a sperm or egg that unites with another cell to form a new organism.

[924] Ex. 5040-000002-TRB.

[925] Tr. 4078-79, vol. 17.

[926] Ex. 5045-000001-TRB, Ex. 5045-000009-TRB.

[927] Ex. 5045-000002-TRB.

[928] Ex. 5045-000003-TRB.

[929] Ex. 5045-000003-5-TRB.

[930] Ex. 5045-000005-TRB.

[931] Ex. 5045-000009-TRB.

Oil can impact multiple generations. In an extensive study, pink salmon were exposed as embryos to oil under laboratory conditions similar to the Exxon Valdez spill.[932] These fish were then released into the wild environment.[933] The study results showed that exposure to low concentrations of PAH even in the low parts per billion resulted in reduced growth and marine survival. This demonstrated that the immediate effects of an oil spill in one generation of fish may combine with delayed effects in another generation to increase the overall impact on the population. The acute and chronic toxicity assays that are performed in most studies are performed over too short a time period and inaccurately portray the lowest concentrations that can impair exposed organisms. Fish populations whose natal habitats are contaminated with PAHs at low ppb levels can expect a combination of effects of mortality during exposure, reduced survivorship after exposure, and reduced reproductive output from mature adults, which is a cause for concern.[934]

Temporal considerations and population effects. Gregory Challenger was asked whether he agreed that, in the event of an oil spill, out-migrant juvenile smolts would be exposed for just five days and adult fish for no more than a month. Mr. Challenger agreed that this was a reasonable, even conservative, estimate of the maximum amount of time that either juvenile or adult salmon would be exposed to crude oil released into the water.[935] On the other hand, Dr. Rice explained that there are two halves of the risk equation as it relates to exposure and environmental sensitivity. He disagreed that the effects of an oil spill on fish would be a temporary phenomenon. Dr. Rice cautioned that oil spills are classic "low probability/high consequence" events that require careful assessment of the risk of exposure as well as the resulting consequences to species and habitats. The overall risk is confounded when either half of the equation is under-represented. Dr. Rice said that any risk evaluation must address the temporal, or considerations of time. Evaluations of both exposure and sensitivity risk must adequately portray the both short and long term effects of an exposure to a contaminant such as crude oil. Since spilled oil can persist for years in some contaminated habitats, affected species can suffer long lasting impacts.[936]

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[932] Four to five months following the Exxon Valdez spill, pink salmon returned to Prince William Sound to spawn in oil-contaminated streams. At the time, streambed gravels contained relatively little oil, but there were large deposits of oil found on the stream banks. It appears that incoming tides forced interstitial water up through oil-contaminated gravels. Through that means, PAHs that were dissolved in the interstitial water were delivered to the eggs as the tide ebbed. In the study, eggs were incubated to embryos in water contaminated with PAHs derived from oil whose composition was consistent with oil that washed on to the beaches of Prince William Sound. The more volatile components of the oil were removed from the oil to achieve this consistency. The oil was never replenished during the exposure period. The PAH concentrations decreased as the oil on the gravel weathered. Ex. 5040-000002-03-TRB, Ex. 5040-000005-TRB.

[933] Ex. 5040-000002-TRB.

[934] Ex. 5040-000008-10-TRB; PFT of Rice 10-14.

[935] Tr. 1923, vol. 8.

[936] PFT of Rice 3.

Mr. Challenger's opinion was that there is very little evidence, if any, on the issue of population level effects on fish when fish embryos are exposed to PAHs.[937] Citing the Oil Pollution Act, he stated that exposure is not injury.[938] He said that, if a spill affects an area, the spill may have a meaningful local effect such as an entire wetland, but he felt there is no conclusive evidence of population level effects.[939] Referring to Dr. Rice's testimony, Mr. Challenger's opinion was that, although there are impacts on early life stages of fish from low-level exposure to oil, it does not mean this level of exposure would have a significant impact on a fish population.[940]

In response, Dr. Rice cited studies demonstrating that sub-lethal exposure of toxic substances in fish during the embryonic stage has significant consequences on the development of the fish. Sub-lethal effects eventually will lead to increased predation on the exposed fish, resulting in poorer chances of survival. Heart damage and decreased function were found in juvenile fish up to nine months after being exposed to low parts per billion of PAH.[941] One example of a negative effect from oil exposure is that the heart rate of exposed embryos was much slower than fish embryos not exposed to oil. Another is that studied juveniles exposed to oil did not swim as well as control fish.[942] Slow swimming performance makes it more difficult for exposed fish to avoid predators, and impacts the ability of exposed fish to be successful predators themselves and thus survive through their life cycle. Dr. Rice explained that "[s]low swimming performance will make it difficult to be a successful predator, and more difficult to avoid predation. This is an example of how sub-lethal effects are actually lethal to a population."[943]

Summary of the Council's Analysis of Impacts on Salmon. As a habitat of a rich diversity of species, the health of the Columbia River is critically important to the Council's balancing test. The geographic impacts of spilled oil can be widespread. While oil travels downstream is has sufficient time to impact embryos and other tiny organisms. Oil in the environment can persist in shorelands and wetlands, sometimes for decades. Cleanup operations do little or nothing to protect exposed aquatic organisms.

Upper Columbia Spring Chinook are an endangered species because of their very small numbers. They have a very narrow timing window in that most of the fish pass through Bonneville Dam and other projects in just a couple of weeks. It is possible that an oil spill at the time this group of fish is migrating would impact the whole population. Oil exposure to early-life stages of salmon has life-threatening impacts. Oil can cause elevated mortality for years after exposure.

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[937] Tr. 1925, vol. 8.
[938] Tr. 1919, vol. 8.
[939] Tr. 1925-27, vol. 8.
[940] Tr. 1928, vol. 8.
[941] PFT of Rice 10-18.
[942] PFT of Rice 17.
[943] PFT of Rice 18.

Mortality is increased in not only the fish that were directly exposed but also in their offspring. This is a population level effect. In individual animals, effects can last for years and in doing so, can affect their ability to survive and reproduce. For example, elevated salmon mortality rates after the Exxon Valdez oil spill resulted in two pods of killer whales losing 40 percent of their population in about a year, leaving one pod with no reproductive females.

The effects of oil can last for decades, particularly in long-lived species such as sturgeon. Both toxic and sub-lethal effects can lead to death of the organism. Impacts caused by dilbit include cardio toxic effects in embryonic fish, such as pericardial edema, heart malformations, and reduced heart rate, which can reduce future aerobic performance and swimming ability, which can impact the ability to migrate and capture prey. These sub-lethal effects eventually will lead to increased predation and poorer chances of survival and can be lethal to a population.

These impacts are appropriate for consideration in the Council's balancing analysis and the Council therefore moves this topic into Section IV.

b. VOC and PAH Risks to First Responders and the Public

Beginning immediately after an oil spill, the lighter, volatile compounds begin to evaporate, which may present health and explosion hazards.[944] After a spill, about 50 percent of Bakken crude and about 20 percent of dilbit will evaporate.[945] Evaporating volatile organic compounds (VOCs) create a safety concern for first responders and the public.[946] Bakken oil poses an additional risk because it contains high levels of PAHs in the naphthalene to phenanthrene range, which can dissolve in the water column and cause toxic effects.[947]

Summary of the Council's Analysis of Risks to First Responders. Based on this record, the Council concludes that VOCs and PAHs evaporating from spilled oil pose a risk to first responders and the public, and moves this topic into its balancing analysis in Section IV.

c. Recovery and the Fishing Economy

Economic Impacts from a Spill on the Lower Columbia River. Eric English, Ph.D. is an economist specializing in natural resource issues. Dr. English looked at the potential economic impacts to commercial and recreational fishing from an oil spill on the lower Columbia River. He assumed that a tanker accident near Vancouver released 8 million gallons of Bakken crude oil into the river. His conclusions were based on information about recent levels of fishing activity obtained by the Washington and Oregon Departments of Fish and Wildlife, information from public reports evaluating the impacts to fishing from past spills in

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[944] Ex. 5515-000188-CRK.
[945] Tr. 4404, vol. 19.
[946] Tr. 1846-47, vol. 8.
[947] Ex. 5215-000012-13-TRB.

the United States, and other publicly available sources.[948] Dr. English also assumed that, given the large amount of the release being considered, it is likely that both commercial and recreational fishing would be closed for a full six-month period.[949]

Dr. English estimated the lost revenue from commercial landings to be $4.7 million. This measured the economic losses to commercial fisherman. He noted that losses may continue even after a fishery is reopened due to public perceptions about the fish that would be harvested from the river. He estimated the decline in expenditures by recreational anglers to be $14.4 million. This measures the potential impacts to the local business economy such as less activity at bait shops and marinas. Finally, Dr. English estimated the decline in the value of recreational fishing to be $17.8 million. This figure is the monetary quantification of lost enjoyment by recreational anglers whose experience is degraded or reduced in quality because of the spill. The estimates only included impacts on the lower Columbia River and did not include impacts from oil leaving the mouth of the river. Each of the estimated losses utilizes different concepts, and the values should not be added together.[950] Mr. Challenger did not disagree with Eric English's conclusions on lost revenues to commercial fishers and a decline in expenditures by recreational anglers.[951] Mr. Challenger did agree that there would be a decline in the value of recreational fishing, and that a stigma could impact fisheries.[952]

Compensatory Mitigation. Compensatory mitigation means the service that was lost pending the primary restoration of the impacted area is replaced. Natural resource damages under the OPA are a measure of the cost to assess injury and effect restoration. This includes any service that was lost pending the period of recovery.[953] A resource equivalency analysis looks at the number of birds and bird years, for example.[954]

The Abt Associates report, *Potential Fishing Impacts and Natural Resource Damages from Worst-Case Discharges of Oil on the Columbia River*, assumed two worst-case oil spill discharge scenarios.[955] James V. Holmes is an environmental scientist who has worked on natural resource damage assessments and natural resource restoration planning since 1991.[956] He evaluated natural resource injuries and damages to the Columbia River associated with two hypothetical scenarios.[957] The first assumed that a tanker grounded in the Lower Columbia River near Vancouver spilling 189,845 bbl of Bakken crude oil. It assumed that the oil would travel approximately 40 miles downstream to Longview on the first day. It would continue

[948] PFT of English 2.
[949] PFT of English 2.
[950] PFT of English 3.
[951] Tr. 1936, 1939, vol. 8.
[952] Tr. 1939-40, vol. 8.
[953] Tr. 1931-32, vol. 8.
[954] Tr. 1933-34, vol. 8.
[955] Ex. 1503-000001-95-ENV.
[956] Ex. 1501-00001-ENV.
[957] Ex. 1503-000001-95-ENV.

down the Columbia until it reached the mouth of the river, four days later.[958] The Abt report places an overall damage value on the worst-case discharge scenario in the range of $171.3 million.[959] Although Mr. Challenger questions some of the methodology, he believes that $171.3 million could very well be within the range of Natural Resource Damage Assessment settlements.[960]

The second worst-case discharge scenario was for a train derailment that would spill 20,000 bbl of Bakken crude into the Columbia River immediately upstream of Bonneville Dam, with most of the oil going through the spillway. Under this scenario, much of the oil would be mixed into the water column.[961] Mr. James Holmes assumed that the entire river downstream from the terminal would be heavily oiled. Mr. Challenger disagreed with this testimony and asserted that it is much more realistic to expect a number of river miles that are heavily oiled, and a number of river miles that would be lightly oiled.[962] The report placed an overall damage value for this scenario at $84.9 million, including $54.5 million for injured habitats in the river channel and $30.4 million for injuries to the floodplain wetlands near the river.[963] Mr. James Holmes assumed a 90 percent loss of services, which included birds, fish, and everything from bank to bank in the river. Mr. Challenger considered this probably pretty high because it is unlikely that 90 percent of all of these areas would be exposed to a heavy oiling condition.[964]

Spilled oil recovery requires that the oil does not become dissolved in the water. The Abt report assumed that all of the dispersed oil in its scenario was dissolved. Mr. Challenger considered this unrealistic. He said that a lot of dispersed oil would not be dissolved.[965] It was his opinion that a lot of the oil would stay in particulate form, distributed in a patchy way making it easier to recover.[966] He reasoned that, as opposed to what would happen when oil moves into an ocean region such as Prince William Sound where a lot of it is unrecoverable because it becomes widely dispersed, when oil moves down a river it is directionally moving downstream and stays together.[967] Mr. Challenger's opinion was that, because there is less tidal influence making the water level fluctuate in the Columbia River, a spill is more likely to produce a stripe of oil along the bank. Although the Lower Columbia River has tides, he characterized this tidal fluctuation as not equivalent to the movement in a body of water such as Prince William Sound.[968] Mr. Challenger believed that the 10-year recovery period for all affected habitats used by Abt was too conservatively long, but he said that 90 percent of the

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[958] PFT of J. Holmes 5; Ex. 1503-000006-ENV.
[959] PFT of J. Holmes 7; Ex. 1503-000012-ENV.
[960] Tr. 1935-36, vol. 8.
[961] PFT of J. Holmes 7; Ex. 1503-000006-ENV.
[962] Tr. 1908-10, vol. 8.
[963] Ex. 1503-000013-ENV.
[964] Tr. 1935, vol. 8.
[965] Tr. 1912-14, vol. 8.
[966] Tr. 1912-14, vol. 8.
[967] Tr. 1908, vol. 8.
[968] Tr. 1908-09, vol. 8.

service loss would come back in the first year, with the last 10 percent taking ten years. For this reason, Mr. Challenger considered recovery to happen "quickly."[969]

Other biological and cultural impacts. The Opponents presented evidence of other negative biological and cultural impacts that they allege will result from VEDT operations. For example, lamprey is one of the main tribal foods along with salmon, and it is very important to tribal people that it continues to be available. Lamprey is utilized in a number of ceremonial dinners. Dried lamprey tail is given to babies who are teething because of its unique properties. However, the numbers for lamprey in the Klickitat River have declined very dramatically over the years. Changes in habitat already make it difficult for fishers to continue to harvest lamprey. For instance, Swale Creek at Wahkiacus used to have abundant lamprey but agricultural practices have dried up the stream to a trickle. A gravel pit and some farming activities near Hungry Horse Camp also altered the water for the lamprey to go into that area.[970]

Mr. Slockish recalled going to Fifteenmile Creek, a tributary to the Columbia River in the 1950s with his family to fish for eels. It was an area of bountiful eel and lamprey. Then a chemical spill occurred near The Dalles Dam and the Indian fishers were strongly warned away from the area as unsafe to harvest eel and lamprey there. This particular spill went downriver along a large platform area commonly known as the Lone Pine in-lieu treaty fishing area. About 30 to 40 tribal members had fished along that area downriver of the spill, and the tribal fishers were told it was unsafe to harvest eel and lamprey there anymore. The company involved with the spill cleanup promised the tribal fishers they would be notified when it was safe to harvest fish again in the area. But word never came that it was again safe to harvest there, so the Indian fishers were never again able to return to fish for lamprey or eel at Fifteenmile Creek.[971]

Lamprey used to occur throughout tributaries and falls throughout the basin. Their numbers now are quite depressed.[972] After twice harvesting lamprey at Willamette River falls, Mr. Slockish developed a rash on his hands and around his eyes, which itched and burned, and he will no longer be able to harvest lamprey at that location. After mentioning a recent meal with lamprey being served on the table, Mr. Slockish said that now the number of times this occurs is "very few and far between."[973]

Summary of the Council's Analysis of Recovery and the Fishing Economy. Eric English looked at the potential economic impacts to commercial and recreational fishing from an oil spill on the lower Columbia River. He estimated three types of economic losses:

[969] Tr. 1918-19, vol. 8.
[970] Tr. 3918-20, vol. 17.
[971] Tr. 3920-22, 3977-78, vol. 17.
[972] Tr. 3797, vol. 16.
[973] Tr. 3921-22, vol. 17.

- $4.7 million in lost revenues from commercial landings, with losses possibly continuing after the fishery is reopened due to negative public perception.
- $14.4 million decline in expenditures by recreational anglers. This measured potential impacts to local businesses such as bait shops and marinas.
- $17.8 million decline in the value of recreational fishing. This is the monetary quantification of lost enjoyment by recreational anglers whose experience is degraded or reduced in quality because of the spill.

These estimates included only impacts on the lower Columbia River and did not include impacts from oil leaving the mouth of the river.

Mr. Challenger did not disagree with Dr. English's conclusions on lost revenues to commercial fishers and a decline in expenditures by recreational anglers. Mr. Challenger agreed there would be a decline in the value of recreational fishing, and that a stigma could impact fisheries.

James V. Holmes is an environmental scientist who has worked on natural resource damage assessments and natural resource restoration planning since 1991.[974] He evaluated natural resource injuries and damages to the Columbia River associated with two hypothetical scenarios.[975] The first assumed that a tanker grounded in the Lower Columbia River near Vancouver spilling 189,845 bbl of Bakken crude oil. Mr. James Holmes placed an overall damage value on the worst-case discharge scenario in the range of $171.3 million. Although Mr. Challenger questioned some of the methodology, he stated that $171.3 million could very well be within the range of natural resource damage assessment settlements.

The second worst-case discharge scenario was for a train derailment spilling 20,000 bbl of Bakken crude into the Columbia River immediately upstream of Bonneville Dam, with most of the oil going through the spillway. Mr. James Holmes assumed that the entire river downstream from the terminal would be heavily oiled. He placed an overall damage value for this scenario at $84.9 million, including $54.5 million for injured habitats in the river channel and $30.4 million for injuries to the floodplain wetlands near the river.[976] Mr. Challenger disagreed with this testimony and asserted that it is much more realistic to expect a number of river miles that are heavily oiled, and a number of river miles that would be lightly oiled.[977]

The Opponents presented evidence of other negative biological and cultural impacts that they allege will result from VEDT operations. Lamprey used to occur throughout tributaries and falls throughout the basin but their numbers now are quite depressed.[978] Mr. Slockish recalled going to Fifteenmile Creek, a tributary to the Columbia River, in the

[974] Ex. 1501-00001-ENV.
[975] Ex. 1503-000001-95-ENV.
[976] Ex. 1503-000013-ENV.
[977] Tr. 1908-10, vol. 8.
[978] Tr. 3797, vol. 16.

1950s with his family to fish for eels. It was an area of bountiful eel and lamprey. A chemical spill occurred near The Dalles Dam and the Indian fishers were strongly warned away from the area as unsafe to harvest eel and lamprey there. They have never been able to return to fish for lamprey or eel at Fifteenmile Creek.[979] Mr. Slockish also recalls developing an itchy, burning rash on his hands and around his eyes after twice harvesting lamprey at Willamette River falls. He will no longer be able to harvest lamprey at that location.[980]

From this evidence, the Council concludes that substantial economic and cultural impacts could result from an oil spill associated with the VEDT and moves this issue into its balancing analysis in Section IV.

D. EVALUATION OF POTENTIAL IMPACTS TO WASHINGTON POPULATIONS

1. Land Use Consistency and Other Communities' Interests

a. Legal Background

Project Proponents and Opponents proffer different views about the legal framework applicable to the Council's analysis of land use issues so the Council will start by explaining the overall legal framework that guides the Council's consideration of land use issues.

RCW 80.50.110 and .120 preempt local governments from exercising land use regulatory authority over proposals under the Council's review. The Council exercises land use regulatory authority in two main ways: under RCW 80.50.090(2) and under its general authority to consider issues material to its overarching RCW 80.50.010 analysis. We discuss each in turn.

RCW 80.50.090(2) and Order 872.[981] As an initial component of its overall consideration of an ASC, the Council performs a narrow land use analysis under RCW 80.50.090(2). That statute requires the Council to hold a public hearing to determine whether a proposed facility's "site" is "consistent and in compliance" with city, county, or regional land use plans or zoning ordinances. For the purposes of this RCW 80.50.090(2) analysis, the terms "land use plans" and "zoning ordinances" are narrowly defined in the Energy Facility Site Location Act (EFSLA). RCW 80.50.020(14), (22) define land use plans and zoning ordinances as "comprehensive plan[s] or land use element[s] thereof" and "an ordinance . . . regulating the use of land," respectively, that are adopted pursuant to listed planning statutes. Pursuant to these definitions, the Council analyzes only the portions of the comprehensive plan that assigns general uses (such as housing) to land segments and specifies desired concentrations and design goals. The Council similarly analyzes only the zoning ordinances that regulate land use by creating districts and restricting uses in the districts (i.e.,

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[979] Tr. 3920-22, 3977-78, vol. 17.
[980] Tr. 3921-22, vol. 17.
[981] Council Order No. 872, Order Determining Land Use Consistency (Aug. 2014) (Order 872).

number, size, location, type of structures, lot size) to promote compatible uses.[982] Other potential land use matters are outside of the Council's RCW 80.50.090(2) analysis.

The Council held its RCW 80.50.090(2) land use public hearing in May 2014, resulting in Order 872, which determined that the proposed *site* of the VEDT was consistent with Vancouver's Comprehensive Plan and in compliance with Vancouver's zoning ordinances, but only on a narrow basis.[983] In accordance with the pertinent statues and past precedent, the Council found the site consistent with Vancouver's Comprehensive Plan because the Plan's land use map and associated definitions designated the area of the site as "Industrial," which includes subtypes such as "IH-Heavy Industrial," a subtype that is generally intended for "[i]ntensive industrial manufacturing, service, production or storage often involving heavy truck, rail or marine traffic, or outdoor storage and generating vibration, noise and odors."[984] The Council found that the site was in compliance with the City's zoning ordinances because the site is zoned "IH-Heavy Industrial," which is appropriate for intensive industrial uses including warehousing and freight movement, railroad yards, with allowable activities including those that use raw materials, require significant outdoor storage, and generate heavy truck or rail traffic and permitted uses including storage and movement of large quantities of materials or products indoors or outdoors associated with significant truck or rail traffic.[985]

Tesoro Savage is thus inaccurate in its post-hearing brief when it contends that Order 872 decided the fundamental question of whether the proposed terminal is consistent with the Vancouver's Comprehensive Plan and zoning ordinances.[986] Order 872 resolved only the narrow question of whether the *site* was consistent and in compliance with identified

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[982] Order 872, at 10.

[983] The Port describes Order 872 as "*prima facie* proof of consistency and compliance with land use plans and zoning ordinances absent contrary demonstration by anyone present at the hearing." Port of Vancouver USA's Post-Hr'g Br. 10 (citing Order 870, at 4; WAC 463-26-090). This is incorrect. The Council's rules on RCW 80.50.090(2) land use consistency hearings are in WAC 463-26. WAC 463-26-090 allows project applicants to present certificates from local land use authorities, attesting that Tesoro Savage's proposed site is consistent and in compliance with local land use plans and zoning ordinances as those terms are defined for the purposes of an RCW 80.50.090(2) hearing. If an applicant presents such a certificate, that certificate is *prima facie* evidence of consistency and compliance unless someone at the land use consistency hearing demonstrates the contrary. Order 872 was not—and cannot be—such a certificate because it was not issued by Vancouver during the Council's land use consistency hearing as an expression of Vancouver's views. Moreover, Order 872 by its own terms did not address anything other than consistency and compliance under RCW 80.50.090(2), leaving for another day the broader question of how the VEDT (as opposed to the VEDT's site) might impact land use.

Regardless of whether an applicant presents a certificate, the Council determines whether the site is consistent and in compliance with the identified limited portions of the land use plans and zoning ordinances. WAC 463-26-110. If the Council determines that the site is inconsistent then the Council holds an adjudication to consider whether those portions of the land use plans and zoning ordinances should be preempted. WAC 463-28-060(1). That adjudication may be combined with the adjudication held under RCW 80.50.090(3). WAC 463-28-060(2). Because in this case the Council found that the site was consistent and in compliance it did not hold such an adjudication.

[984] Order 872, at 4, 11, 14.

[985] Order 872, at 4, 12, 14-15.

[986] Applicant Post-Hr'g Br. 53-54.

portions of the Comprehensive Plan and zoning ordinances under RCW 80.50.090(2). Columbia Riverkeeper is thus correct that Council Order 872 is limited, and applies only Vancouver's land use map and zoning code.[987]

Tesoro Savage correctly acknowledges that Order 872 allows for consideration of other planning documents and standards such as policies in the comprehensive plan, critical area ordinances, and policies in the Shoreline Management Act (SMA).[988] Because by law Order 872 is a very narrow decision, the Council explicitly did not consider Comprehensive Plan policies (Order 872 at 12) or other matters outside of the scope of its RCW 80.50.090(2) analysis, stating "Potential issues not addressed by this land use consistency determination include, but are not limited to, potential on or off-site impacts to public safety and the environment (including but not limited to shoreline and storm water management, critical areas ordinances, fire and spill response and impacts to neighborhoods."[989] The Council also stated that "[n]othing in this Order precludes parties from raising issues during the adjudication . . . with respect to on-site or off-site impacts, or mitigation of those impacts, including but not limited to issues regarding shoreline management, critical area ordinances, stormwater, service availability, spills or fires."[990]

The Council's general authority to consider issues relevant to its RCW 80.50.010 analysis. During the adjudication, the parties raised issues related to the VEDT's conformance with local land use visions, plans, and ordinances beyond those covered in Order 872.

RCW 80.50.090(3) and RCW 34.05.461(3) authorize the Council to consider material issues that are relevant to its overarching RCW 80.50.010 analysis, authority that may include consideration of land use issues not addressed in Order 872.[991] To the degree that local land use planning documents and ordinances might be relevant to the Council's analysis, the Council may elect to—but is not required to—recognize the general legal principle that at the local level comprehensive plans generally have no project-specific regulatory effect,[992] but that zoning ordinances generally do.[993] With regard to the relative weight to be accorded to various Comprehensive Plan policies, the Council would echo the comment it made in Order 872 about the countywide planning policies listed in the Growth Management Act to guide local comprehensive planning. The Washington courts have recognized that some of the policies are mutually competitive and as a result it is not necessary for a project to advance each of the policies in order for the Council to recommend approval.[994]

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[987] Columbia Riverkeeper Final Adjudication Br. 69.
[988] Applicant Post-Hr'g Br. 53-54.
[989] Order 872, at 14 n.105.
[990] Order 872, at 15.
[991] WAC 463-30-300(2).
[992] *Citizens for Mount Vernon v. City of Mount Vernon,* 133 Wn.2d 861, 873-74, 947 P.2d 1208 (1997).
[993] *Viking Properties, Inc. v. Holm,* 155 Wn.2d 112, 126, 118 P.3d 322 (2005).
[994] Order 872, at 12 n.86 and cases cited therein.

Local land use planning documents and ordinances may also play into the Council's analysis if the Council recommends project approval. In that case, RCW 80.50.100(2) and WAC 463-64-020 require the Council to include conditions in the site certification agreement that "protect state or local governmental or community interests affected by the construction or operation of the energy facility, and conditions designed to recognize the purpose of local laws or ordinances . . . that are preempted . . . ."[995]

The Council is not, however, bound by local land use planning documents or zoning ordinances that might be applicable to the facility or related rail or vessel routes if this were not a Council project. RCW 80.50.110 and .120 preempt such local planning authority. Columbia Riverkeeper is thus incorrect that WAC 463-28-060(3) requires the Council to address whether a proposed project would violate local land use plans, zoning ordinances, and other development regulations.[996] WAC 463-28 applies only when the Council's RCW 80.50.090(2) analysis (discussed above) results in a determination that a site is inconsistent with the pertinent portions of the Comprehensive Plan and non-compliant with the pertinent portions of the zoning ordinances. When that occurs, the Council must decide whether to recommend that the Governor preempt the land use provisions.[997] Because Order 872 determined that the VEDT site is consistent and in compliance with the narrowly defined land use provisions, the requirement in WAC 463-28-060(3) does not come into play, either with regard to the Council's RCW 80.50.090(2) land use analysis or as the Council considers other land use issues that may be relevant to its overall recommendation.

Moreover, although RCW 36.70A.103 requires state agencies to comply with local comprehensive plans and development regulations adopted pursuant to the Growth Management Act, Columbia Riverkeeper is incorrect that this statute is relevant to the Council's analysis of land use issues.[998] The Supreme Court has held that RCW 36.70A.103 does not supersede the preemptive reach of EFSLA.[999]

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[995] Columbia Riverkeeper is thus incorrect that WAC 463-64-020 (and, by implication, RCW 80.50.100(2)) impose a general requirement that the Council protect state and local interests by considering local land use documents other than the narrowly-defined land use provisions. Columbia Riverkeeper Final Adjudication Br. 69, 71. While on a case-by-case basis it may be appropriate for the Council to do so as part of its overarching RCW 80.50.010 analysis, RCW 80.50.100(2) and WAC 463-64-020 are not the source of a mandate that the Council do so in all circumstances.

[996] Columbia Riverkeeper Final Adjudication Br. 71.

[997] WAC 463-28-060(1), (3) ("[s]hould the council determine . . . a site . . . is inconsistent it will . . . consider preemption" and "shall determine whether to recommend to the governor that the state preempt the land use plans, zoning ordinances . . . for a site . . . .").

[998] Columbia Riverkeeper Final Adjudication Br. 71.

[999] *Residents Opposed to Kittitas Turbines v. EFSEC*, 165 Wn.2d 275, 308-11, 197 P.3d 1153 (2008).

b. Vancouver Community Interests

(1) Proponents' Evidence and Argument

Proponents' primary testimony on land use consistency issues was provided by land use planner Brian Carrico. Mr. Carrico is a Senior Project Manager and the Natural Resources Team Lead for BergerABAM Inc., a multidisciplinary consulting firm providing permitting, planning, natural resources, engineering, environmental assessment, and other services to public and private clients across the West.[1000]

Role of Comprehensive Plans and Zoning Ordinances. Mr. Carrico stated that zoning ordinances are the primary standard for reviewing local land use applications, while Comprehensive Plans are largely advisory.[1001] Vancouver's Comprehensive Plan states that it is implemented by the zoning code and zoning code, in turn, says it is the vehicle for implementing the Comprehensive Plan.[1002] According to Mr. Carrico, Vancouver's land use polices and regulations cannot be applied to address off-site impacts from the VEDT unless those policies and regulations have a set threshold distinguishing compliance and non-compliance.[1003]

However, in the absence of specific development regulation, a local government is to consider a project's off-site or extra-jurisdictional impacts of a project under the SMA and SEPA.[1004] The SMA's goals for shorelines of statewide significance in RCW 90.58.020 are, in priority order: (1) recognize and protect the statewide interest over local interest; (2) preserve the natural character of the shoreline; (3) result in long term over short-term benefit; (4) protect the resources and ecology of the shoreline; (5) increase public access; and (6) increase recreational opportunities.[1005] Last in priority comes providing for other elements defined in RCW 80.50.100(2), one of which is economic development.[1006] RCW 90.58.020 also says that alterations of the natural conditions of the shorelines of the state shall be recognized by the department and this statement applies to industrial ports on shorelines of statewide significance.[1007] SEPA analyses should be integrated to the fullest extent possible in comprehensive planning or long-range planning.[1008] SEPA does not give authority or

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[1000] Mr. Carrico has a bachelor's degree in Geography with a minor in Environmental Studies and is a member of the American Institute of Certified Planners. He has been working as a professional land use and natural resource planner for more than 20 years. Since starting work with BergerABAM in 2007, Mr. Carrico has worked on permitting and environmental review and compliance for multiple port and industrial projects in Washington. PFT of Carrico 1-2, 4.

[1001] PFT of Carrico 12-13; Tr. 483-84, 515, vol. 3.

[1002] PFT of Carrico 13.

[1003] Tr. at 468, 476, 489, 492, vol. 3.

[1004] Tr. 484-86, 491-92, 516, vol. 3.

[1005] Tr. 507-08, vol. 3.

[1006] Tr. 509, vol. 3.

[1007] Tr. 529, vol. 3.

[1008] Tr. 519, vol. 3.

jurisdiction over activities for which a city does not otherwise have authority or the authority to regulate hazardous material on the rail corridor.[1009]

Off-Site Impacts. For off-site rail impacts, land use inconsistency can be found and land use standards apply only if actual improvements are proposed to the rail corridor.[1010] The VEDT will not impact neighboring land uses because it proposes no physical improvements or land use changes that would trigger review under Vancouver land use standards.[1011] Without changes to the physical condition of the rail line, no type of land use on the rail line, or impacts from that use, would lead Mr. Carrico to find a land use inconsistency.[1012] Changes in use intensity might produce impacts but the impacts may be related to noise or air quality or some other issue, but not land use.[1013] Land use planners do look at changes in use intensity proposed by project applicants if the jurisdiction had the authority to regulate that impact.[1014] Planners would also take changes in intensity into account in planning to determine whether the land uses adjacent to the rail corridor were still appropriate.[1015] Mr. Carrico did evaluate off-site rail impacts in the absence of track changes.[1016]

Proponents' Analysis of the VEDT Site. Mr. Carrico stated that the VEDT is compatible with applicable land use provisions.[1017] The site, including its operational activities, is consistent with development regulations.[1018] The site is designated by the Vancouver Comprehensive Plan and zoning ordinance for industrial uses, the site presently contains industrial uses, and the site has previously contained industrial uses.[1019] Approval of the VEDT is unlikely to negate Vancouver's planning efforts because the plan designation and zoning for the site is heavy industrial and Vancouver's planning has recognized and accommodated growth in both land use and rail traffic.[1020] The industrial designation of the VEDT site predates the development of nearby recreational trail facilities and the Jail Work Center.[1021] This consistency is demonstrated by Draft Staff Report containing a Vancouver staff determination that, subject to certain concerns and recommended conditions, Tesoro Savage has demonstrated the VEDT complies with Vancouver's development regulations.[1022] To the

[1009] Tr. 531, vol. 3.
[1010] Tr. 449, 477-78, 483, 490, vol. 3.
[1011] PFT of Carrico 28-33; Tr. 449, 455-56, 520, vol. 3.
[1012] Tr. 477-78, vol. 3.
[1013] Tr. 497, vol. 3.
[1014] Tr. 499, vol. 3.
[1015] Tr. 499, vol. 3.
[1016] Tr. 499-500, vol. 3.
[1017] Tr. 469, vol. 3.
[1018] Tr. 476, vol. 3.
[1019] Tr. 444-46, 449, vol. 3.
[1020] Tr. 448, vol. 3.
[1021] Tr. 444-45, 459, vol. 3.
[1022] PFT of Carrico 10-11L Ex. 0167-000001-69-TSS. This was the culmination of a process that started with the Tesoro Savage's submittal to Vancouver of a pre-application request (Ex. 0162-000001-37-TSS), which resulted in Vancouver's issuance of a Conference Report summarizing the provisions of the Vancouver Municipal Code that Vancouver believed to be applicable to the project and in which Vancouver identified the zoning as

best of Mr. Carrico's knowledge, the Report has not been revised, finalized, or declared incorrect.[1023]

The Comprehensive Plan recognizes that balance is necessary, especially when it comes to economic development and environmental protection.[1024] In Mr. Carrico's view, the VEDT complies with the following Vancouver Comprehensive Plan policies:

- CD-3 – Infill and redevelopment. The VEDT site contains limited development and is surrounded primarily by other developed industrial properties with some open space.[1025] The policy should be interpreted to encourage development of the site for heavy industrial use, consistent with surrounding uses.[1026]

- CD-4 – Urban centers and corridors. The VEDT site is not in a designated center or corridor so this policy about achieving full potential use is inapplicable. No physical modifications are being constructed on the rail corridor so the policy doesn't apply to the rail corridor or traffic on the rail lines. If the policy applies to rail traffic, the planning efforts for the identified centers and corridors have taken the rail corridors and transport into account so the Project is consistent.[1027]

- CD-6 – Neighborhood livability; CD-7 – Human scale, accessible redevelopment, and interaction; CD-8 – Design. The VEDT is consistent because these policies do not require or encourage mixed use and pedestrian oriented development in all locations of the city, particularly heavy industrial areas.[1028]

- CD-9 – Compatible uses. The VEDT is consistent because the VEDT is in an area devoted to industrial, transportation, and correctional activities.[1029]

- CD-10 – Complementary uses; CD-12 – Integrated area planning; CD-14 – Connected and integrated communities. The VEDT is consistent with these policies that favor locating complementary land uses near each other, promote integrated planning, and encourage development of complete neighborhoods.[1030] The IH

Heavy Industrial (IH). PFT of Carrico 7-9; Ex. 0164-0000001-45-TSS. Tesoro Savage also submitted to Vancouver a Project Narrative for Land Use Consistency Review, requesting a certificate from Vancouver indicating the VEDT was consistent with Vancouver plans and ordinances as provided in WAC 463-26-090. PFT of Carrico 9; Ex. 0161-000001-102-TSS. The request addressed the provisions Vancouver had identified in its Conference Report as applicable. PFT of Carrico 9.

[1023] PFT of Carrico 11.
[1024] PFT of Carrico 13.
[1025] PFT of Carrico 14-15.
[1026] PFT of Carrico 14-15.
[1027] PFT of Carrico 15.
[1028] PFT of Carrico 15-16.
[1029] PFT of Carrico 16-17.
[1030] PFT of Carrico 17-18.

zoning district is for industrial activities that aren't generally compatible with other uses and which are typically separated from uses such as residential uses.[1031] The marine vessel-loading component of the VEDT is appropriately located on a site with an existing dock. This policy does not require all uses, including heaving industrial uses, to be located near each other. [1032]

- CD-15 – Public health and the built environment; CD-16 – Sustainability. These policies are inapplicable to the VEDT because they are directed at land use patterns and not at specific types of development.[1033] These policies do not override policies that promote industrial uses in industrial zones.[1034]

- EC-1 – Jobs-housing balance; EC-2 – Family-wage employment; EC-3 – Public revenue enhancement; EC-4 – Industrial and business park sanctuaries; EC-5 – No net loss of employment capacity. The VEDT complies because it will generate 91 jobs annually during start-up and 176 higher-than-average-income-jobs annually over the remaining 15-year operational life, along with state and local property, business and occupation, and sales taxes.[1035]

- EC-6 – Efficient use of employment land; EC-7 – Regional focus. The VEDT is consistent with Policy EC-6 because it utilizes existing developed Port land that is used for low intensity cargo laydown or that is vacant.[1036] The VEDT is consistent with Policy EC-7 because the Port's efforts resulted in the site being able to accommodate unit trains and is uniquely suited to the region.[1037]

- H-1-Housing Options. The VEDT is not contrary to this policy, which favors the provision of a range of housing types, because the IH zone specifically excludes residential activities[1038].

- EN-1 – Environmental projection. The VEDT site is predominantly vacant industrial land and the VEDT will not directly affect natural areas such as wetlands or riparian lands. The VEDT is consistent with Vancouver's critical area regulations. [1039]

[1031] PFT of Carrico 17.
[1032] PFT of Carrico 18.
[1033] PFT of Carrico 19; Tr. 535-36, vol. 3.
[1034] PFT of Carrico 19.
[1035] PFT of Carrico 20.
[1036] PFT of Carrico 20.
[1037] PFT of Carrico 20-21.
[1038] PFT of Carrico 21.
[1039] PFT of Carrico 21.

- EN-3 – Energy Conservation. The policy does not prohibit development that lacks specific energy conservation or alternative sources.[1040] The VEDT will use a variety of energy conservation measures in its construction and operation, although the VEDT itself is not an energy conservation or alternative energy source.[1041] The policy does not require every project to be an energy conservation project.[1042]

- EN-4 – Restoration and Enhancement. The VEDT is not inconsistent with this policy, which promotes ecosystem restoration and enhancement, because the VEDT is in an already developed area.[1043]

- EN-6 – Habitat. The VEDT is consistent with this policy, which favors protection of riparian areas, wetlands, and other habitats, because it is consistent with critical area review criteria under the Vancouver Municipal Code (VMC).[1044] The VEDT site contains a number of critical areas including fish and wildlife conservation areas (riparian buffers), but not wetlands or other fish and wildlife habitat areas.[1045] The activity in the fish and wildlife conservation area is the relatively minor proposed dock improvements, mostly seismic upgrades.[1046] VMC 20.740.060 provides a sequence for impact mitigation.[1047] The VEDT will not result in any new impacts to the fish and wildlife conservation areas on the VEDT site and the VEDT is therefore consistent with the review criteria.[1048]
- EN-7 – Endangered species. This policy favors habitat protection for salmonids and other listed species and facilitation of recovery. The Columbia River is designated critical habitat for salmonids and other species.[1049] As explained in other documents, the VEDT complies with this policy.[1050]

- EN-8 – Water quality and quantity. The VEDT is consistent with this policy, which favors enhancement and protection of water bodies and sources, because it complies with Vancouver's zoning ordinances such as those concerning erosion control, stormwater control and water resources protection.[1051]

[1040] PFT of Carrico 22.
[1041] PFT of Carrico 22; Tr. 514, vol. 3.
[1042] Tr. 533-34, vol. 3.
[1043] PFT of Carrico 22.
[1044] PFT of Carrico 22-24.
[1045] PFT of Carrico 22-23.
[1046] PFT of Carrico 23.
[1047] PFT of Carrico 23-24.
[1048] PFT of Carrico 24.
[1049] PFT of Carrico 24.
[1050] PFT of Carrico 24.
[1051] PFT of Carrico 25; Ex. 0161-000036-TSS § 4.1.3.

- EN-9 – Trees and other vegetation. The VEDT will comply with VMC 20.770, which favors conservation and restoration.[1052]

- EN-10 – Air quality. This policy favors protection and enhancement of air quality.[1053] The VEDT will comply with this policy, which favors protection and enhancement of air quality.

The VEDT also complies with a range of applicable individual development regulations, including the Shoreline Master Program and critical area regulations.[1054] The VEDT site is located along the Columbia River, a shoreline of statewide significance, and the portions of the site that are 200 feet from the ordinary high water mark are subject to Vancouver's Shoreline Master Program.[1055] Mr. Carrico opined that the VEDT complies with applicable Shorelines Master Program policies, including protection of statewide interests over local interest because it is water dependent use on a navigable waterway that facilitates energy access.[1056] The VEDT also promotes the existence of the Port as an industrial port designed for maritime commerce.[1057] The VEDT also complies with Vancouver critical area standards, including those pertaining to fish and wildlife conservation areas, frequently flooded areas, and geologic and seismic hazards.[1058] The VEDT also complies with Vancouver standards because it complies with similar Council environmental requirements pursuant to WAC 463-60-302, -322, -332, -333.[1059]

As explained in the Project Narrative,[1060] the VEDT is also consistent with, or could be designed to be consistent with, other Vancouver zoning ordinances including Title 11 Streets and Sidewalks (Chapter 11.70 Transportation Concurrency, Chapter 11.80 Street and Development Standards); Title 14 Waters and Sewers (Chapter 14.04 Water and Sewer Use - Regulations and Charges; Chapter 14.10 Pretreatment Ordinance; Chapter 14.16 Water and Sewer Service Connections; Chapter 14.24 Erosion Control; Chapter 14.25 Stormwater; Chapter 14.26 Water Resources Protection); Title 16 Fire Code; Title 17 Building and Construction; Title 20 Land Use and Development Code (Chapter 20.270 Site Plan Review; Chapter 20.440 Industrial Districts; Chapter 20.710 Archaeological Resources Protection; Chapter 20.770 Tree Conservation; Chapter 20.912 Fences and Walls; Chapter 20.915 Impact Fees; Chapter 20.925 Landscaping; Chapter 20.935 Off -Site Impacts; Chapter 20.945 Parking and Loading; Chapter 20.960 Signs; Chapter 20.970 Solid Waste Disposal and Recycling).[1061]

[1052] PFT of Carrico 25; Ex. 0161-000054-55-TSS § 4.2.6.
[1053] PFT of Carrico 25.
[1054] PFT of Carrico 25-28.
[1055] PFT of Carrico 26; Tr. 507, vol. 3.
[1056] PFT of Carrico 26; Ex. 0170-000001-35-TSS; Tr. 453-54, vol. 3.
[1057] Tr. 529-30, vol. 3.
[1058] PFT of Carrico 26; Ex. 0161-000052-53-TSS § 4.2.4; Ex. 0167-000049-51-TSS.
[1059] PFT of Carrico 26-27.
[1060] Ex. 0161-000001-102-TSS.
[1061] PFT of Carrico 27; Ex. 0161-000001-102-TSS; Ex. 0164-000001-45-TSS; Ex. 0167-000001-69-TSS.

Analysis of the Rail Line. Mr. Carrico recalled that all of Vancouver's planning processes occurred before late 2013 to early 2014 when there was some level of awareness of the potential for accidents associated with CBR transport.[1062] Vancouver's planning processes typically predated increases in CBR transport and, except for the WVFA Rail Project (whose purpose was to increase mainline capacity and access to the Port), did not take into account future rail uses or volumes.[1063] Based on Mr. Carrico's understanding, comprehensive plans and development regulations do not regulate or apply to rail traffic volumes or the type of commodity transported on the rail lines.[1064]

Referring to the tracks leading to and from the facility, Mr. Carrico stated that the rail corridor already exists and no improvements to it are planned.[1065] The rail corridor was established before the surrounding built environment and applicable land use standards were created.[1066] Some population growth, development and planning took place recognizing the rail line was in place and some development was likely intentionally centered on the rail line.[1067] A variety of products are currently transported on the rail line, including combustible materials.[1068] In selecting appropriate land uses along the rail corridor, it should be understood that a variety of products may travel down the tracks.[1069] If, over time, changes in train volume, length, or cargo have occurred, the Comprehensive Plan should acknowledge such changes and possibly lead to prospective discouragement or disallowance of additional incompatible development along the rail corridor.[1070]

Impact on Neighboring Properties. Mr. Carrico analyzed the impact of the VEDT on some neighboring properties along the rail corridor and concluded there would be none.[1071] In doing so he was responding to issues raised in SEPA comment letters and wasn't agreeing that all of those issues applied.[1072] With the exception of two state parks, Mr. Carrico did not analyze rail impacts on other state parks along the line.[1073] He did not analyze residential impacts or consistency with the comprehensive plans or development regulations of the multiple counties and cities anywhere else along the rail line.[1074]

Vancouver's subarea plans recognized the presence of the rail corridor, even though cities do not typically take into account subarea plans outside where the development is

[1062] Tr. 475-76, vol. 3.
[1063] Tr. 474-77, vol. 3.
[1064] Tr. 531, vol. 3.
[1065] Tr. 449, vol. 3.
[1066] PFT of Carrico 29-33; Tr. 480-81, vol. 3.
[1067] PFT of Carrico 29.
[1068] Tr. 480, vol. 3.
[1069] Tr. 481, vol. 3.
[1070] Tr. 482, vol. 3.
[1071] PFT of Carrico 28-34; Tr. 489-91, vol. 3.
[1072] Tr. 530-31, vol. 3.
[1073] Tr. 505, vol. 3.
[1074] Tr. 505, vol. 3.

sited.[1075] The Fruit Valley, Vancouver City Center, and Columbia Gateway subarea plans acknowledged rail traffic but did not discuss, contemplate, or encourage additional rail traffic on the BNSF lines.[1076]

The waterfront redevelopment access project also acknowledged the existing rail corridor and focused on efficiency and safety of rail traffic by removing two at-grade crossings and decreasing delays on the BNSF main line.[1077] In addition, the Port's WVFA Project, which the VEDT will use, acknowledged the rail line and anticipated up to 10 trains inbound and 10 trains outbound per day, and the trains associated with the VEDT fall within this volume.[1078] Also, Vancouver Waterfront Development takes the railroad into account by having buildings along the rail corridor having structured parking and garage entrances facing the rail corridor until floors above the rail.[1079]

The Fruit Valley subarea plan recognizes that rail was constructed before most development in the area and that the railroad led to industrial development in the neighborhood. There will be no at-grade crossings in this subarea.[1080] In the Riverview Gateway subarea, most of the subarea is located hundreds of feet north and at a higher elevation than the rail line; the rail line is not addressed in detail in the plan because it doesn't impact the subarea. To Mr. Carrico's knowledge, access to this development does not require crossing the rail corridor. Zoning adjacent to the rail line is low-density residential R-2 and, for the sawmill site, heavy industrial. The R-2 zone specifically allows rail corridors.[1081]

With regard to the Clark County trails plan, the proper time to address inconsistencies between the industrial uses and zoning at the site would have been at the time the zoning or plan designation was applied.[1082] Mr. Carrico believes the zoning was in place before the trail system was planned.[1083] The rail corridor leading to the facility is not adjacent to the trails. The Columbia River water trail is in a navigable federally designated channel, with an existing vessel berth.[1084]

2013 Vancouver Staff Determination of Consistency and Compliance. Mr. Carrico cites a December 16, 2013, Staff Determination of Consistency and Compliance with Land Use document,[1085] undertaken at the request of Tesoro Savage as evidence that Vancouver staff found the proposal in compliance. That document stated that "[s]taff has determined that

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[1075] PFT of Carrico 30-31; Tr. 442-43, 456-57, 474, vol. 3.
[1076] Tr. 504, vol. 3.
[1077] PFT of Carrico 31-32; Tr. 448-50, vol. 3.
[1078] PFT of Carrico 32; Tr. 448, vol. 3.
[1079] PFT of Carrico 33; Ex. 0177-000001-TSS.
[1080] PFT of Carrico 33.
[1081] Tr. 458, vol. 3.
[1082] Tr. 459-60, vol. 3.
[1083] Tr. 459, vol. 3.
[1084] Tr. 460, vol. 3.
[1085] Ex. 0167-000001-69-TSS; PFT of Carrico 9-10.

subject to certain concerns and recommended conditions, [Tesoro Savage] has demonstrated the proposal is in compliance with the development regulations of the city of Vancouver."[1086]

(2) Opponents' Evidence and Argument

David L. Wechner, a professional land use planner for more than 25 years with experience in environmental and land use planning, provided the Opponents' primary testimony on land use issues.[1087]

Consideration of Non-Localized Impacts. He testified that because the VEDT's impacts can be felt throughout the state along the rail and vessel lines, the Council's analysis should not be restricted to the localized site.[1088] Based on laws such as SEPA and the SMA, planners normally consider off-site impacts, particularly for large projects or projects that pose impacts such as odors, hazardous chemicals, or large amounts of traffic.[1089] SEPA requires jurisdictions to look at impacts outside of the jurisdiction.[1090] Off-site impacts are considered even at the development review level where the zoning code is the primary driver of review.[1091] For example, the Vancouver Waterfront Development Plan would have to look at off-site traffic impacts and consistency with other impacted plans.[1092] The policies of a subarea plan can be applied to developments that aren't within the subarea if the development causes off-site impacts within the subarea.[1093]

Existing Uses. Existing uses are considered in doing long-range land use planning. Generally, one zones or plans to be inclusive of that use, although once the use is abandoned re-establishment may be prohibited. Planners also consider what impacts the existing use might have on the properties around it.[1094] It is typical in land use planning to say that existing, non-compatible (i.e., nonconforming) uses may not be enlarged or expanded.[1095] Each type of expanded use has to be looked at individually, so container shipping by rail may not have the

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[1086] Ex. 0167-000004-TSS.

[1087] He has a Master's degree in environmental studies and has been certified through the American Institute of Certified Planners since 2001. He has served as the director of planning and community development for Island County, Washington; the planning director for Josephine County, Oregon; and the planning and building director for the City of Sherwood, Oregon. He is currently the principal at Wechner Consulting, a land use consulting firm in Coupeville, Washington. PFT of Wechner 1. He has overseen nearly all aspects of community development and environmental review in these cities and counties, including SEPA and SMA compliance. PFT of Wechner 2. His areas of expertise include land use planning with an emphasis on reviewing and designing projects for minimal environmental impact and reviewing documents for compliance with the State Environmental Policy Act. PFT of Wechner 1-2.

[1088] Tr. 4139, vol. 18.

[1089] Tr. 4138-39, vol. 18.

[1090] Tr. 4182, vol. 18.

[1091] Tr. 4173, vol. 18.

[1092] Tr. 4153-54, vol. 18.

[1093] Tr. 4152-53, vol. 18.

[1094] Tr. 4166, vol. 18.

[1095] Tr. 4170, vol. 18.

same impacts.[1096] The VEDT's use is unique because it involves a hazardous substance moving through residential uses; it is also rail traffic with associated impacts.[1097] When developing comprehensive plans or subarea plans, the purpose is to take a more holistic and less deferential look at what use got there first in order to develop a longer-term vision.[1098] These concepts apply to transportation corridors and crossings.[1099] The railroad was built before a residential development was built that is accessed across the railroad tracks.[1100] The permit for that development would appropriately have taken the presence of the railroad into account.[1101]

VEDT Impacts are Inconsistent with Local Planning Documents. Based on his knowledge and experience as a land use planner, Mr. Wechner's overall conclusion was that while components of the VEDT are consistent with a heavy industrial zone, the impacts of the VEDT stretch beyond that zone and are inconsistent with the Comprehensive Plan, the subarea plans, neighborhood development, proximity to residences, and at-grade crossings (including cutting off 200 residences at the Steamboat Landing subdivision for several minutes at a time throughout the day).[1102] In addition, a populated jail is not typical within a larger industrial use such as the Port.[1103] The siting documents for this jail recognized its location in an industrial area with associated potential land use conflicts, although Mr. Wechner does not believe the VEDT had been proposed at that time.[1104]

VEDT Off-Site Impacts. The VEDT's primary off-site impacts are related to the commodity being transported by rail and vessel and increased risk of spills.[1105] Shiploads of crude oil will be crossing the Columbia Bar, which is generally accepted as one of the more dangerous crossings on the West Coast.[1106] The increased volume of rail traffic would be inconsistent with the Comprehensive Plan and the subarea plans, impacting neighborhoods and possibly investments in the area.[1107] Train traffic impacts are to be considered even if no new track is being installed.[1108] Rail traffic will impact downtown Vancouver because trains will travel to the Port, off-load their cargo, then back up past downtown to use the north alignment to travel north.[1109] This means each mile-and-a-half-long train makes three passes of downtown Vancouver, four times a day.[1110] Off-site traffic impacts are assessed by looking at average daily traffic, peak hours, and dispersion, noting that for rail impacts there are no

[1096] Tr. 4177-78, vol. 18.
[1097] Tr. 4178, vol. 18.
[1098] Tr. 4173, vol. 18.
[1099] Tr. 4166-67, 4170-71, vol. 18.
[1100] Tr. 4167-68, vol. 18.
[1101] Tr. 4168, vol. 18.
[1102] Tr. 4142-43, vol. 18.
[1103] Tr. 4174, vol. 18.
[1104] Tr. 4179-80, 4183-84, vol. 18.
[1105] Tr.4146-47, 4156, vol. 18.
[1106] Tr. 4146, vol. 18.
[1107] Tr. 4161, vol. 18.
[1108] Tr. 4162, vol. 18.
[1109] Tr. 4146-47, vol. 18.
[1110] Tr. 4147, vol. 18.

bypass routes.[1111] Both high and low volumes would be considered, although high volumes would likely produce the greatest impacts.[1112] At the Port, the highest level of Port-reported rail car volume was 57,000 rail cars in 2007 and the VEDT would produce 160,600 rail cars (100-120 cars/unit train, averaging four trains/day, 365 days/year).[1113] The VEDT will produce a significant increase in rail traffic coming to the Port, at a level that is nearly three-fold over the historic high.[1114] The neighborhoods that will experience the most impact are the Fruit Valley Neighborhood (with residences as close as 1100 feet from the inbound route and 240 feet from the outbound route), Columbia Way (with residences as close as 120 feet from the tracks), and Riverview and Old Evergreen Highway neighborhoods (with some residences only 60 feet from the tracks, with multiple at-grade crossings along the rail line).[1115]

The Comprehensive Plan, the various subarea plans, and the environmental assessment for the WVFA Project were not written in anticipation of a particular level of increased rail traffic along the east to west rail corridor.[1116] The WVFA Project was built for general congestion relief and better operational functionality of the rail lines.[1117] This VEDT piggybacks on the WVFA Project but crude as a commodity was not identified.[1118]

The VEDT Conflicts with Comprehensive Plan Policies. Primarily as a result of increased rail traffic, the VEDT will conflict with individual Vancouver Comprehensive Plan policies as follows:

- Detract from the character of urban centers and corridors; decrease long-term viability due to noise, air quality, aesthetics, traffic, and accident risks; and frustrate private development (Policy CD-4).[1119] The VEDT's conflicts with Policy CD-4 will be especially damaging for the Waterfront Development Project (The Waterfront at Vancouver, WA, USA), a $1.3 billion infill project to develop 35 acres of riverfront and connect it to the City's historic core.[1120] The project will include up to 3300 residential units, approximately one million square feet of office space, and retail space for restaurants, specialty shops, and services. The VEDT will result in multiple unit trains traversing the site each day.[1121] Vancouver's approval of the development required rail underpasses to provide vehicular access to the project and implementation of building design standards to address noise.[1122] The

[1111] Tr. 4149, vol. 18.
[1112] Tr. 4150, vol. 18.
[1113] Tr. 4150-51, 4171-72, vol. 18.
[1114] Tr. 4161; PFT of Wechner 12.
[1115] PFT of Wechner 12.
[1116] Tr. 4140-42, 4145-46, 4151, vol. 18.
[1117] Tr. 4159, vol. 18.
[1118] Tr. 4159, vol. 18.
[1119] PFT of Wechner 10.
[1120] PFT of Wechner 12, 10 n.3.
[1121] PFT of Wechner 10 n.3.
[1122] Tr. 4169, vol. 18.

developer of the Waterfront Development Project, Vancouver, and the Port worked together on the WVFA Project.[1123]

- Create a potential for spills, accidents and direct impacts to non-industrial areas and raise concerns about safety and livability of neighborhoods and the Waterfront Development Project (Policies CD-6, CD-7, CD-8, and CD-9).[1124]

- Impact compatibility of uses by juxtaposing industrial-scale rail traffic with residential uses, causing traffic congestion and reducing community access to businesses (Policy CD-10).[1125]

- Conflict with downtown revitalization (Policies CD-12, CD-13).[1126]

- Risk human exposure to toxic chemicals, smoke, water pollution, injury and death (Policy CD-15).[1127]

- Adversely affect sustainability through inconsistency with sustainability tenets such as utilizing efficient growth strategies to enhance the environment, minimize costs, and improve the social condition of residents and visitors (Policy CD-16). In addition, reliance on heavy crude as an energy source is unsustainable (Policy CD-16).[1128]

- Fail to promote or facilitate energy conservation or use of alternative energy sources (Policy EN-3) and be inconsistent with the protection of priority and locally important habitats, priority species, and threatened and endangered species, fish, shellfish, and wildlife (Policies EN-3, EN-7).[1129]

- Be a disincentive to other proposed developments (Policy EC-6) and deter development that Vancouver desires for its downtown core (Policy EC-7).[1130]

VEDT Conflicts with Subarea Plans. The VEDT will conflict with the subarea plans for the Fruit Valley, the Central City and Riverview Gateway areas, along with the Regional Trail & Bikeway System Plan, primarily because of resulting increases in overall rail traffic.[1131] These plans are very neighborhood-centric, with an emphasis on increased

[1123] Tr. 4175, vol. 18.
[1124] PFT of Wechner 11-13.
[1125] PFT of Wechner 14.
[1126] PFT of Wechner 14-15.
[1127] PFT of Wechner 15.
[1128] PFT of Wechner 18.
[1129] PFT of Wechner 18-20.
[1130] PFT of Wechner 20-22.
[1131] PFT of Wechner 5.

pedestrian access, alternative modes of transportation, access to the water, walkable communities, human scale, and interaction between neighborhoods and commercial and light industrial activities. The VEDT brings a heavy industrial use to the doorstep of some of the neighborhoods,[1132] although the VEDT isn't located in the area of the Fruit Valley, Downtown (CCP or VCCV), or Riverview Gateway subarea plans[1133] but the rail line goes through the Fruit Valley subarea.[1134]

The VEDT will conflict with the Vancouver City Center use priorities and development regulations by increasing heavy industrial use an in area that is moving away from heavy industry toward uses such as residential, office and retail, light industry, and public access to the shoreline.[1135] There are no policies in the City Center Plan that call for intensifying heavy industrial uses such as the VEDT, which would increase rail traffic and the possibility of spills, accidents and other potential impacts.[1136] Thus, additional rail traffic would conflict with the plan and do not support revitalization of the downtown area.[1137] In addition, rail traffic and rail loop track unloading conflict with the adjacent Lewis & Clark Discovery Greenway Trail and other existing trails.[1138] Vancouver's development moratorium on oil terminals further indicates the proposal is inconsistent with overall city plans and ordinances, and local public interests.[1139]

For the Riverview Gateway area, the VEDT will conflict with plans for an urban mix of residential, commercial, office, and employment uses linked by parks, trails and open space by causing train noise, vibration, exhaust, and the hazards of spills and accidents.[1140] It will produce significant rail traffic that is likely to discourage riverfront access or force expensive above-grade crossings, thereby frustrating the goal of the plan.[1141]

The VEDT Conflicts with Vancouver's Shoreline Master Program. Ports and port industrial operations are a preferred use under the SMA.[1142] Vancouver's Shoreline Master Program requires land use planners to look at off-site impacts on shoreline ecological function and value.[1143] However, the VEDT conflicts with the Vancouver Shoreline Master Program and implementing ordinances because the VEDT will not further any of the use preferences in the Master Program, such as preserving natural character of the shoreline, protecting resources

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[1132] Tr. 4141, vol. 18.
[1133] Tr. 4151-52, vol. 18.
[1134] Tr. 4153, vol. 18.
[1135] PFT of Wechner 31-32.
[1136] PFT of Wechner 14-15.
[1137] PFT of Wechner 15; Tr. 4158, vol. 18.
[1138] PFT of Wechner 39-42.
[1139] PFT of Wechner 5-6; Tr. 4144, vol. 18.
[1140] PFT of Wechner 33-39.
[1141] PFT of Wechner 37.
[1142] Tr. 4169, vol. 18.
[1143] Tr. 4171, vol. 18.

and ecological function of the shoreline, increasing public access or recreation.[1144] The VEDT is unlikely to promote the use preference for statewide interests over local interests or long-term interests over short-term interests because the VEDT furthers an unsustainable and environmentally damaging energy source and climate change, and local job creation and economic benefit would be outweighed by the VEDT's local and statewide impacts. Potential off-site impacts conflict with the preference for protecting downstream shorelines containing unique, scarce, or sensitive resources from oils spills.[1145] A catastrophic oil spill could have long-term impacts.[1146] The VEDT would conflict with Shoreline Master Program use and development regulations, including a failure to demonstrate all reasonable efforts have been taken to avoid, minimize, or mitigate negative shoreline impacts; failure to supply a site restoration plan; intensive armoring of the shoreline; failure to allow for safe and unobstructed passage for fish; risking the release of crude oil to the river; and failure to create shallow in-water habitat.[1147]

Vancouver's Reasons for Opposing the VEDT. The Opponents also relied on the testimony of Vancouver City Manager Eric Holmes. Mr. Eric Holmes has a Bachelor of Arts degree in Planning, Public Policy and Management and a Masters of Public Administration. He is an executive board member of the Columbia River Economic Development Council, a member of the Association of Washington Cities Legislative Committee, the Washington State University Vancouver Advisory Council, the International City/County Management Association, and a past member of the American Planning Association. He has worked at multiple levels of government, including 15 years of executive experience in public administration. He began work for Vancouver in 2007 as the Economic Development Director, became Assistant City Manager in 2010, and City Manager later that same year. As Economic Development Director, he was responsible for strategic development and redevelopment through the City, including oversight of business recruitment, retention and expansion. He was involved in the City Center Vision plan district and Downtown Vancouver Waterfront Development project. Prior to employment with the City, his local government experience included serving as the Planning Director for the City of Washougal and the City Manager of Battle Ground.[1148]

Mr. Eric Holmes stated Vancouver opposes the VEDT.[1149] He summarized Vancouver's strategic vision for urban growth and land use as focusing on establishing and enhancing connections with the Columbia River waterfront, with Vancouver now being the largest and most vibrant waterfront city on the river.[1150] The City's Strategic Plan envisions Vancouver as vibrant, safe, and prosperous with support for waterfront development, arts and

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[1144] PFT of Wechner 44.
[1145] PFT of Wechner 44-45.
[1146] PFT of Wechner 46.
[1147] PFT of Wechner 47-51.
[1148] PFT of E. Holmes 1-2.
[1149] Tr. 2858, vol. 12.
[1150] PFT of E. Holmes 3; Tr. 2825, 2900-01, vol. 12.

culture, transportation infrastructure improvements, improved parks and public safety, and preserving existing assets. Vancouver's 2011-2013 Comprehensive Plan sets the vision for the next 20 years and is implemented through subarea plans, the municipal code, and other local standards.[1151] The Comprehensive Plan emphasizes the need to use co-location to maximize limited municipal resources.[1152] These documents emphasize linkages, linking land uses together, encouraging complementary growth and linking the urban core to the river.[1153] In addition, the city council recently enacted a moratorium on crude oil handling facilities.[1154]

The VEDT will have significant impacts on urban land uses in Vancouver because the area along the rail lines contains residences, parks, industrial, and commercial development. The Comprehensive Plan is intended to direct land use patterns and growth in a manner that makes Vancouver livable for future generations.[1155]

City Manager Eric Holmes stated Vancouver is asking the Council to apply its land use provisions differently than Vancouver would because the Council's process dictated that difference.[1156]

The VEDT is inconsistent with particular Vancouver Comprehensive Plan[1157] and Vancouver Strategic Plan[1158] policies emphasizing interconnectivity of land uses, linkages to the Columbia River and the downtown waterfront development, and economic development, primarily due to increased CBR traffic in the corridor, and oil storage at the VEDT.[1159] Key policy objectives of the Comprehensive Plan are to facilitate development that minimizes adverse impact on neighborhoods and adjacent areas, to locate complimentary uses adjacent to one another, and to increase the ratio of jobs to housing.[1160] Substantial investments are currently occurring or planned within a mile of the rail corridor, including over $100 million in recent public investments in the downtown area and access to the waterfront, and $1.5 billion in private investment is anticipated in the waterfront for the Columbia Waterfront Project.[1161] The Port's newly efficient yard might be useful in national or global business and trade, in support of Comprehensive Plan Policy EC-7, which addresses promoting the region nationally and globally to attract new business.[1162]

[1151] PFT of E. Holmes 3.
[1152] PFT of E. Holmes 2-3.
[1153] PFT of E. Holmes 3-4; Tr. 2825, vol. 12.
[1154] Tr. 2872, vol. 12.
[1155] PFT of E. Holmes 14.
[1156] Tr. 2876, vol. 12.
[1157] Ex. 3097-000156-VAN.
[1158] Ex. 3042-0001-42-VAN.
[1159] PFT of E. Holmes 4.
[1160] Tr. 2826, vol. 12.
[1161] PFT of E. Holmes 5, 8-9.
[1162] Tr. 2866-67, vol. 12.

Vancouver developed a series of subarea plans throughout Vancouver. Subarea plans are a method of taking a finer grain approach and establishing policies to achieve the desired state in defined geographic subareas of Vancouver. Four out of Vancouver's subarea plans are located either adjacent to or within a half mile of the existing rail line in Vancouver.[1163]

The Fruit Valley subarea plan is located on the western side of Vancouver and is a socioeconomically challenged area.[1164] Just to the east of that is the Vancouver City Center Vision Plan, which defines the urban growth aspirations for about 150 blocks of Vancouver's downtown area is bounded on the south by the Columbia River, on the east by Interstate 5, on the north by Fourth Plain Boulevard, and on the west by the rail line.[1165] The EIS for the vision acknowledged that train traffic would increase but did not anticipate the unique aspects of crude.[1166]

West of that is a congressionally historic reserve and national park. To the west is the Lower Grand Employment Subarea, bordered on the south by SR 14 and the railroad.[1167] A significant portion of this subarea is slated for redevelopment with high intensity employment and industrial uses.[1168]

East of Vancouver is the Riverview Gateway subarea. This is an approximately 200 acre area, a quarter mile north of the railway, that is slated for development with in excess of 2 million square feet of urban mixed-use development including office, retail, public open space, and residential uses.[1169]

The Waterfront Redevelopment Project is within the Vancouver City Center Vision Plan. It is planned to include about 3000 housing units, about 2500 direct jobs, about 400,000 square feet of retail, and a limited amount of institutional uses. It includes approximately ten acres of public open space, recreation space; about slightly more than seven of those acres are being actively developed into a waterfront park. The VEDT is located approximately 2 miles west of downtown and a shorter distance west of the Fruit Valley subarea and the rail line runs through or immediately adjacent to these two subareas.[1170] The redevelopment project is enabled by public investment in infrastructure to provide adequate access for pedestrians, autos, and emergency response vehicles, with federal, state, local, and private investments funding completion of about $44 million worth of improvements to waterfront access, about $6.5 million worth of onsite road and utilities improvements to extend

[1163] Tr. 2826, vol. 12.
[1164] Tr. 2826, vol. 12; Ex. 5904-000001-73-CRK.
[1165] Tr. 2827, vol. 12; Ex. 3092-0001-24-VAN.
[1166] Tr. 2868-69, vol. 12.
[1167] Tr. 2828-29, vol. 12.
[1168] Tr. 2929, vol. 12; Ex. 3055-0001-53-VAN.
[1169] Tr. 2829-30, vol. 12; Ex. 3096-0001-55-VAN.
[1170] Tr. 2827-29, vol. 12.

an arterial road to and through the site, and approximately $27 million for construction of a waterfront park.[1171]

(3) Summary of the Council's Analysis of Vancouver Community Interests

In assessing the evidence, the Council finds that both Brian Carrico and David Wechner are experienced experts in the field of land use planning. Consistent with their backgrounds, the Council also finds that Mr. Carrico may underestimate the impact of the VEDT and its consistency with Vancouver's Comprehensive Plan and zoning ordinances, and that Mr. Wechner may overestimate the impact of the VEDT. The Council finds that Mr. Eric Holmes, as the Vancouver City Manager, a former land use planner himself,[1172] is in the best position to know the intent, purpose and application of Vancouver's plans, especially in relationship to Vancouver's vision of its city as related to future development.

Role of Land Use Planning Documents. In first determining what to consider in evaluating land use issues, the Council looks in part to the City of Vancouver Comprehensive Plan, Vancouver's subarea plans, and other planning documents, as well as Vancouver's zoning ordinances, and moratorium on crude oil handling. The Council concurs with Proponents that Comprehensive Plans are largely advisory in local review of development proposals. However, as described above, in this part of its land use analysis the Council is not bound by local land use planning documents or ordinances or by this otherwise applicable interpretive principle. RCW 80.50.010, RCW 80.50.090(3), RCW 80.50.100(2), RCW 80.50.110, RCW 80.50.120, RCW 34.05.461(3), WAC 463-30-300(2), and WAC 463-64-020 envision a broader review in which comprehensive plans and other plans may be considered, particularly in light of otherwise applicable statutory requirements identifying comprehensive plans as local government plans for the future. Thus, to the degree that the Opponents may be asking the Council to apply Vancouver's plans and regulations differently than Vancouver might do so for other projects, the difference in treatment of the comprehensive plan, subarea plans, and zoning ordinances is justified by the Council's different process and authorities.

The VEDT Site. Next, the Council considers the VEDT site. The site is unquestionably in an area that has historically been used for heavy industrial purposes and is used for such purposes today. However, as discussed in the seismic section of this Order, the Council believes that the VEDT is not adequately designed given the seismic risks present in an area of liquefiable soils. The probability of a major seismic event is not miniscule or remote, as expert testimony in the record indicates a 15 percent chance of a Cascadia level subduction earthquake striking the region in the next 50 years, which is the design life of the VEDT. No amount of infrastructure improvements can guarantee that the public and the environment would be fully protected from the consequences of such an earthquake. Even if all designs

[1171] Tr. 2828, 2862-65, vol. 12.
[1172] PFT of E. Holmes 1-2.

perform as appropriate, there remains a 2 percent change that an earthquake exceeding design specifications will occur within the next 50 years. The potential consequences of such an event include large-scale oil release, fire, or explosion, with negative implications for public safety, public service provision, and the environment, particularly the Columbia River. Notably absent from Tesoro Savage's land use testimony asserting compliance with some 27 individual policies of the Vancouver Comprehensive plan is an evaluation of consistency with Plan Policy EN-11, Hazard Areas, which states "Manage development in geographically hazardous area and floodplains to protect public health and safety." Tesoro Savage has not carried its burden in demonstrating proposed terminal development is consistent with City of Vancouver land use plans, ordinances, and interests.

The Rail Corridor. The Opponents argue that the land use consistency evaluation should include the rail corridor, since the VEDT does include rail corridor improvements at the VEDT site, and the VEDT's off-site impacts are regulated under a range of applicable standards, including SEPA, the SMA, and Vancouver and Clark County plans and rules.[1173] The Opponents further argue that Vancouver subarea plans did not authorize the current proposal, since the various subarea plans abutting the rail corridor did not analyze rail volumes, hazardous cargo rail volumes, or their impacts. In the case of the WVFA Project, anticipated increases in the number of trains were 35 percent less than would result from the proposal.[1174]

The Proponents argue that the land use consistency evaluation should not include the rail corridor but even it is does, the VEDT is still consistent. The rail corridor is preexisting and no improvements or changes are planned to the rail corridor. Improvements have previously been made to facilitate increased rail use, as anticipated by this Project. So any conflict associated with rail traffic would occur in the absence of this Project. Therefore, it should not be used as a basis for disapproval.[1175]

In the Council's view, the Council's land use analysis may include consideration of the rail corridor. Proponents provide no support for their contention that local policies and regulations are not intended to be applied to off-site impacts unless those standards contain explicit thresholds delineating compliance and non-compliance. The Opponents cite various contrary examples of Vancouver and Council standards clearly applicable on- and off-site without preset compliance thresholds.[1176] In any event, the Council's consideration of on- and

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[1173] The Council has long expressed an interest in off-site transportation impacts as indicated in its guideline about topics applicants should cover in their applications. WAC 463-60-372 specifically asks for information about the vehicular, rail, and vessel implications of their projects.

[1174] Columbia Riverkeeper Final Adjudication Br. 72-74.

[1175] Applicant Post-Hr'g Br. 56-57.

[1176] Although the record is less clear, Proponents also do not carry the burden in demonstrating the changes in the intensity of and content of rail corridor traffic could not trigger local land use review, which includes SEPA. Vancouver zoning standards define use not as a structure, but as "an *activity or purpose for which* land" or structures are intended or occupied. VMC 20.150.040F (emphasis added). The Council is not persuaded that a change in rail activity or cargo could not be considered a change in use under Vancouver code, or allow for local SEPA review if the City found a significant adverse impact would result.

off-site use impacts is not restricted by the contents of local land use planning documents or the way they may have traditionally been applied by some land use planners.

The Council believes that the VEDT is inconsistent with local plans and ordinances, and not protective of local interests. Turning first to the rail corridor, the Council sees no basis to support the Proponent's contention that the proposal would not increase rail traffic. The indirect impacts of the VEDT include an increase in CBR traffic in excess of 200 percent over 2015 levels.[1177] Because of the length of the trains, each train would have to come in past the downtown out to the Port, unload, move far enough back on the mainline so the train could then take the line north.[1178] This translates into 12-15 trains per day.[1179] As discussed in greater detail in the rail risk section of this Order, an approximate doubling in the number of loaded crude oil trains is likely, as well as significant increases in overall train traffic, particularly the number of longer trains with more than 100 cars. Tesoro Savage's rail risk analysis, when applied to the approximately 11 mile Vancouver corridor located on mainline track not containing guardrails, would project a derailment of a loaded oil train associated with the proposal roughly once every 84 years. Tesoro Savage projects an average of 112.7 tank cars will derail. Houses are within 60 feet of the track in much of the Vancouver corridor, raising the possibility that even derailments without release of oil, fire, or explosion can have significant safety consequences. In fact, the record suggests that when CBR derailments have occurred, oil release, fire, and in some cases explosions, have often resulted.[1180] Frequencies of this nature are not considered remote under local regulatory standards. In the case of floods, for example, even though advance warning is typically provided, land use ordinances in Vancouver and other communities in Washington and the nation identify a frequency of once every 100 years to be a sufficient risk to impose significant development limitations.[1181]

These risks affect not only public safety. As discussed elsewhere in the Order, local inhabitants may be negatively impacted by oil release or fire along the corridor, which runs close to and upslope from the Columbia River. The waterfront development and nearby portions of downtown Vancouver within the Vancouver Central City Vision subarea would likely on balance develop less intensely than would occur without the proposal and its real and perceived risks. Values of residential and commercial properties throughout the corridor will likely be diminished, with implications for local revenue to fund public services. Connectivity to residential and recreational areas fully or partially dependent on access via the 27 at-grade crossings in the Vancouver corridor will be diminished. In the downtown area, the Council agrees with Proponents that subarea planning and related implementation has been undertaken with an understanding of existing rail traffic and potential increases, and in some cases has made specific improvements in response. However, there is no indication that those plans

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[1177] Tr. 2849, vol. 12.

[1178] Tr. 2850, vol. 12; Ex. 3131-0001-VAN.

[1179] Tr. 2850, 2851, vol. 12.

[1180] PFT of Barkan 10. Five projected derailments averaging 12.7 cars every 2.4 years on 385-mile Washington route, of which 11 miles represents 2.8 percent.

[1181] VMC 20.740.120.

considered the extent of rail volume increases posed by the proposal, or more importantly, considered the advent of CBR transport or its impacts. Those impacts have only become clear recently, as 21 or 24 CBR accidents noted in the record have occurred in 2014 or later.[1182]

Key policy objectives in the Vancouver Comprehensive Plans are to facilitate development that minimizes adverse impact on neighborhoods and adjacent areas, to locate complimentary uses adjacent to one another, and to increase the ratio of jobs to housing so that Vancouver's economy is more self-sustaining.[1183] In reviewing the testimony and determining compliance with Vancouver's plans, the Council views Mr. Carrico as consistently putting the narrowest interpretation to each policy or goal. Given the objective of these plans, it would be inconsistent to apply the narrow interpretations offered by Mr. Carrico. Therefore, the Council has interpreted the policies and goals consistent with the overall objective of the Comprehensive Plans.

Based on the above, the Council finds the VEDT at the terminal site and rail corridor inconsistent with the balance of Vancouver plans and ordinances, and interests, as follows:

- Strategic Plan Goals 1 and 7 provisions for safe infrastructure and utilities, and strengthened connections to the Columbia River and waterfront are not met by the VEDT. As set out in other sections of this Order, the VEDT presents risks related to rail, seismic events and other incidents that could result in fire, explosions, and oil spills into the Columbia River. This is not consistent with Goals 1 and 7.

- Comprehensive Plan goal CD-6 – Neighborhood livability. The VEDT necessarily increases the number of crude oil unit trains going through Vancouver, with associated increases in noise, delays at rail crossings, emissions from the trains, and increased risk of an incident, all of which run contrary to this goal of neighborhood livability.[1184] Even if Mr. Carrico is correct that this policy does not require or encourage mixed use and pedestrian oriented development in all locations of Vancouver, particularly heavy industrial areas,[1185] this does not refute the fact that there will be impacts that do affect the livability of the neighborhoods that are within close proximity to the VEDT.

- CD-9 – Compatible uses. The VEDT creates a potential for spills, accidents, and direct impacts to non-industrial areas and raises concerns about safety and livability of neighborhoods and the Waterfront Development Project (Policies CD-6, CD-7, CD-8, CD-9)[1186] Even though the VEDT is in an area devoted to industrial, transportation, and correctional activities,[1187] this does not mean that the area

[1182] City of Vancouver's Closing Br. 65.
[1183] Tr. 2826, vol. 12.
[1184] PFT of Wechner 13.
[1185] PFT of Carrico 16.
[1186] PFT of Wechner 11-13.
[1187] PFT of Carrico 16.

should have the type of high risk activity associated with the VEDT. Therefore, the Council cannot agree that the VEDT is a compatible use.

- CD-10 – Complementary uses. To complement is to fill up, complete or make perfect. For land use, complementary uses would be uses that make each more complete; for example, adding residential services to a residential neighborhood. Here, the Council agrees that the VEDT, with its attendant increase in rail traffic and associated risks and impacts, are not complements to residential areas, but are the opposite.[1188]

- CD-15 – Public Health and the built environment. This addresses the risk of human exposure to toxic chemicals, smoke, water pollution, injury and death.[1189] CD-16 (Sustainability) addresses sustainability tenets such as utilizing efficient growth strategies to enhance the environment, minimize costs, and improve the social condition of residents and visitors. Reliance on heavy crude as an energy source is unsustainable.[1190] The Council disagrees with the narrow interpretation that these policies are directed only at land use patterns and not at specific types of development. These policies promote public health and sustainability by encouraging integrating land uses, and creating walkable/bikeable areas, and facilitating sustainable land use development that fosters reduction in greenhouse gas emissions.

- EN-3 – Energy conservation. The Council finds that the VEDT does not meet this goal as it fails to promote or facilitate energy conservation or use of alternative energy sources.[1191] We agree with Mr. Carrico that this policy does not prohibit development of a project that lacks specific energy conservation or alternative sources. The Council acknowledges that the VEDT will use a variety of energy conservation measures in its construction and operation, although the VEDT itself is not an energy conservation or alternative energy source.[1192] However, the VEDT, although not an energy conservation or alternative energy source, is the one that promotes the continued use of fossil fuels, by allowing an alternative storage facility to facilitate the transport of crude oil to its refineries. This is the opposite of what this policy goal seeks to advance.[1193]

- EN-6 – Habitat. The VEDT is inconsistent with the protection of priority and locally important habitats, priority species, and threatened and endangered species,

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[1188] PFT of Wechner 13-15.
[1189] PFT of Wechner 16.
[1190] PFT of Wechner 18.
[1191] PFT of Wechner 19.
[1192] PFT of Carrico 19; Tr. 514, vol. 3.
[1193] PFT of Wechner 19.

fish, shellfish, and wildlife (Policies EN-3, EN-7)[1194] Mr. Carrico asserts that this policy favors the protection of riparian areas, wetlands, and other habitats and the Project is consistent with this policy.[1195] Mr. Carrico fails to take into account the VEDT's impact on wetlands, wildlife and fish habitat, and the species that rely on those habitats as set forth elsewhere in this Order.

- EN-7 – Endangered species. This proposal is inconsistent with this policy to protect endangered species. Tesoro Savage acknowledged that salmonids listed under the federal Endangered Species Act "use portions of the site and the surrounding areas."[1196] Other priority species in the Vancouver area include the bald eagle, western gray squirrel, great blue heron, peregrine falcon, purple martin, and leopard dace.[1197] A crude oil spill could be devastating to fish and wildlife at the VEDT site and the surrounding area.[1198]

- EN-11 – Hazard Areas. The proposal is inconsistent with this policy requiring management of development in geographically hazardous areas and floodplains to protect public health and safety, as it would located a large oil transfer facility at a site subject to soil liquefaction, and require 4.7 loaded crude oil trains to approach the facility daily through areas of landslide hazard and wildfire danger, without adequate safety, as described in the seismic and rail risk portions of this Order.

Further, because the VEDT will likely reduce development yields and lessen public safety in the downtown waterfront area, the VEDT is inconsistent with the Vancouver Central City Vision Subarea Plan. The Council agrees with Proponents' assertion that consistency with local comprehensive plans and ordinances does not require consistency with each policy or standard or component, but is convinced that the VEDT is inconsistent with the portions of the plan and ordinances that are most significant with regard to the specifics of this proposal.

The record does not support the view that particular Vancouver actions prove consistency with local land use plans and ordinances. The 2013 Staff Determination[1199] cited by Proponents was never finalized, and explicitly makes no finding regarding SEPA compliance, and for geological hazards notes an applicant study will be reviewed by Vancouver and incorporated into final engineering and structural standards.[1200] The Determination also does not address off-site impacts in the rail or vessel corridor, and predates many of the national CBR accidents, which might have heightened local safety concerns. Similarly, as the testimony from Mr. Eric Holmes indicates, Vancouver's advocacy in this

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[1194] PFT of Wechner 18-20.
[1195] PFT of Carrico 22-24.
[1196] *See* Ex. 0001-000672-PCE; PFT of Carrico 22-24; Ex. 0001-000513-14-PCE: Table 3.4-2.
[1197] *See* Ex. 5903-000202-CRK.
[1198] PFT of Wechner 20.
[1199] Ex. 0167-000001-69-TSS.
[1200] Ex. 0167-000057-TSS.

process recognizes that the Council's standards and review processes differ from local land use review in various respects.

c. Other Communities' Interests – Washougal and Spokane

Outside of Vancouver, other local jurisdictions along the rail corridor raised concerns about public safety and services, but do not address consistency with their own local land use plans and ordinances. However, as community interests, the Council will address these concerns in this section.

(1) Washougal

Washougal offered the testimony of Carl Einberger, a hydrogeologist and project manager responsible for water resource project planning, management, and technical support.[1201] According to Mr. Einberger, Washougal has significant concerns about the proximity of the BNSF rail corridor to its wellfields, and the increased risk of a crude oil spill associated with the VEDT. Washougal provides water supply to approximately 15,000 residents. Washougal's primary water supply source is the Westside (Lower) Wellfield. This wellfield has multiple water supply wells (Wells 5, 6, 7, and 11) located less than 100 feet from the rail corridor.[1202] The wells are completed in a shallow, unconfined aquifer composed of porous alluvial materials. In the vicinity of Washougal's wellfields, including along the rail corridor, coarse-grained materials with high infiltration rates extend from the ground surface to the water table, located at a depth ranging from 30 to 60 feet below ground surface, with total well depths of approximately 100 feet. No aquitard materials are known to be present in the wellfield area that would inhibit downward migration from a crude oil spill.[1203]

Washougal noted that the sensitivity of these wellheads in its Wellhead Protection Report to the Washington Department of Health, and designated them as Washougal's Critical Aquifer Recharge Area.[1204] Mr. Einberger noted the rail corridor crosses the 6-month, 1-year, and 5-year captures zones of Washougal's water supply wells PW-5, -6, -7, -11, and -12, as shown on Figure 4 from the Washougal's Wellhead Protection Report. The rail corridor also crosses Washougal's designated Critical Aquifer Recharge Area. Clearly, a spill in close proximity to the wellfield could affect water supply quality in far less than a 6-month timeframe, while a spill further away in the capture zones could still cause significant medium to longer-term water supply contamination.[1205]

[1201] Mr. Einberger has a BS in Geological Engineering and an MS in Geology. He is a Licensed Hydrogeologist in Washington and a Certified Water Rights Examiner. He is a consultant with Aspect Consulting, which was asked by Washougal to address water supply wellhead protection concerns associated with this Project. PFT of Einberger 1-2.

[1202] Ex. 3503-000001-WSH.

[1203] PFT of Einberger 3.

[1204] PFT of Einberger 5.

[1205] PFT of Einberger 5.

Washougal also asserted that there is no available backup drinking water supplies if the primary wellfield is contaminated by an oil spill.[1206] Mr. Einberger stated that "[t]he City also has a second wellfield, the Hathaway Park (Upper) Wellfield, located approximately 2500 feet from the rail corridor, as shown on Figure 1 from the City's Wellhead Protection Report. As the report demonstrates, these wells are also completed in alluvial materials that are highly susceptible to contamination from surficial contaminant spills. Only one production well is active (Well 1), and typically, this well is used only to supplement summer water demand.[1207] Well 1 is unable to provide sufficient water for Washougal's year round demands, should a spill require shutdown the Lower Wellfield."[1208]

Tesoro Savage presented the testimony of Ken Ames, a Washington state Licensed Hydrogeologist, who has focused on environmental and water issues with over 20 years of consulting experience.[1209] Mr. Ames conducted an analysis of the potential impact of an oil spill from a rail incident in close proximity to a wellhead protection zone or a shallow aquifer, like that in Washougal.[1210] Mr. Ames concluded that "it is not likely that any significant quantity of free petroleum product will reach the unconfined water table in the Spokane Valley, where depths to water in the area of the rail line are generally 50- to 100-feet below ground surface. Although the water table in the unconfined water-bearing unit is considerably shallower in Washougal, the amount of free petroleum product to reach the water table as a result of even a large or [Effective Worst Case Discharge] spill type should be negligible, especially with an immediate and appropriate response to the spill."[1211] However, Mr. Ames also stated that this analysis did not take into consideration the potential of impact that might occur in the longer-term due to dissolution of various contaminants of concern from the free petroleum product, upon interaction with water at the surface or within the vadose zone. However, Mr. Ames anticipates that federal and state laws would result in an immediate response to any of the spills described above at all locations along the BNSF route through Washington, which would include the removal of petroleum-contaminated soils that would minimize any longer-term dissolution and transport of contaminants of concern to the underlying groundwater.[1212]

(2) Spokane

Spokane argues that the VEDT will increase derailment risk along the rail corridor that traverses the length of Spokane and runs directly through its urban core, primarily on elevated track, creating unique consequences in the event of a derailment, and raising the possibility that even derailing train cars that do not release oil or lead to fire can have significant public safety implications. Spokane asserts that increased demand on emergency responders, and gaps in

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1206 PFT of Einberger 4.
1207 PFT of Einberger 4.
1208 PFT of Einberger 4.
1209 PFT of Ames 1.
1210 PFT of Ames 9.
1211 PFT of Ames 11-12.
1212 PFT of Ames 12.

preparedness due to higher traffic density, are likely.[1213] Spokane also notes that the rail line crosses a number of wellhead protection zones and is close to Spokane's two largest public water wells that produce over half of Spokane's supply.[1214]

Spokane presented the testimony of Daniel R. Kegley, the Director of Spokane's Water and Hydroelectric Department and the Director of Spokane's Wastewater Management Department. He has been a Certified Water Distribution Manager for over 20 years.[1215] According to Mr. Kegley, Spokane sits above a large sole source aquifer, which has been designated by the EPA as the sole source of drinking water for Eastern Washington and North Idaho serving over 500,000 connections per day. The aquifer is "an unconfined" aquifer, meaning it is more subject to contamination. It has highly permeable flood deposits, which combined with the very thin topsoil layer in many locations, make it highly susceptible to pollution.[1216] This aquifer is subject to special management practices, such as eliminating septic tanks and pre-treating stormwater in all areas located over the aquifer. In addition, Spokane has a number of wellhead protection zones. The oil trains going to the VEDT would cross over the aquifer and close to the wellhead protection zones. In addition, in regards to the aquifer, it is not clear if there are other sources of water. Mr. Kegley testified only that there is "no other reliable source of clean drinking water available in the volumes to serve the population demand."[1217]

Mr. Ames' analysis cited above, also included these areas of Spokane and he concluded that the risk of contamination would be low.[1218]

(3) Summary of the Council's Analysis of Other Community Interests

Washougal. Based on the testimony of both experts, the Council finds that there is a risk that an oil spill near the Washougal wellhead could result in contamination of Washougal's water supply. Although Mr. Ames puts that risk at a much lower level than Mr. Einberger, Mr. Ames bases his conclusion on assumptions that may not be realistic. Mr. Ames assumes an "immediate" response time and immediate removal of any contaminated soil, an assumption that may not be borne out in reality. In addition, his analysis did not take into account the potential longer-term impact that might occur due to dissolution of various contaminants of concern from the free petroleum product and interaction with water at the surface or within the vadose zone. Due to the fact that this is Washougal's primary water source, with no ready backup water source, this risk of contamination and its consequences are clearly inconsistent with local community interests.

[1213] City of Spokane Hr'g Br. 5-7.
[1214] City of Spokane Hr'g Br. 8.
[1215] PFT of Kegley 1.
[1216] PFT of Kegley 2.
[1217] PFT of Kegley 3.
[1218] PFT of Ames 11-12.

Spokane. The Council agrees with Spokane that the VEDT will increase risk of derailments in Spokane. Spokane is particularly at risk in the event of a derailment because portions of the rail corridor are on elevated track through its urban core. In addition to risks related to spills causing fires or explosions, or degrading emergency response, discussed elsewhere in this Order, this situation creates the possibility that even an intact derailed train could cause significant impacts to life, health, and property.

With regard to risks to Spokane's water supply, the Council agrees that there is a risk of contamination, although the risk is likely lower than the risk in Washougal because the Spokane wellheads are deeper.

Both of these risks impact the public interest and are moved into the Council's balancing analysis in Section IV.

2. Tribal Cultural and Economic Impacts

The Tribal Parties[1219] have raised many issues questioning the safety of the proposed VEDT. They presented largely unrebutted testimony and evidence describing the effects the operation of the VEDT would have on the Indian Tribes in the Columbia River region. They argue that the Tribal Parties will bear an unusually high share of the direct costs associated with oil spills, train derailments and fires, damage to the natural environment, economic and social costs due to impacts on their fisheries, and to their cultural interests. They point out that the operation of the VEDT involves three aspects: rail operations, site operations, and vessel operations. They assert that Tesoro Savage only has control over one aspect, the VEDT site operations. The Tribes argue that, while they will bear disproportionate burdens if the VEDT is built, Tesoro Savage understates and misstates the risks of the VEDT.

In making its recommendation to the Governor, the Council must balance the need for increased energy against the broad public interest.[1220] This requires consideration of the impacts of the proposed facility on populations in the affected area, including Indian peoples' cultural and economic interests. Tesoro Savage's archaeological expert concluded that normal operations of rail transportation of crude oil to the VEDT would not impact archaeological or historic resources along the rail corridor.[1221]

The Tribal Parties argue that even the impacts of normal operations are unacceptable. They point to accidents and catastrophic impacts such as an incident at Mosier, OR, just prior

[1219] The Tribal Parties to this adjudication are the Confederated Tribes and Bands of the Yakama Nation (Yakama Nation), the Confederated Tribes of the Umatilla Indian Reservation (Umatilla Tribes), and the Columbia River Inter-Tribal Fish Commission (CRITFC). CRITFC's creators are the four treaty tribes of the Columbia River: the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, the Nez Perce Tribe, and the Yakama Nation.
[1220] RCW 80.50.010.
[1221] PFT of Reese 5.

to the adjudication and assert such disasters are possible even when BNSF and Tesoro Savage are operating within normal parameters and oil trains are operating at slower than usual speeds.[1222] They allege that both the Council and Washington State are limited in their abilities to exercise enough regulatory oversight over two of the high-risk components of the VEDT project: rail and marine transportation. They assert that state authorities cannot sufficiently mitigate the risks posed by the VEDT, particularly since Tesoro Savage does not own, operate, or control rail or vessel transportation to and from the VEDT.[1223]

Tribal Parties have significant and unique cultural and economic interests at risk that are important not only to their tribes, but to other populations, to Washington's natural resources, in particular endangered salmon, and to the State of Washington.[1224]

Tribal people have been living and subsisting in the same places along the Columbia River since pre-history.[1225] Tribal ties to the Pacific Northwest and the Columbia River are deep.

> The Columbia River system is the life-blood of all the tribes and First Nations found along its entire length. Since time immemorial, the water, salmon, game, roots, and berries of our homeland—the sacred first foods—have sustained our health, spirit, and cultures. So fundamental was this connection that when the Yakama, Umatilla, Warm Springs, and Nez Perce tribes entered into treaties with the United States in 1855, they specifically included language to ensure that they could continue to fish, hunt, and gather their first foods.[1226]

These treaties that guaranteed Tribes access to fish, hunt, gather, and protect sacred sites in their usual and accustomed places, first foods to practice culture, and continue their way of life and plan for the future, cannot be abrogated.

The Tribal Parties assert that their significant cultural interests are put at risk by the VEDT project, including the interests that they contend are protected by their treaty rights.[1227]

[1222] Tribal Parties Post-Hr'g Br. 6.
[1223] Tribal Parties Post-Hr'g Br. 6.
[1224] Tribal Parties Post-Hr'g Br. 6-7.
[1225] PFT of Lumley 3.
[1226] PFT of Lumley 1, 3-8.
[1227] Tr. 3945, vol. 17; Tr. 3809, vol. 16; Tr. 3864, vol. 16.

a. Proponents' Information

Jo Reese is a Registered Professional Archeologist with Archaeological Investigations Northwest, Inc. She was hired by Tesoro Savage to perform cultural resource studies for the VEDT.[1228]

Ms. Reese met with the State Archeologist and Tesoro Savage's EIS consultant to review the methodology for studying cultural resources in relation to the VEDT. She initiated tribal coordination by sending a letter in August 2013 to cultural resource representatives of the Cowlitz Indian Tribe, the Confederated Tribes of the Grande Ronde Community Oregon, Chinook Tribe, Confederated Tribes of the Chehalis Indian Reservation, and the Yakama Indian Nation. The letter requested information on cultural resources or any other concerns that each Tribe might have with the VEDT.[1229] Ms. Reese also conducted an extensive background review of existing reports and site forms for the VEDT from historic preservation offices and she reviewed data gathered from Oregon and Washington historic resource agency databases for a cultural resource overview for the terminal portion of the Council's Preliminary Draft Environmental Impact Statement (PDEIS) for the VEDT.[1230]

Compilation of Existing Information. Historic resources are buildings, structures, and the built environment dated up to 50 years ago. Archaeological resources would typically be much older artifacts that are buried in the ground or found in the vicinity of shipwrecks.[1231] Ms. Reese said she compiled data on existing archaeological and historic resources for Oregon and historic resource data for Washington along the rail and navigation transportation corridors for the VEDT. However, archaeological resource data for Washington was not available because the Washington Department of Archaeology and Historic Preservation (DAHP) was reluctant to share its GIS data.[1232] She did not contact the Umatilla Tribes for archaeological site location information.[1233] Without the archaeological resource data for Washington, Ms. Reese compiled maps of the archaeological sites of which she was aware.[1234] Ms. Reese believes the archaeological resource data for Washington is being handled as part of the SEPA process.[1235]

The archaeologists studied data from the rail transportation corridor for one-half mile on each side of the railroad tracks, and data for the navigation transportation corridor

[1228] Ms. Reese has more than two decades of archaeological work experience on Port lands and along the Columbia River for various clients. In 1993, she directed a survey of the Port's Parcel One, which is the area where most of the project structures will be located. She testified that she is also very familiar with the other areas of the Port where the rail, pipelines, and dock will be constructed. PFT of Reese 1-3.
[1229] PFT of Reese 3.
[1230] PFT of Reese 3-4.
[1231] Tr. 4534, vol. 19.
[1232] PFT of Reese 4; Tr. 4533, vol. 16.
[1233] Tr. 3862, vol. 16.
[1234] Tr. 4532, vol. 19.
[1235] Tr. 4535:19, vol. 19.

one-quarter mile on each side of the proposed route. In reality, the navigation route studied was actually wider because it encompassed one-quarter mile inland from the shoreline plus the Columbia River itself.[1236] They identified a total of 44 historic resources in Klickitat County located within one-half mile of the BNSF rail route and prepared map books. The map books included only historical resources, not archaeological resources.[1237]

From reviewing the compiled maps of historic resources along Washington's rail corridor and the maps of historic and archaeological resources on the Oregon side of the Columbia River, Ms. Reese concluded that normal operations of the rail transportation of crude oil to the facility would not impact either archaeological or historic resources along the rail corridor. She assumed that a rail incident and discovery of cultural resources was unlikely, but that, should it happen, BNSF would stop work immediately and coordinate with the DAHP and the appropriate Tribes to protect the resources.[1238]

VEDT Site Archaeological Survey. In response to information requests from DAHP and the Council related to the potential for encountering archaeological deposits during construction of the VEDT, Ms. Reese developed a work plan to probe soil deposits at the site. She met with Council staff and the State Archaeologist on site to discuss the development of a work plan and a subsurface sampling methodology.[1239]

The work plan proposed to sample the area on Port property where stone columns would be used as part of the construction process. A geo-archaeological study work plan proposed a network of geo-probes to find the depths of fill and native soil and help determine where the project might encounter archaeological sites. This plan was sent to the Army Corps, which circulated it to DAHP and interested tribes for comment. The Army Corps and DAHP approved the plan, and fieldwork commenced.[1240] Representatives of the Confederated Tribes of the Grande Ronde Community of Oregon were part of a site visit during the fieldwork to see how the geo-probe work was handled. Weekly status updates were provided to all the parties through the completion of the fieldwork and a final report was submitted in April of 2015 to the Army Corps and the Council. The Army Corps provided the report to the DAHP and to interested tribes in April 2015.[1241]

A record from 1993 showed that no evidence of an archaeological resource was found during backhoe excavations of the Parcel One area. The 2014–15 subsurface study probes also found no evidence of archaeological resources. One area of pipeline placement in Area 500 was recommended to be monitored if there should be a change in construction techniques

[1236] Tr. 4532-33, vol. 19; PFT of Reese 4.
[1237] PFT of Reese 4; Tr. 4535-36, vol. 19.
[1238] PFT of Reese 5-6.
[1239] Tr. 4527-28, vol. 19; PFT of Reese 4.
[1240] PFT of Reese 4; Tr. 4527-28, vol. 19; Ex. 0260-000001-16-TSS.
[1241] PFT of Reese 4-5; Tr. 4529-30, vol. 19.

proposed to excavate deeper.[1242] Tesoro Savage also prepared an Inadvertent Discovery Plan for the Council to address the possibility of encountering human remains or an archaeological resource during work on the VEDT. This plan requires work to stop immediately should such a discovery occur, and close coordination with appropriate agencies and Tribes to protect the resources.[1243] From these investigations, Ms. Reese correctly concluded that the cultural resource overview and subsurface geo-archaeological study indicate that no archaeological resources are likely present within the VEDT's proposed terminal location. She also concluded that the construction and operation of the facility would have no impact on any significant archaeological or historic resources that might exist at the site.[1244]

b. Tribal Parties' Evidence

Audie Huber is employed by the Umatilla Tribes as an intergovernmental affairs manager. He works closely with tribal ecological resource staff on cultural resources and treaty protection issues. Previously Mr. Huber worked in the cultural resources program for the Umatilla Tribes.[1245]

Archaeological Sites and Cultural Resources. Mr. Huber explained that cultural resource issues, such as those involving the archaeological sites and Tribal treaty rights, are closely connected. The archaeological sites are usually associated with tribal hunting, fishing, and the gathering of food. He was struck that Ms. Reese's work had little or no consideration of Tribal archaeological resources. Based on his experience and personal knowledge, Mr. Huber stated that Tribal archaeological sites in the greatest density in Washington are located in Klickitat County near Celilo Falls on the Columbia River. The adjacent, centuries-old tribal settlement of Wishram is located on the shore of the Columbia River, and the nearby Silo Village in Oregon is one of the longest, most continuously occupied sites in North America. It is over 10,000 years old.[1246]

[1242] PFT of Reese 5; Ex. 00279-000001-25-TSS.

[1243] PFT of Reese 5.

[1244] PFT of Reese 5; Ex. 00279-000001-25-TSS.

[1245] Mr. Huber is a law school graduate, where he focused on federal Indian law and environmental law. His professional experience includes working at the Washington State Department of Natural Resources and working for 15 years on an in-lieu treaty fishing access project with the four Columbia River treaty tribes, as well as with the United States Army Corp of Engineers, and the Bureau of Indian Affairs. (The Treaty Fishing Access Project focused on identifying, acquiring and constructing fishing sites along the Columbia River in partial mitigation for those fishing sites inundated by the construction of Columbia River dams.) Mr. Huber has been involved with projects concerned with the protection of tribal graves and cultural resources along the Columbia River. In this capacity, he reviews projects with federal, state and private entities and evaluates whether treaty rights and cultural resources will be impacted, and works to find ways to mitigate those impacts. In addition, Mr. Huber has worked extensively with the Union Pacific Railroad, BNSF, and with the Federal Railroad Administration on Tribal matters. Tr. 3848-50, vol. 16.

[1246] Tr. 3851, 3854, vol. 16; Tr. 3849-50, vol. 16.

Along the Columbia River rail lines, there are thousands of archaeological and historical sites up and down the River.[1247] Klickitat County alone has over 500 sites that have been recorded and are within one-half mile of the Burlington Northern line.[1248] The information on the 500 Klickitat County recorded sites is maintained on the database at the DAHP.[1249] Ms. Reese did not have access to state data establishing that Klickitat County has over 500 sites that have been recorded within one-half mile of the BNSF tracks when she offered her opinion that there were apparently none there, and that normal operations of the rail transportation of crude oil to the facility would not impact the archaeological or historic resources along the rail corridor. But, historically, the Tribes have used areas close to the Columbia River for centuries, and these sites are now vulnerable because they are now close to the railroad tracks.

Shortly upstream from The Dalles Dam in Klickitat County, is Horsethief Lake State Park, the situs of “She Who Watches,” a well-known ancient rock image. “She Who Watches” is located within 120 feet of BNSF tracks.[1250] In addition, the Army Corps has placed other rock images at this same park after they were moved from along the Columbia River prior to the inundation caused by the construction of The Dalles Dam. Some of these ancient rock images are approximately 100 feet from the railroad tracks. Some are less than that.[1251] Shortly upriver from Horsethief Lake State Park is an archaeological site that was only discovered a few years ago when it was impacted by BNSF crew activities grading the railroad right-of-way. This site contains several burials associated with Wishram Village near Celilo. After their discovery, the affected burial sites were subject to a damage assessment for cultural reasons.[1252]

Cultural resources are important to tribal members because they are the concrete, physical evidence of the Tribes’ presence in the region and their relationship to their tribal ancestors. These are the tribal members’ particularly sensitive places because they represent the cultural record supporting the Tribes’ contention of being here since time immemorial. Rock images specifically, convey a sacred nature to Tribal members. These archaeological sites themselves are a physical connection to the land, enabling members to see where their ancestors were and what they did.[1253]

Mr. Huber disagreed with Ms. Reese’s belief that, in the event of a spill, the instructions from the railroad about how to deal with the spill would not impact archaeological sites along the route. He observed that a burning train doesn’t respond to engineering

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[1247] Tr. 3853, vol. 16.
[1248] Tr. 3853, vol. 16.
[1249] Tr. 3861, vol. 16.
[1250] Ex. 5331-000001-2-TRB.
[1251] Tr. 3857-58, vol. 16.
[1252] Tr. 3857-58, vol. 16.
[1253] Tr. 3859, vol. 16.

instructions.[1254] Mr. Huber said that spills of crude oil can contaminate the ground, which often requires excavation and removal of the contaminated soil. Most archaeological sites are underground and have remained undisturbed. In the event of a spill, a removal action has a strong potential to impact archaeological sites.[1255] In addition, contamination of archaeological material such as wood can prevent a site from ever being analyzed. It could also be hazardous to the archaeologists, and to the cultural resources themselves, making them incapable of being carbon dated.[1256] Surface fires are particularly damaging to surface deposits of archaeological materials. Oil fires, with their intensity and duration, pose a special problem and have a strong potential to impact such resources as "She Who Watches."[1257]

Mr. Huber stressed the importance of historical and archaeological sites to tribal members' ability to reference their history and connection to place. The Council agrees that these sites and potential sites are unique resources that are "priceless and irreplaceable. They cannot be restored in the event that [a] site is excavated."[1258] Mr. Huber explained that archaeological resources' *in situ* presence is very important to preserve so that tribal members can feel and see their connection to their own particular place.[1259] We agree that these cultural resources' complete value cannot ever be restored in the event a site is excavated because the excavation moves artifacts and takes away their connection to a particular spot. The Council is persuaded that the value of the rich historical and archaeological resources along the Columbia River is beyond monetary. These resources are indeed priceless, not only to Washington Tribal peoples, but to all the people of the state of Washington and to the state of Oregon as well. Based on the history of incidents along the rail route that have threatened these cultural resources, the Council agrees that the construction of the VEDT and the transport of very large quantities of crude oil creates the potential for further serious compromise and even the loss of the state's irreplaceable cultural resources.

Fishing as Part of Tribal Culture. Tribal members have been fishing the Columbia River from time immemorial, going back numerous generations.[1260] Yakama Nation members consider themselves "river people." They believe that fish is their lifeblood, particularly salmon; expressing it as taking care of the salmon so the salmon can take care of them. "If we don't go and catch the salmon and provide them in our diet and bring them to the table, they won't be there for us anymore. So if we're not going to protect them, then we're not Yakama people. So that's the lifeblood of who we are."[1261] Long-time tribal member Wilbur Slockish testified about the connection he feels between fishing and his tribal culture: "I can't place a monetary value on my spiritual being and my cultural awareness and my cultural teachings. To

[1254] Tr. 3855-56, vol. 16.
[1255] Tr. 3860, vol. 16.
[1256] Tr. 3860, vol. 16.
[1257] Tr. 3860, vol. 16.
[1258] Tr. 3861:18-20, vol. 16.
[1259] Tr. 3861, vol. 16.
[1260] Tr. 3827, vol. 16.
[1261] Tr. 3956:17-22, vol. 17.

me, it's priceless."[1262] Mr. Slockish illustrated this cultural connection by telling how he felt after catching a fish: "[I]t's undescribable [sic] the feeling that you get when you harvest in there and giving him thanks that he's made the sacrifice to feed you, to utilize him in those ways of drying and smoking and meals. So they're very important in that aspect and that feeling is priceless."[1263] Mr. Slockish also related how the first salmon caught by a young person is an important milestone in coming of age, celebrated in a specific ceremony and observed by specific cultural practices.[1264]

Roger Dick is the Harvest Coordinator for Yakama Nation Fisheries. In describing the importance of fishing to tribal culture, he said that treaty fishing is integral to who they are as people. He analogized tribal fishing to the value that all U.S. citizens would place on such things as the right to vote, free speech and freedom of religion.[1265] The Tribes encourage participation in commercial fishing as a way to provide cultural as well as economic opportunities for tribal members.[1266] Fishing helps keep tribal families together.[1267] A 2014 survey counted 400 fishing platforms between the Bonneville and McNary Dams.[1268] One witness testified regarding what would be adequate compensation for closing of fishing sites: "And when asked . . . [by] sportsmen, how much would it take for you to ease your conscience? I told them, I said, you can bring me all the gold, silver, all of your precious metals, you can print me hundred dollar bills for a thousand years and you would never have enough to pay me for my cultural spirit."[1269]

Responsibility for Habitat Protection and Restoration. Tribal members feel a strong responsibility to protect and restore habitat because they believe these resources were placed on the land by the Creator. "[S]o when we witness things like the degradation of our water, like the degradation of our air, we don't want to relocate, we don't want to go to some other place. We want those things to stop. We want to have this land for the generations of our younger people."[1270] Mr. Dick said, "[I] know all four tribes have production programs that are all aimed at rebuilding the runs. And, you know, the sentiment always is, on the tribal side, that we're not just rebuilding the runs for the tribes; we're working to rebuild them for everybody."[1271]

Restoring habitat is a very important part of rebuilding diminished salmon populations, but there are other benefits. When habitat is restored, it creates cleaner and cooler water, which

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[1262] Tr. 3924, vol. 17.
[1263] Tr. 3927, vol. 17.
[1264] Tr. 3917, vol. 17.
[1265] Tr. 4002:10-16, vol. 17.
[1266] PFT of Ellis 9.
[1267] Tr. 3826, vol. 16.
[1268] PFT of Ellis 10.
[1269] Tr. 3924, vol. 17.
[1270] Tr. 3994-95, vol. 17.
[1271] Tr. 4011, vol. 17.

in turn results in cleaner air.[1272] The Tribes are strong supporters of making habitat improvements. They are working to establish co-management of the fisheries to rebuild the salmon runs so that all aspects of the salmon's life cycle come into play, not just the harvest.[1273] In emphasizing these goals, CRITFC fisheries scientist Stuart Ellis cautioned that the benefits of habitat improvements are very long term in nature and restoration has some inherent uncertainty. It takes an enormous effort to fix a habitat to where it is a fully functioning, good ecosystem again. It is also very expensive.[1274]

Treaties and Indian Fishing. Four tribes entered into similar treaties with the federal government, the Warm Springs, Nez Perce, Umatilla, and the Yakama Nation have similar fishing rights.[1275] Thus, the Tribal Parties are treaty tribes. These Tribal Parties consider the lands ceded in the treaties to be subject to their reserved rights according to the language of the 1855 treaties. Non-treaty tribes have separate smaller arrangements that are different in origin and extent.[1276] The Council makes no findings or legal conclusions about the Tribal Parties' reserved treaty rights in this proceeding, beyond recognizing that, since the 1855 treaties were signed, tribal members contend they have continuously practiced their fishing, hunting, gathering, and observance of their sacred places in the areas pertinent to this application in accordance with their understanding of their reserved treaty rights.

Treaty and non-treaty fisheries in the main-stem Columbia River are managed according to a court-ordered agreement under the *United States v. Oregon* federal court case.[1277] The Columbia River between Washington and Oregon is divided into different zones for fishery management purposes. Zone 6 is the stretch of the Columbia River between the Bonneville and McNary Dams. For commercial fishing purposes, Zone 6 is considered an exclusive commercial fishing area for treaty tribes.[1278] Numerous witnesses testified to fishing with their families in Zone 6 using platforms, scaffolds, or gillnets.[1279] The Tribes also have a small bank fishery just below Bonneville Dam, which at times can be used for commercial purposes.[1280] All of the locations where the Tribes currently fish commercially are upriver of the proposed VEDT.[1281]

Tribal people claim fishing rights that go down to the mouth of the Columbia River and they have never abandoned their claim.[1282] The Tribes have not gone to court to assert treaty

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[1272] Tr. 3836, vol. 16.
[1273] Tr. 4009-10, vol. 17.
[1274] Tr. 3813, vol. 16.
[1275] Non-treaty tribes have separate arrangements that are different in origin and extent. Tr. 3790, vol. 16.
[1276] Tr. 3945, vol. 17.
[1277] Tr. 3780, vol. 16.
[1278] Tr. 4008, vol. 17; Tr. 4329-30, vol. 18; PFT of K. Brigham 1.
[1279] *See, e.g.*, Tr. 3939, vol. 17; Tr. 3998, vol. 17.
[1280] Tr. 3807, vol. 16.
[1281] Tr. 3807, vol. 16.
[1282] Tr. 3793, 3808-09, vol. 16; Tr. 3827, vol. 16; Tr. 3924-25, vol. 17; Tr. 4008-09, vol. 17; Tr. 4329-32, vol. 18.

fishing rights downstream of Bonneville Dam.[1283] They have found it more efficient to work out management agreements.[1284]

Potential Tribal Economic Impacts from the VEDT. Historically, Tribal members develop and establish their fishing at very specific locations based upon the way the fishing is done and catch rates. These tribal fishing sites and villages were concentrated near tributary mouths and at cascades and rapids along the Columbia River. Although not completely eliminated, these historic sites have been disrupted by the development of the hydro system and by the development of the railroad lines along the river, but fishers still maintain a system of site based fishing activity.[1285] The platform fishery and the set gillnet fishery are shore-based. Specific conditions such as back eddies and deeper water affect catch rates.[1286]

Tribes maintain a system where fishers have the option of registering their platform and gillnet sites with their tribe as a way to document their claim to that site. The Yakama Nation registers the commercial gillnet sites all up and down the river. A fishing site is where a platform would be built or where a set gillnet would be attached to the shore. The in-lieu treaty fishing access sites are more like campgrounds.[1287] The platforms are not registered but they are established through the traditional means of recognized usage, and the sites are associated with either an individual or a family. Fishing sites can be handed down through families and transferred through marriage much like other property. Tribal fishers are very territorial. One witness testified that he lost his brother because he was beaten with steel bars over a fishing dispute. If an area was closed because of a spill and fishers had to relocate, it would be difficult or impossible for them to access another equally productive fishing site or even to access another site at all.[1288]

"In-lieu" fishing sites were built by the Army Corps to replace fishing villages that were flooded by the construction of the Bonneville Dam. The original sites were built approximately in the 1950s, but it wasn't nearly the acreage that was promised to the Tribes. More new sites were built in the late 1980s through 2000s, with the last one being completed about five years ago. The Army Corps had to find land that was available for purchase. Some of the sites are close to treaty fishing areas, but a lot of them are not. Therefore, the in-lieu treaty fishing access sites themselves are not completely representative of where the actual fishing sites are. Frequently tribal members must drive along dirt roads that run along the railroad tracks to access their fishing sites.[1289]

[1283] Tr. 4354-55, vol. 18.
[1284] Tr. 3809, vol. 16.
[1285] PFT of Ellis 3-4.
[1286] Tr. 4000, vol. 17.
[1287] Tr. 4007, vol. 17.
[1288] Tr. 4000, vol. 17; PFT of Ellis 3-4; Tr. 3993, vol. 17.
[1289] Tr. 4008, vol. 17.

Increased train traffic raises a safety issue in many cases where fishers have to cross the tracks to access their fishing sites. Testifying tribal members expressed their worries about safety and increased train traffic. Some witnesses even had family members killed crossing the tracks. These fishing sites are often in remote areas without developed, safe railroad crossings.[1290] The in-lieu access sites have normal railroad crossings but the more remote fishing sites often have nothing. Tribal members must cross the tracks at many sites, some without crossing arms or any signals at all. There are also more parked trains than in the past. It is quite difficult for fishers to get over a parked train with their salmon catch.[1291] Fishers consider the oil trains dangerous either full or empty.[1292] An increase in train traffic traveling in both directions would make this dangerous situation even more dangerous. Increased train traffic may also impede access to boat launches and fishing sites and cause delays in fishing activity.[1293]

Harvest, Sales, and Compensatory Damages. Tribal fishers have three main reasons why fishing is a crucial part of their lives. Ceremonial fishing is done primarily in the spring and is typically managed through a system of permits. None of these fish may be sold. Tribal subsistence fishing includes fishing for personal and family use. This could also include barter among federally recognized tribes. Tribal fishers are allowed to take fish through subsistence fishing the entire year. Tribal commercial fishing is done for the purpose of trade with non-Indians.[1294]

Many tribal fishers depend on fishing for a significant portion of their income.[1295] For many fishers, it is their sole source of income. If commercial fishing is not available to these fishers, it is a significant economic loss, particularly for tribal communities with high unemployment rates. For these reasons, the Tribes have invested very heavily in efforts to increase the marketability as well as the economic value of their commercial catch. They are upgrading their equipment and skills, and are doing a much better job at taking care of the tribal catch, such as having ice much more readily available. As a result of these efforts, prices for fish have gone up.[1296]

Mr. Gregory Challenger testified that natural resource damages are compensable under federal law for losses of direct and passive uses, including fishing. The Coast Guard has established a claims process that requires the fisher to produce a record of their earnings from previous years.[1297] However, if a fishing site closes, it is very difficult for tribal members to file claims and receive compensation for the closure. A recent effort that illustrates this

[1290] Tr. 3999, vol. 17.
[1291] PFT of K. Brigham 1-2; PFT of R. Brigham 1-2.
[1292] Tr. 4015-17, vol. 17.
[1293] PFT of Ellis 11.
[1294] PFT of Ellis 4; Tr. 3787-88, vol. 16; PFT of Dick 5.
[1295] PFT of Dick 5-6.
[1296] Tr. 3794-95, vol. 16; Tr. 3811, vol. 16.
[1297] PFT of Challenger 33-34; Tr. 1931-41, vol. 8.

difficulty involved the collision of two military jets that collided and fell into the river near Arlington, OR, and Roosevelt, WA. Although a tribal commercial gillnet fishery was in operation at the time, a portion of the river was closed. On that occasion, it was difficult to get tribal members to file claims for compensation.[1298]

One major reason why it is difficult for tribal members to receive compensation for natural resource damages is that they are not very good about documentation and many run their business in a traditional, less formal way. When tribal fishers sell fish to wholesale buyers, receipts that are called "fish tickets" are provided with the sale. However, many sales are made directly to retailers, restaurants, and casinos, as well as directly to the public and these buyers do not provide fish tickets. There is also usually little documentation for ceremonial or subsistence fishing.[1299] Data is collected on the harvest management side and catch estimates are developed, but the data doesn't go down to specific fishers. Anonymity is a concern because tribal members are fearful that the information will be used against them in the future somehow.[1300] The second reason why it is difficult for tribal members to receive compensation when a fishing site is closed is because of the community's strong negative views of the idea of selling your fishing rights. This goes back to the history of the payments relating to construction of The Dalles Dam. Tribal witnesses spoke of their belief that the value of the money is small compared to what is actually lost to tribal people through losses of resources and culturally valuable assets.[1301] In the case of the spill at Fifteen Mile Creek, tribal members did not receive any compensation afterwards.[1302]

If a fishing site has been closed because there is an oil spill, and there is residual oil in the sediment or on aquatic plants, fish are affected. They have an acute sense of smell and will probably avoid the area. That will impact the catch numbers. Mr. Dick told about the "big stigmatism with spills and contamination" making tribal fishers leery and cautions about going back into the area to fish again.[1303] The economic value of the catch is also likely to be diminished if the perception of Columbia River fish as a high quality fish is diminished.[1304] Tribal members are concerned that they have invested a lot of funds and made a lot of effort, along with BPA, for salmon restoration. An oil spill could eliminate the gains from those efforts. Mr. Lumley pointed out that, in the development of the Columbia River hydropower system, efforts aimed at the protection of endangered species affected by the construction of the dams would prove inadequate because the planning calculations did not take into account impacts from the proposed VEDT. He said, "if this proposal moves forward, it could call into question the entire biological opinion and its validity and potentially could even undo several

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[1298] Tr. 4002-03, vol. 17.
[1299] Tr. 4003, vol. 17.
[1300] Tr. 4003-04, vol. 17.
[1301] Tr. 4004-05, vol. 17.
[1302] Tr. 3923-24, vol. 17.
[1303] Tr. 4005-06, vol. 17.
[1304] PFT of Ellis 11; Tr. 1940, vol. 8.

fish and wildlife programs that have taken great success of late in bringing back some of these endangered fish."[1305]

Michael Broncheau manages the CRITFC's Fishing Site Maintenance Department, which provides operations and maintenance services to the tribal in-lieu fishing sites and treaty fishing access sites.[1306] He noted that the three geographic response plans (GRP) between Bonneville and McNary Dams anticipate using the in-lieu fishing sites and some treaty fishing access sites to stage oil recovery operations in the event of an oil spill. Neither CRITFC nor its member tribes officially participated in the development of these GRPs.[1307] When tribal members first saw the GRPs about three years ago, they commented that it was not a good idea to use these sites as oil collection points. The oil could have a lasting effect on these sites for years to come. Some of these sites have been used as fishing sites for 10,000 years. Tribal members saw that this was not changed when they went to a significant oil training program last year and commented on it.[1308] In the GRP that includes Cook's Landing, for example, the proposal is to put a boom and collect oil using the rock that protects the small dock and boat ramp. If Cook's Landing is used, oil would get into the rock groin and contaminate that area for months or probably years to come. It would likely have to be removed down to the base and then cleaned and reconstructed. The fishing platforms at those particular sites could not be used for years to come.[1309]

Tribal members are concerned that the in-lieu sites are very limited and that fact is not being taken into account. For example, railroad tracks are immediately adjacent to the Cook's Landing in-lieu fishing site. Tribal dwellings are located within 30 yards of the railroad tracks. The only egress is by a road that crosses the BNSF railroad tracks at grade or by a boat ramp to the Columbia River by watercraft. Approximately 25 people reside there year-round. The Underwood in-lieu fishing site is within 100 yards of the BNSF railroad tracks. State Route 14 separates the Underwood site from the BNSF railroad tracks. Neither of these sites have fire hydrants or other firefighting water supply capabilities, nor firefighting apparatus on site.[1310] There are 15 fishing sites on the Washington side that are immediately adjacent to BNSF tracks. All of these sites require passage over or under rail, or by use of a boat for access.[1311] Among other concerns, there are no emergency notification procedures to protect tribal members using these sites in the event of a derailment and oil spill. There are no tribally-authorized plans to evacuate residents from these sites and no plans for sheltering tribal members that might be evacuated in case of a spill. And there is no assessment of how a

[1305] Tr. 4353, vol. 18.
[1306] PFT of Hicks & Broncheau 2; Tr. 4263, vol. 18.
[1307] PFT of Hicks & Broncheau 9-10.
[1308] Tr. 4274-75, vol. 18; Tr. 4279, vol. 18.
[1309] Tr. 4274-77, vol. 18.
[1310] PFT of Hicks & Broncheau 3-4.
[1311] PFT of Hicks & Broncheau 4.

derailment and spill would impact dispatch services of the CRITFC Enforcement Department.[1312]

Federal, state, and county agencies are concerned about their limited ability to respond in case of a train derailment and oil spill. Tribal emergency response resources along the Columbia River are essentially non-existent.[1313] At some of the sites, there is no cell phone coverage.[1314] Information and training were offered at the training session, but no funding, equipment, or personnel.[1315]

The Tribal Parties argue that, since time immemorial, they have lived along and survived on the resources the Columbia River provides, especially its fish resources. They point out the history that the river has been impacted over the last century by the many projects and developments manipulating the river's resources for short-term gain, while leaving a long-term legacy of pollution and damage for tribal members to contend with. Tribal witnesses testified at length about their efforts at habitat restoration, which tribal people consider a sacred duty. They argue that no mitigation can completely restore habitat to full function within the time scale of the VEDT, leaving tribal peoples to complete the job of habitat restoration for decades into the future, if it's possible at all.

c. Summary of the Council's Analysis of Tribal Impacts

The Tribal Parties consider the lands ceded in the treaties to be subject to their reserved rights according to the language of the 1855 treaties so that they can practice their culture, continue the Tribes' way of life, and plan for their future.[1316] The Council is convinced by the credibility of testimony by the tribal witnesses who need access to these resources, and who study and work to restore them, and who revere the Columbia River for cultural reasons. We have no doubt that the Tribal parties would be particularly impacted by the VEDT, both in terms of access limitations from over one-mile-long crude oil trains and from the potential for habitat and fish resource damage from accidents that cause fires and oil spills. It would not be possible to devise mitigation that could eliminate or even sufficiently reduce or compensate for these risks.

In addition, rail accidents and even maintenance activities can damage cultural sites that are important to tribal members' ability to reference their history and connection to place. We agree that these resources' value cannot ever completely be restored excavation moves artifacts and takes away their connection to a particular spot. The value of the resources along the Columbia River is beyond monetary. These resources are priceless, not only to Washington

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[1312] PFT of Hicks & Broncheau 8; Tr. 4305, vol. 18.
[1313] PFT of Hicks & Broncheau 9.
[1314] Tr. 4274, vol. 18.
[1315] PFT of Hicks & Broncheau 10.
[1316] Tribal Parties Post-Hr'g Br. 8.

tribal peoples, but to all the people of the State of Washington and to the State of Oregon as well.

The Council moves these impacts into its balancing analysis in Section IV.

3. Clark County Jail Work Center

The JWC is a public facility that is directly impacted by the VEDT. The VEDT would surround the JWC on three sides. There would be crude oil piping along the northern and eastern boundaries of the JWC property coming from the VEDT unloading facility. [1317] Clark County Public Utility Natural Gas Generation facility is located directly north of the JWC. In addition, the Port plans to construct an electrical substation adjacent to the JWC and in close proximity to the piping bordering the JWC property.

a. Summary of Parties' Positions

Clark County alleged risks to inmates, workers, visitors, and first responders. Clark County offered testimony regarding the risks posed by the VEDT to the JWC inmate population and to workers and visitors. Clark County describes the risks as "quantifiable and unacceptable."[1318] In addition, Clark County presented testimony that in the event of an incident, emergency response resources would be overwhelmed and evacuation plans would be unrealistic given the inmate population at the JWC, all of which would threaten the safety of the inmates, workers, and emergency responders.[1319]

Tesoro Savage argues that Clark County assumed the risk of what is a low probability event. Tesoro Savage argues that Clark County assumed these risks when it sited the JWC in a heavy industrial area. In addition, Tesoro Savage offered testimony that the probability of an incident is low, and the impacts of an incident overstated.[1320] It further argues that the emergency plans for evacuation and shelter-in-place are adequate. Finally, Tesoro Savage argues that because Clark County's expert did not testify live, but only submitted pre-filed testimony, Tesoro Savage's own expert's testimony is "unrefuted" and should be accepted without challenge.[1321]

b. Risk analysis

Both Clark County and Tesoro Savage presented a risk analysis regarding the probability of an incident and its impact on the inmates and employees[1322] at the JWC.

[1317] PFT of Peterson 2-3; Tr. 283-86, vol. 2.
[1318] Clark Cty. Post-Hr'g Br. 1.
[1319] Clark Cty. Post-Hr'g Br. 1.
[1320] Applicant Post-Hr'g Br. 47.
[1321] Applicant Post-Hr'g Br. 49-50.
[1322] There could also be an impact to visitors to the JWC.

Clark County's Risk Analysis. Clark County presented the testimony of Eric Peterson, a Senior Principal Engineer in the Technical Safety and Risk Department of MMI Engineering, Inc.[1323] Dr. Peterson studied the likelihood of adverse events (spills, explosions, or other environmental threats) that could present a risk to human health and safety for inmates, workers or visitors at the JWC. He analyzed: (1) the risks presented by transporting, transferring, and storing crude oil the VEDT; and (2) potential mitigation options.[1324] He performed both a consequence-based screening assessment and a QRA.[1325]

Hazard from the pipeline. The objective of the screening assessment was to evaluate the potential for fire, toxic releases, and explosion events at the VEDT based on planned infrastructure and operations.[1326] Dr. Peterson used six hazardous scenarios.[1327] Using what Dr. Peterson describes as conservative assumptions, he found that the most likely hazard would be from the planned 24–30 inch pipelines on the northern and eastern boundaries of the JWC property.[1328]

The result of this assessment showed an unacceptable risk level.[1329] The U.S. has not adopted explicit land use planning risk criteria relating to oil terminals such as the VEDT, but typically relies on development and evaluation of criteria on an individual project and location basis. It is common to use metrics from other countries as a reference; such as the U.K. Health and Safety Executive (HSE) and the Netherlands External Safety Decree. In the U.K. HSE societal risk guidance, a risk level of 1 in a million (1 x 10^{-6}/yr.) would generally be considered "broadly acceptable" and would be the appropriate minimum risk threshold for the location of the VEDT in relation to the JWC.[1330]

Dr. Peterson's reports his QRA results in terms of Location Specific Individual Risk (LSIR) to any individual located within the JWC. LSIR is the expected frequency of a fatality if an individual is located in a particular area for 24 hours a day, 365 days a year. The base case LSIR results for the JWC were estimated as 2.35 x 10^{-5}/yr. (1 in 42,553) for people outside and 1.62 x 10^{-5}/yr. (1 in 61,728) for people within the site buildings. As referenced above, this risk range exceeds the "broadly acceptable" risk of 1 in a million (1 x 10^{-6}/yr.). This risk range also exceeds 1 in 100,000 (1 x 10^{-5}/yr.), which Dr. Peterson considers to be generally unacceptable for off-site facilities such as the JWC.[1331]

[1323] Dr. Peterson has undergraduate degrees in both physics and mathematics, an M.S. in geophysical sciences, and a Ph.D. in chemical engineering. He has over 30 years' experience in the fields of physics, mathematics, and chemical engineering, most recently applied to technical process safety and risk for the oil and gas industries. PFT of Peterson 1-2.

[1324] PFT of Peterson 3; Ex. 2001-000001-63-CLA.

[1325] PFT of Peterson 3; Ex. 2001-000001-63-CLA

[1326] PFT of Peterson 3; Ex. 2001-000001-63-CLA

[1327] PFT of Peterson 4.

[1328] PFT of Peterson 6.

[1329] PFT of Peterson 9.

[1330] PFT of Peterson 8.

[1331] PFT of Peterson 9.

Hazard from the planned electrical substation. To account for the electrical substation that the Port plans to install between the oil pipelines and the JWC, Dr. Peterson conducted a sensitivity of risk assessment in which ignition probabilities were modified to take the additional risk into account.[1332] The sensitivity case LSIR results increased to 3.64×10^{-5}/yr. (1 in 27,473) for people outside the building and 2.45×10^{-5}/yr. (1 in 40,816) for people inside the building. The presence of the electrical substation ignition source increased the risk to the JWC population by approximately 50 percent. This increase in risk is driven by the increase in probability of ignition (which would result in a fire) due to the proximity of the electrical substation. This heightened level of risk is well above what is considered broadly or even generally acceptable in the industry and, in Dr. Peterson's opinion, requires necessary mitigation as a condition of approval. Tables 3-3[1333] and 3-4[1334] in Exhibit B provide LSIR breakdown by event type updated to include the electric substation.[1335]

Tesoro Savage's Risk Analysis. Tesoro Savage presented the testimony of J. Kelly Thomas, Vice President and Blast Effects Section Manager with Baker Engineering and Risk Consultants, Inc. (BakerRisk).[1336] Dr. Thomas and his team completed a Facility Siting Study (FSS) and QRA. BakerRisk used an FN curve to determine and express risk. The F is frequency, the N is consequence; in this case, fatalities. Exhibit 118, prepared by BakerRisk, shows the relationship between the frequencies of events that would cause a prescribed number of casualties.[1337]

In looking at the FN curve for the offsite population (persons who are outside the VEDT), the X axis is the N, the consequence in this case, fatalities, and on the Y axis is the frequency with which that would occur be exceeded. The black line represents the facility risk profile, the green and the red lines represent risk tolerance criteria. The red line represents a risk tolerance criteria that if that is exceeded, based on normal accepted industry risk tolerance, you would need to institute additional preventive and/or mitigation to bring the risks down.[1338]

Dr. Thomas explained the meaning of Exhibit 0118-000006-TSS. He stated that if a risk profile falls in the space between the red and the green lines, actions to prevent or mitigate the risk is necessary if such action is practical and cost effective. If the risk is below the lower green line, then the risk is generally acceptable "as is" without further mitigation or prevention actions.[1339] Based on this analysis, Dr. Thomas concluded that the risk profile for the VEDT is

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[1332] PFT of Peterson 10.

[1333] Ex. 2001-000023-24-CLA.

[1334] Ex. 2001-000025-CLA.

[1335] PFT of Peterson 10-11.

[1336] Dr. Kelly has undergraduate, masters, and Ph.D. degrees all in nuclear engineering. His primary focus has been on the development and application of empirical, analytical, and numerical models for the characterization of flammability and explosion phenomena. PFT of Thomas 1, Attach. A.

[1337] Tr. 1243, vol. 6.

[1338] Tr. 1243-44, vol. 6.

[1339] Tr. 1243-44, vol. 6; Ex. 0118-0000060-TSS.

well below the lower risk tolerance criteria, meaning that the facility is acceptable without further prevention or mitigation actions for offsite populations.[1340]

In comparing the BakerRisk analysis and that of Dr. Peterson, Dr. Thomas stated that his analysis was more complex and detailed. His analysis looked at the specific location of the piping runs, which he assumed were buried, as opposed to Dr. Peterson who assumed the pipes were elevated.[1341] In addition, BakerRisk looked at pressure of the fluid, with a lower source pressure than assumed by Dr. Peterson. Assuming the higher source pressure will give you a higher release rate, and result in a larger thermal hazard.[1342]

In discussing Dr. Peterson's analysis of the release from the pipeline that runs from the rail unloading area to the tank storage area, Dr. Thomas stated that it shows the predicted overpressure contours are a half of 1 and 3 psi. This shows the maximum predicted overpressure as predicted by Dr. Peterson for releases from the pipeline leading from the rail unloading area to the tank storage area. The releases along that line are being characterized by the single point. The nearest building lies outside of the half psi contour. Based on the building type that Dr. Peterson considered, Dr. Thomas concluded that would indicate no occupant vulnerability in any of these buildings for this release scenario. So he concluded that Dr. Peterson is considering somebody outside of a building standing essentially at the fence line.[1343]

BakerRisk did the analysis based on 20 hazardous scenarios.[1344] Dr. Thomas stated that they used conservative assumptions such as assuming that all buildings were the weakest type of industrial building and that hydrogen sulfide concentrations were 5000 ppm. They concluded that there was a low risk from toxic exposure, for both offsite and onsite.[1345]

BakerRisk used its own safe site code to assess consequence and the QRA tool to pair that consequence with event frequencies to calculate risk. Dr. Peterson used the Process Hazards Analysis Software Tools (PHAST) code, which Dr. Thomas admitted is widely accepted in the industry. However the PHAST code results in higher consequences and risk than the BakerRisk model.[1346]

In addition, the BakerRisk analysis made certain assumptions regarding population reaction to an event. BakerRisk's analysis assumed that when a hazard appears, people will immediately begin to leave the area at 7 to 10 feet per second. Dr. Peterson however, opined

[1340] Tr. 1244, vol. 6.
[1341] Tr. 1249-51, vol. 6.
[1342] Tr. 1251, vol. 6.
[1343] Tr. 1255-56, vol. 6.
[1344] Tr. 1258, vol. 6**.**
[1345] Tr. 1260-61, vol. 6.
[1346] Tr. 1264-66, vol. 6.

the person would stand there for a minute and a half and then moved from the hazard.[1347] In addition, in terms of fatality, Dr. Thomas's assessment accepts a higher fatality risk if additional mitigation would not be practical or cost effective. [1348]

Dr. Thomas agreed that the location of the planned electrical substation increases the probability of ignition and fire but does not believe it that the increased risk would bring the risk outside the tolerance criteria.[1349]

On cross-examination, Dr. Thomas stated that he considered the JWC to be an indoor population area. He agreed that there are staff and visitors to the JWC, which would result in outdoor population as well. In addition, Dr. Thomas did not take into account any expansion of the JWC. Dr. Thomas agreed that accounting for outdoor activity and expansion could change the predicted risks.[1350]

Dr. Thomas was also asked about whether he calculated the vulnerability and non-escape probability with respect to the half LFL and the LFL distances. Dr. Thomas stated that he assumed that people inside buildings would stay put and people outside buildings would try to move away.[1351]

c. Emergency Response Issues

Clark County's Evidence. Clark County presented the testimony of Clark County Sheriff Chuck Atkins.[1352] Sheriff Atkins is concerned about the effect of a VEDT incident on JWC inmates and employees because the JWC is surrounded on three sides by the VEDT. Sheriff Atkins explained that Clark County has a "paramount custodial responsibility" to protect inmates. In an emergency, shelter-in-place may not be the correct response, with a required evacuation taking priority over other routine law enforcement duties.[1353] The resources needed to accomplish an evacuation would "indefinitely strain" the ability of the County Sheriff's Office to respond to other emergency calls.[1354]

Vancouver's Evidence. Vancouver presented the testimony of Scott Johnson, Emergency Management Division Manager for CRESA, which is an interlocal governmental

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[1347] Tr. 1269-70, vol. 6.
[1348] Tr. 4517, 4620, vol. 19.
[1349] Tr. 1281-82, vol. 6.
[1350] Tr. 1291-92, vol. 6.
[1351] Tr. 1295-96, vol. 6.
[1352] Sheriff Atkins has been in law enforcement in the County for 37 years. PFT of Atkins 2.
[1353] PFT of Atkins 4.
[1354] PFT of Atkins 4-5.

agency providing dispatch, emergency communications support, and emergency management for the seven cities in Clark County and the County itself.[1355]

Mr. Johnson testified that dealing with "special needs" populations requires different emergency management planning and evacuation processes. "Special needs populations" are people who during evacuation or sheltering have unique needs, such as the need for medical assistance at their sheltering locations. Incarcerated persons have special needs related to adequate security, segregation during transport, and physical site security by law enforcement at shelter locations. Thus, the JWC is a special needs population during evacuation and sheltering.[1356]

Mr. Johnson testified that evacuation of the JWC would pose challenges because resources needed to evacuate the JWC would simultaneously be needed to provide emergency response in the impacted area. The roads are narrow at the JWC location and CRESA would have to get resources into the JWC area at the same time outbound evacuation was occurring. Unlike most other populations in an emergency, the JWC population is not mobile and high security transport would be required.[1357]

Tesoro Savage's Evidence. Mr. Rhoads, in response to questions about evacuating the JWC, disagreed that an automatic evacuation would necessarily be the best course of action. Shelter-in-place is a common tactic for sensitive populations and may be better suited for an incident response.[1358] He testified that JWC exposure to a thermal event from the VEDT is unlikely and that, if it occurred, it would not be significant enough to require evacuation. He viewed it as imprudent to remove people from the JWC through a smoke plume. If an evacuation is required, he identified "numerous" evacuation points.[1359]

d. The Legal Status of the JWC

The JWC is a unique facility in close proximity to the VEDT. It poses unique challenges as the inmate population is within the care and custody of the County Sheriff's Office. Inmates are entitled to the protections afforded in the United States Constitution[1360] although rights are subject to restrictions and limitations.[1361] Prison officials are given great

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[1355] Mr. Johnson is responsible for administering the emergency management program with assistance in planning and preparing for, mitigating against, responding to and recovering from natural and technical disasters. Mr. Johnson has extensive experience in emergency management and emergency response. Tr. 316668, vol. 14.

[1356] Tr. 3195-96, vol. 14.

[1357] Tr. 3196, vol. 14.

[1358] Shelter-in-place means that you shut off the air intakes and windows and other sources of outside air and you stay where you are at until the incident is deemed safe. Tr. 2142, vol. 9.

[1359] Tr. 2142-43, vol. 9.

[1360] *Shaw v. Murphy*, 532 U.S. 223, 228-29, 121 S. Ct. 1475, 149 L. Ed. 2d 420 (2001); *Mauro v. Arpaio*, 188 F.3d 1054, 1058 (9th Cir. 1999) (en banc).

[1361] *Shaw*, 532 U.S. at 229.

deference when analyzing the constitutional validity of prison regulations.[1362] Despite limitations on prisoners' constitutional rights and the deference accorded to prison officials, "when a prison regulation or practice offends a fundamental constitutional guarantee, federal courts will discharge their duty to protect [prisoners'] constitutional rights."[1363]

The Eighth Amendment prohibits the imposition of cruel and unusual punishments and embodies "broad and idealistic concepts of dignity, civilized standards, humanity and decency."[1364] There is no static test that courts apply to determine whether confinement conditions violate the Eighth Amendment. Courts look to the "evolving standards of decency that mark the progress of a maturing society."[1365]

Prison officials have a duty to take reasonable steps to protect inmates from physical abuse.[1366] To establish a violation of this duty, the prisoner must establish that prison officials were "deliberately indifferen[t]" to serious threats to the inmate's safety.[1367] Prison officials may not escape liability because they cannot, or did not, identify the specific source of the risk; the serious threat can be one to which all prisoners are exposed.[1368]

Courts have looked at whether fire safety can be a concern under the Eight Amendment generally hold that fire safety can be an Eighth Amendment concern, but not every fire code violation would violate the constitution. In *Santana v. Collazo*,[1369] in looking at conditions at a juvenile facility, the Court stated that there is no question that fire safety is a legitimate concern under the Eighth Amendment. Persons who are involuntarily confined have a constitutional right to safe confinement conditions.[1370] The state has a duty to ensure that safety, because the individuals concerned, by reason of the confinement, cannot provide for their own safety.[1371] *French v. Owens*[1372] dealt with conditions at an adult correctional facility and the Court, citing *Santana*, agreed that fire safety and occupational safety are both legitimate concerns under the Eight Amendment.

[1362] *Overton v. Bazzetta*, 539 U.S. 126, 132, 123 S. Ct. 2162, 156 L. Ed. 2d 162 (2003).

[1363] *Mauro*, 188 F.3d at 1058 (quoting *Turner v. Safley*, 482 U.S. 78, 84, 107 S. Ct. 2254, 96 L. Ed. 2d 64 (1987)).

[1364] *Estelle v. Gamble*, 429 U.S. 97, 102, 97 S. Ct. 285, 50 L. Ed. 2d 251 (1976) (citation omitted).

[1365] *Rhodes v. Chapman*, 452 U.S. 337, 346, 101 S. Ct. 2392, 69 L. Ed. 2d 59 (1981) (quoting *Trop v. Dulles*, 356 U.S. 86, 101, 78 S. Ct. 590, 2 L. Ed. 2d 596 (1958)).

[1366] *Farmer v. Brennan*, 511 U.S. 825, 833, 114 S. Ct. 1970, 128 L. Ed. 2d 811 (1994).

[1367] *See Farmer*, 511 U.S. at 834.

[1368] *See Farmer*, 511 U.S. at 843; *see Wallis v. Baldwin*, 70 F.3d 1074, 1076-77 (9th Cir. 1995) (a prisoner's exposure to asbestos is sufficient to meet the objective prong of the Eighth Amendment).

[1369] *Santana v. Collazo*, 714 F.2d 1172 (1st Cir. 1983).

[1370] *Youngberg v. Romeo*, 457 U.S. 307, 315, 102 S. Ct. 2452, 73 L. Ed. 2d 28 (1982).

[1371] *Cf. Estelle*, 429 U.S. at 103-04.

[1372] *French v. Owens*, 777 F.2d 1250 (7th Cir. 1985).

e. Summary of the Council's Analysis of JWC Issues

The risk analysis evidence presented by Dr. Thomas and Dr. Peterson are both compelling. They used different modeling to produce their conclusions. Dr. Thomas admitted that the modeling analysis used by Dr. Peterson is accepted in the industry. We find that both modeling methods are valid ways of determining risk.

Dr. Thomas and Dr. Peterson used different assumptions in their modeling and to derive their conclusions, both believe they used conservative assumptions. Dr. Thomas's conclusions reflect a much lower level of risk and consequential harm than that presented by Dr. Peterson. However, Dr. Thomas made a number of incorrect assumptions that caused his conclusions to be less credible than that of Dr. Peterson's conclusions.

Dr. Thomas assumed that all the piping in the vicinity of the JWC is buried. He stated that Dr. Peterson's conclusion about a longer distance to lower flammability limit leads to a higher consequence and risk associated with flash fires and vapor cloud explosions, which could lead to an increased thermal radiation predication for pooling jet fires, is a result of Dr. Peterson's assumption that the pipes are not buried but are at 2 meters high.[1373] Conversely, assuming the pipes are buried reduces the risk level in Dr. Thomas's model. However, Dr. Thomas is incorrect in his assumption, in that the pipes are not buried as confirmed by David Corpron. Mr. Corpron not only confirmed this fact, but would not commit to burying the pipes to lower the risk and consequences of an event.[1374]

Dr. Thomas's second incorrect assumption was that inmates, employees, and visitors would not be outside at the JWC building. This assumption lacks common sense. There are staff and visitors that come and go from the facility, as well as the opportunity for the inmates to be outside the building. When taking into account the outside population, Dr. Thomas admits his predicted risks to the JWC population would increase.[1375]

In the event of an incident, Mr. Rhoads testified that the JWC should shelter-in-place. This may or may not be feasible, and it would be unreasonable to not consider what would happen in the event an evacuation was needed, especially in light of the constitutional requirements for the care and custody of inmate populations. In looking at evacuation scenarios, Dr. Thomas based his conclusion that evacuation could be safely done on an assumption that the continuous rate of escape would be three meters per second. However, he conceded on cross-examination that he did not have any facts upon which to base that assumption. In addition, Mr. Rhoads opined that there were sufficient routes in case evacuation was needed.

[1373] Tr. 1265-66, vol. 6.
[1374] Tr. 4885, vol. 21.
[1375] Tr. 1291, vol. 6.

Neither Dr. Thomas nor Mr. Rhoads took into account the special needs associated with evacuating the inmate population identified by both Mr. Johnson and Sheriff Atkins. As set forth above, evacuation would take a significantly longer period of time and considerably more resources than are available. In addition, the JWC outbound evacuation routes may be compromised by first responders using these same routes to enter the VEDT area. Dr. Thomas and Mr. Rhoads also did not take into account the need to find shelter for the JWC population that, unlike the general public, Clark County would have a constitutional duty to care for and secure. The testimony of both Mr. Johnson and Sheriff Atkins is more credible as both are based on personal experience in the Vancouver and Clark County area, while the Tesoro Savage witnesses, although experts, do not have direct and personal knowledge of the area about which they are providing testimony.

Finally, the proposed electrical substation also poses an additional risk to the JWC. Currently it is planned to be located within 200 feet of the JWC. There are industry authorities that advise against co-locating such facilities in proximity to each other. For instance, the CCPS book, "Guidelines for Facility Siting and Layout," Wiley (2003), recommends minimum preparation distances of 250 feet between petrochemical infrastructure, such as the subject oil piping, and electrical substation equipment.[1376]

Based upon the above-referenced heightened modeled risk associated with the co-location of oil terminal infrastructure and an electrical substation and industry guidelines recommending 250 feet of separation, Dr. Peterson stated that it would be unwise and unreasonable to locate these facilities unless there is a minimum separation of 250 feet between the oil piping and the substation if the pipeline is not buried, which it currently is not.[1377] Dr. Thomas agreed that increasing the distance would reduce the ignition probability and therefore decrease the risk.[1378] The Council agrees that the substation should be located at a greater distance to reduce the risk to the JWC population. Tesoro Savage and the Port have not, however, demonstrate that that move will occur.

The Council concludes that risk to the JWC population and subsequent potential damages are not within acceptable risk levels. This includes the potential harm to the JWC population if an event occurs, the barriers to a successful evacuation of the JWC population, and the lack of resources to respond to an incident at the VEDT at the same time that resources are needed for the JWC population. As local government has a higher constitutional standard in relation to the care and custody of the inmate population, the risk and barriers with this proposal are not acceptable.

[1376] PFT of Peterson 11.
[1377] PFT of Peterson 11.
[1378] Tr. 1300, vol. 6.

4. Workers at the Port

The Opponents charge that the VEDT poses risks to workers at the Port and the surrounding community. Jared Smith[1379] has been employed since 2000 as a longshoreman at the Port and is president of the ILWU Local 4. The union has been working at the Port since the 1930s, and has approximately 200 full-time and approximately 100 part-time workers. He worked on maintenance of the conveyor systems, welding, mechanic work for about six years and prior to that he did "ship work."[1380] Mr. Smith said that the ILWU Local 4 intervened in this adjudication when the members looked at the volume of crude oil that was going to be shipped through the Port, and considered the potential of an oil spill at a ship loading operation or if vessels run aground. They were also aware of an incident at Tesoro's Anacortes refinery, in which seven people were killed. The members were concerned about working next to the VEDT site and decided to oppose the project.[1381] Having an understanding of conditions and operations at the Port, Mr. Smith said that he and the members believe there is a high potential for accidents and spills. In addition to other effects of such an incident, there would be a shutdown of operations and the longshoremen would lose work.[1382]

Mr. Smith also described dangers he saw with the designed operations at the site. For example, the VEDT is close to other Port operations, property, and freight being stored. He described the loop track that the Port had already put in place to receive the crude oil trains and explained that the space within the loop is used for purposes unrelated to the VEDT such as storage of wind turbine blades[1383] Union members would be working within the loop tracks and next to the VEDT operations, with a potential that workers would be blocked from escaping should a dangerous incident occur.[1384] Mr. Smith said that the workers did not want to work around oil train cars or an oil terminal. They were concerned after what they had seen at the oil train crash and fire at Lac-Mégantic in Canada. Mr. Smith said the longshoremen were aware of more than ten derailments and explosions around the country. He observed that the mainline track at the Port passes through the middle of a malting plant and a grain elevator. He and the other ILWU Local 4 members had concluded that this was unsafe and they did not want to work where there would be four or more additional crude oil unit trains going by.[1385]

Summary of the Council's Analysis of Risk to Workers at the Port. ILWU Local 4 has approximately 200 full-time and approximately 100 part-time workers who are worried about working next to the VEDT site. Based on their knowledge of operations at the Port, the members believe there is a high potential for accidents and spill that, in addition to other impacts, would lead to a shutdown of operations and lost work for the union members.

[1379] Mr. Smith was a witness and he also represents a party, the International Longshore Warehouse Union Local 4. Tr. 3562, vol. 15.

[1380] Tr. 3562-63, vol. 15.

[1381] Tr. 3563, vol. 15.

[1382] Tr. 3565-66, vol. 15.

[1383] Tr. 3566, vol. 15; Ex. 0001-000214-PCE.

[1384] Tr. 3566, vol. 15.

[1385] Tr. 3566-67, vol. 15.

Union members work within the loop track that will receive the crude oil trains, risking that workers would be blocked from escaping should there be a dangerous incident. Additional trains on the mainline track, which passes through a malting plant and a grain elevator exposes workers to unsafe conditions.

5. Emergency Response Capabilities

The parties disagree about the probability of an incident occurring at the VEDT site and whether the operational safeguards and mitigation measures are adequate to protect the on-site and off-site populations as well as the environment. Finally, the parties disagree about the degree of damage an incident on-site may cause. Those issues are discussed in other sections of this Order. This section looks at the emergency response capabilities if an incident occurs at the VEDT.[1386]

Vancouver. Vancouver is concerned about its ability to respond to an emergency at the VEDT, due to its limited resources. Vancouver City Manager Eric Holmes provided an overall picture of Vancouver's response capabilities and concerns. Vancouver's fire and police resources are already operating at maximum capacity, and an accident involving the VEDT would severely burden Vancouver's ability to provide these services. An evacuation caused by a High Hazard Flammable Trains accident would pose the greatest difficulties for Vancouver, because a disabled train that is 1.5 miles long may block vehicular access. In addition, he stated that Vancouver has one fireboat capable of a riverside rescue. Mr. Eric Holmes also expressed concern about the lack of necessary police resources to handle a large-scale evacuation. And finally, although Vancouver is part of a mutual aid agreement, the availability of adequate assistance is case dependent, and would probably be inadequate. Assistance from Clark County would be limited if an evacuation of the Clark County JWC facility was necessary because virtually every on-duty county officer would be needed for that effort, leaving the County unable to respond to requests for mutual aid. Mr. Eric Holmes concluded that "Vancouver and Clark County probably could not field enough firefighters and police officers to address the community's needs in the event of a serious accident, particularly first responders to address emergencies during the critical early stages described in Michael Hildebrand's pre-filed testimony."[1387]

Spokane. Spokane is concerned that the higher train traffic density associated with the VEDT will impact Spokane's emergency response capabilities. Spokane presented testimony by Brian Schaeffer, the Assistant Chief for the Spokane Fire Department.[1388] Spokane lacks a

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[1386] Response to an emergency along the rail line is discussed in the Rail section. Response to a marine oil spill is discussed in the Oil Spill section. Finally, the emergency response issues dealing specifically with the Jail Work Center is discussed in the Jail Work Center section.

[1387] PFT of E. Holmes 13-14, referencing PFT of Hildebrand (City of Vancouver).

[1388] Assistant Chief Schaeffer has held that position since 2005. Before that he was the Deputy Chief of the City of Yakima from 2003 to 2005. Before that he served as a Fire Chief in Missouri and flight paramedic for an Air Medical Program. He has a Bachelor's Degree in Fire Science from Sterling College in Kansas City and a

Comprehensive Alert and Warning System and the existing system cannot notify key facilities such as schools, hospitals, and assisted living facilities about a derailment, or utilize message sharing and layering, develop plume modeling, or utilize multiple platforms (e.g., phone, text, internet) for message.[1389] The system also does not integrate with the Public Alert and Warning System.[1390] He is also concerned about the fact that the BNSF mainline transects downtown Spokane with thousands of citizens working and living within a one-mile evacuation radius from the mainline. The Spokane Police Department would be responsible to provide coordinated evacuation of the area but the plan was developed to address small-scale incidents, not the evacuation of the magnitude necessary to protect Spokane's citizens in the event of an incident.[1391] Spokane lacks sufficient sheltering capacity for an evacuation.[1392]

a. Fire Response Capabilities

High Hazard Flammable Train Fire Characteristics. As described above, Mr. Hildebrand described the stages of High Hazard Flammable Trains fires and the low odds of being able to actively fight and extinguish such a fire, noting that, to date, no High Hazard Flammable Trains fire has been controlled by using an offensive strategy during Phase I and that fire fighters typically use either a defensive or non-intervention strategy.

- In Phase I, in the first hour following a derailment, fire from cars breached in the derailment may occur, with flames sometimes impinging adjacent tank cars.[1393] Based on actual High Hazard Flammable Trains derailment experience, to date no High Hazard Flammable Trains fire has been controlled by using an offensive strategy during Phase I.[1394]

- In Phase II, two to eight hours after the initial incident, fires typically grow as additional oil is released from impinged tank cars through activation of their pressure relief devices, or through heat-induced tears or rapid release events. Running or unconfined spill fires and releases may occur, and spills may flow into storm drains and other structures creating secondary fires. During this stage, fireballs may occur. [1395] The window for extinguishment closes and the fire fighters have to shift to either a defensive or non-intervention strategy.[1396]

M.P.A. from the University of Missouri. He is currently in the dissertation phase of a doctorate degree through Creighton University. He also serves on multiple local and state public safety and health-related committees and has served in multiple progressive positions handling hazardous materials. PFT of Schaeffer 1.

[1389] PFT of Schaeffer 2.
[1390] PFT of Schaeffer 2.
[1391] PFT of Schaeffer 2.
[1392] PFT of Schaeffer 3.
[1393] PFT of Hildebrand (City of Spokane) 7.
[1394] PFT of Hildebrand (City of Spokane) 7.
[1395] PFT of Hildebrand (City of Spokane) 7.
[1396] PFT of Hildebrand (City of Spokane) 7.

- Phase III, equilibrium is reached when fires are no longer expanding, typically 8-12 hours after the initial incident.[1397] Fires will continue to burn off the available fuel until it achieves equilibrium and is no longer growing in size or scope.[1398]

Vancouver. Chief Molina testified about the capabilities of the Vancouver Fire Department (VFD) in the event of an incident at the VEDT.[1399] Chief Molina stated that an incident at the VEDT could result from the commodity vapors being exposed to a source of ignition, which could cause a sudden, intense fire known as a flash fire. Anyone in close proximity to a flash fire, including firefighters in protective equipment, would be at risk for serious injury or death.[1400] He noted in the pre-filed testimony of Michael S. Hildebrand that these vapors would tend to spread along the ground and collect in confined areas such as storm sewers, causing secondary fires to erupt unpredictably, even hours later, when the vapors come into contact with an ignition source. The dynamics of local winds also affect the spread of flammable vapors. Thus, secondary fires from flammable vapors are particularly dangerous because they may occur at a distance from the main incident, in an area that is considered safe, and they may occur later in time.[1401]

The VFD has 188 sworn firefighters to staff stations, over three shifts, with a minimum 24/7 staffing of 40 on-duty personnel. The VFD runs an average of 70 calls per day or 25,500 runs per year and serves a population of approximately 255,000 people. Any High Hazard Flammable Trains derailment scenario or fire at the VEDT would not stop daily call volume. The VFD would still need to provide service and would rely on mutual aid, not only for response to the regular emergencies and covering stations, but also for the emergency incident at the VEDT. Based on the VFD staff model, a two-alarm commercial fire would require 75 percent of the on-duty complement of 40 firefighters. This would leave two engine companies of six personnel to cover the rest of Vancouver. A recall of off-duty firefighters would take up to an hour.[1402]

The VFD does not staff specialty response assets, such as a Hazmat Team, Technical Rescue Team, or Marine Response. If these assets were required, off-duty personnel would be called in to respond and to staff the specialized equipment. The performance response standard for these services is 60 minutes.[1403]

[1397] PFT of Hildebrand (City of Spokane) 8.

[1398] PFT of Hildebrand (City of Spokane) 8.

[1399] Chief Molina began his fire service career in 1992, culminating in his current position as Fire Chief which he has held since 2011. He has served as both a responder and an incident commander for a variety of emergencies, including hazardous materials incidents. PFT of Molina 1-2.

[1400] PFT of Molina 3-4.

[1401] PFT of Molina 4.

[1402] PFT of Molina 4-5.

[1403] PFT of Molina 6.

Chief Molina did a gap analysis to determine which resources did not exist or were needed to successfully respond to an incident. He found the following.

- Funding is an issue for the VFD. The VFD's ability to fund overtime for a major incident response significantly impact its budget to provide current service levels. The VFD is also constrained in funding overtime to backfill positions to allow staff to attend training.

- The VFD needs additional resources for training in industrial and storage tank firefighting.

- The VFD needs assistance in planning and training with foam and other specialty equipment to improve deployment speed and mobility for use of specialized equipment and specialty teams such as hazmat, technical rescue and marine responses.

The VFD also has limited capacity to respond to an oil mixture fire on a marine vessel at the VEDT. Although the VFD has a quick-response vessel, the vessel has a three-person crew that cross-staffs an engine at Station No. 1. Depending on availability, it could take an hour to call back staff for the vessel. In addition, although the vessel has a 3000 gallon-per-minute water pump capability, it has limited reach, so the vessel may not be able to reach some fire locations. The vessel does not have the quantities of foam that may be necessary. The vessel may also be needed to help ensure other vessels in the vicinity remain at a safe distance, restricting its ability to assist in the fire event.[1404]

Spokane. Spokane Fire Department Assistant Chief Brian Schaeffer opined that Spokane's capability to respond to the size and complexity of a crude rail tank car fire incident would likely be inadequate or ineffective.[1405] Spokane lacks firefighting foam, access to large hose streams, and adequate firefighter staffing.[1406] If a derailment were to occur, the crisis would immediately overwhelm Spokane's Type II Hazardous Materials Response Team.[1407]

Michael Hildebrand is a hazardous materials planning and emergency response expert who co-founded Hildebrand and Noll Associates, Inc., to serve as consultants to industry and government on over 700 projects throughout the world.[1408] He said that the Spokane Fire

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[1404] PFT of Molina 11.

[1405] PFT of Schaeffer 3.

[1406] PFT of Schaeffer 3.

[1407] PFT of Schaeffer 3.

[1408] Mr. Hildebrand is the co-author of nine textbooks including Hazardous Materials: Managing the Incident (4th ed.), which is now in its 27th year of publication. Mr. Hildebrand served as the Chief Technical Officer for Hazardous Materials Training, and Information Services for Columbia Maryland; as the Director of Safety and Fire Protection for the American Petroleum Institute, as a Researcher with the International Association of Fire Chiefs, and as a Hazardous Materials Technician within the National Transportation Safety Board. He served four years as an active duty firefighter and medic with the US Air Force and was an active

Department and Spokane Department of Emergency Management have made good progress in improving their emergency preparedness and response capability to deal with a High Hazard Flammable Trains derailment.[1409] Although Spokane (and the county) has good emergency response capability to deal with a typical flammable liquids emergency, a High Hazard Flammable Trains derailment and fire will present significant challenges, depending on the location and size of the derailment.[1410] Several areas of Spokane would be extremely challenging for the fire department to address, including certain overpasses where subsurface drainage flows downhill and a derailment might place rail cars on top of buildings and an elevated overpass that would drop railcars directly on the Ruby-2 hotel, and expose historic Davenport hotel to fire, with drainage flowing away from the fire area.[1411] Spill control downtown would present an immediate problem if tank cars ruptured and burn, especially when the slope flows away from the derailment site.[1412] If burning crude enters a storm drain in some areas, the fire would spread burning crude to other locations downtown causing secondary or tertiary fires.[1413] Storm drainage even flows into the Spokane River.[1414]

Mr. Hildebrand testified that with the support of mutual aid organizations, the Spokane Fire Department may be able to control a High Hazard Flammable Trains derailment in areas of low population density when evacuation is not an immediate priority; the water supply is adequate and can be placed in service quickly; adequate quantities of foam could be marshaled and placed in service within the first hour of the incident.[1415] In contrast, if the High Hazard Flammable Trains derailment occurred in the city center's vulnerable areas, the Spokane Fire Department would face extreme challenges to simultaneously evacuate the threatened area; implement spill control tactics to prevent burning crude from entering the stormwater system and river; protect buildings and infrastructure from fire; and establish a water supply, master streams, and firefighting foam within an hour. Even if this occurs, Spokane will only be able to manage a controlled burn until the fire reaches equilibrium, at which point the fire may be extinguished.[1416]

Tesoro Savage Evidence. Mr. Rhoads believes that VEDT personnel and first responders have the capability to plan for and respond to an incident at the VEDT. He believes that although a release of crude oil at the VEDT would present VEDT personnel and local emergency responders with many of the same challenges to safely mitigate the spill as a rail-centric event, because the VEDT is a fixed facility, plans can be more detailed and specific. In

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volunteer firefighter for twenty years. He is a Certified Safety Professional, a Certified Fire Protection Specialist, and a Certified Hazardous Materials Manager. He has a B.S. in Fire Safety Analysis and Investigation. PFT of Hildebrand (City of Spokane) 2.

[1409] PFT of Hildebrand (City of Spokane) 8.
[1410] PFT of Hildebrand (City of Spokane) 9.
[1411] PFT of Hildebrand (City of Spokane) 9.
[1412] PFT of Hildebrand (City of Spokane) 9.
[1413] PFT of Hildebrand (City of Spokane) 10.
[1414] PFT of Hildebrand (City of Spokane) 10.
[1415] PFT of Hildebrand (City of Spokane) 10.
[1416] PFT of Hildebrand (City of Spokane) 10.

addition, he believes that the VEDT will have more resources readily available, such as foam immediately available, fire suppression systems, sustainable water supply, and emergency access. Finally, because of the operational safeguards, the incident will be more limited and easier to contain.[1417]

With the designed fire alarm and fire suppression systems, VEDT and local responders would have more resources immediately available to control a spill or fire event. The VEDT can stock foam resources to handle low probability but high significance events such as tank seal fires, pool fires from pipeline or transfer hose releases, pump seal fires and other fire scenarios. Local emergency responders can become familiar with the fire suppression systems, facility layout, and operations personnel that would greatly benefit them if called to a fire or spill at the facility.[1418]

As a fixed location, the VEDT can conduct emergency drills with different release scenarios and can engage and include local emergency responders in these exercises. The exercises can be a table top with command level personnel to full scale hands on drills to maintain firefighter orientation of the facility physical layout, interaction with the facility fire suppression systems and the railcar unloading and tank farm safety systems. Post-exercise debriefs to identify plan weakness and improvements will serve to strengthen the overall response plan.[1419]

Mr. Rhoads also testified about the need to have training for emergency responders to understand the hazards of crude oil, the risks associated with response to a large scale uncontrolled release of crude oil in a fire, and potential violent rupture of a tank car. Training in hazardous materials awareness, operations level and the incident command system are good starting points for this training and are available in a no-cost on-line basis from several sources.[1420]

Mr. Rhoads recommends additional training in effective incident management, which is available through the use of the National Incident Management System including the Incident Command System and Unified Command structure for involving multiple response agencies and industries. Depending upon the response agency, staffing resources, and capability, additional training could include foam firefighting training, air monitoring devices and railroad tank car specialist training. The latter is more appropriate for organized hazardous materials response teams; however, foam firefighting can be done outside of hazardous materials technicians and specialist levels. Local responders should conduct ongoing training and exercise their skills on a regular basis.[1421]

[1417] PFT of Rhoads 32.
[1418] PFT of Rhoads 33.
[1419] PFT of Rhoads 33.
[1420] PFT of Rhoads 40-41.
[1421] PFT of Rhoads 42.

Mr. Rhoads also testified as to the equipment that first responders should have. Typical response equipment and resources for fire suppression activities and vapor suppression activities include adequate water supply to maintain fire flows of 1000–2500 gallons per minute (gpm) for up to an hour. Pumper apparatus and master stream devices capable of delivering large volumes over a long distance will be needed if tank cooling activities are initiated. Other response equipment include an air monitoring device capable of measuring percentages of flammable vapors in air to determine the direction and concentration of vapors as they leave the area of spilled crude oil.[1422]

If foam is used for fire suppression or vapor suppression, it needs to be supported with foam delivery equipment (nozzles, eductors, and aspirators) for both master stream devices and hand lines. The quantity of foam is largely dependent upon the size of the pooled product, the volume of product spilled, and the length of time a vapor suppressive blanket is needed. Established foam application rates developed by the National Fire Protection Association call for a rate of 0.1 gpm per square foot of surface area for 15 minutes. The concentration of the foam (one percent, three percent, or six percent) will determine the amount of foam required. For example, a 100 foot by 50 foot pool of spilled crude oil involved in a fire requires 450 gallons of 6 percent AFFF ATC to supply the 500 gpm for 15 minutes. This does not include reapplication of foam to maintain the blanket quality and drain down of the foam over time.[1423]

In response to Chief Molina's concerns that are specific to the VFD response resources, Mr. Rhoads pointed out that the VFD is a recent recipient of a $198,000 port security grant from the Federal Emergency Management Agency, which could be used for comprehensive response planning for the lower Columbia River.[1424] David Corpron also testified that Tesoro Savage tried to assist Chief Molina in his gap analysis. Mr. Corpron invited Chief Molina and the VFD to the Anacortes facility to see a facility similar to the VEDT and worked with the VDF to create a gap analysis scope of work but everything was then put on hold.[1425]

In regards to response capability, Mr. Rhoads testified that there's an understanding in the emergency response community that no community can handle absolutely everything on its own. Even if you were not looking at a hazardous materials incident, large-scale fires may require a large commitment of resources from any one jurisdiction. Mutual aid companies could come into the city to form backfill for stations where those units were used somewhere else on a large fire.[1426]

[1422] PFT of Rhoads 43-44.
[1423] PFT of Rhoads 43-44.
[1424] Tr. 4826-27, vol. 21.
[1425] Tr. 4860-61, vol. 21.
[1426] Tr. 2097, vol. 9.

b. Water Resources

Vancouver. Water is necessary to fight a fire at the VEDT. Vancouver expressed concern about the availability of water supply to do so, Tyler Clary, Water Engineering Program Manager for Vancouver's Department of Public Works, identified concerns about the water supply.[1427] Mr. Clary agreed that the 24-inch supply line along NW Lower River Road, which reduces to a 16-inch line at the VEDT site and is a dead-end route, is a weak point in the Vancouver system.[1428] Dead-end lines are lines that only have one feed so only one pipe would go into an area. At the time of the hearing, negotiations between Vancouver and the Port to fund the installation of a secondary supply, no agreement had been reached to design and implement install a looped system that has a secondary feed into to the location.[1429]

Mr. Clary also provided information about fire flow tests. Vancouver had not completed a fire flow test in Area 200 and he was not aware of an "assumed value" being provided to the VEDT. The static pressure represented for Area 200 was misrepresented at 50 psi when it is in fact closer to 80 psi. The locations of the fire flow tests for Areas 300 and 400 indicated in Figure 3.3 were not accurate. The report noted that the fire flow Tesoro Savage proposed to provide through the use of auxiliary fire pumps is:

- Area 200 – Railcar Unloading Facility – 2000 gpm at 125 psi
- Area 300 – Storage Area – 2500 gpm at 125 psi
- Area 400 – Marine Terminal – 2000 gpm at 125 psi

Mr. Clary testified that the Vancouver water system is not capable of providing this level of pressure and fire flow to these areas without the use of auxiliary pumps. However, using auxiliary pumps could have a negative impact on the water system. If Tesoro Savage's fire system draws on Vancouver's water system in the amounts indicated, it could result in other locations within Vancouver's distribution system falling below the state minimum standard for pressure during a fire flow.[1430]

Mr. Clary has not determined the actual impact on Vancouver's water system from the pumps at the VEDT. He would need specific information on what piping improvements there would be, specific locations where those pumps would be drawing water from the City system, and at what flow rates at each location.[1431] However, a hydrant flow testing was conducted in the general project area. The results were approximately around the 3500 gallons per minute

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[1427] Mr. Clary is a licensed civil engineer with a B.A. in civil engineering. Tr. 2664-65, vol. 12.
[1428] PFT of Clary 3.
[1429] PFT of Clary 3; Tr. 2667-68, vol. 12.
[1430] PFT of Clary 4.
[1431] Tr. 2679, vol. 12.

range, which is above the design for the project's firefighting capability at 2500 gallons per minute range.[1432]

Tesoro Savage's Evidence. With regard to sufficiency of water for firefighting, Mr. Rhoads said that drawing water from natural water bodies is common[1433] so the VFD could draw water from sources such as the Columbia River. Mr. Rhoads admitted that he did not know about limits that might thwart use of the river as a water source, such as tribal objections. Moreover, drawing water from the river takes preplanning, training and related equipment.[1434]

Tesoro Savage recalled David Corpron to discuss the water supply issues. In regards to Mr. Clary's testimony on the need to loop the water lines, Mr. Corpron stated that Tesoro Savage participated in those negotiations and provided estimates to install the waterline, but that the estimates had not been acted upon. Tesoro Savage does believe that a looped system is desirable.[1435]

In regards to Mr. Clary's concern that a water pressure drawdown may go below the regulatory 20-psi limit, Mr. Corpron stated that there are other solutions that Tesoro Savage could implement including increasing the pipe size or adding onsite storage or pump stations.[1436]

c. Emergency Evacuation Notification to the General Public

Scott Johnson testified about concerns related to an evacuation of the general public. The Federal Emergency Management Agency requires CRESA to provide public information and warning during emergencies, i.e., to deliver coordinated, prompt, reliable, and actionable information to the whole community through the use of clear, consistent, accessible, and culturally and linguistically appropriate methods to effectively relay information regarding any threat or hazard, as well as the actions being taken and the assistance being made available, as appropriate. CRESA currently does this through five primary means: Emergency Community Notification Systems, Wireless Emergency Alerts, FlashAlert, Emergency Alerts Systems, and Social Media.[1437]

Currently, for each of these systems, CRESA must separately map the area to be notified and create a message to be distributed. CRESA must manually ensure uniform mapping and messaging across all platforms. These systems have been adequate for events that allow pre-event notification and planning, except for severe weather. However, hazardous

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[1432] Tr. 2680-81, vol. 12.
[1433] Tr. 4827, vol. 21.
[1434] Tr. 4848-49, vol. 21.
[1435] Tr. 4857-58, vol. 21.
[1436] Tr. 4858-59, vol. 21.
[1437] PFT of S. Johnson 5.

material events seldom allow for pre-event notification, expand rapidly, and have the capability of impacting communities both close to and removed from the immediate incident.[1438]

Mr. Johnson is concerned that CRESA will be unable to meet the Federal Emergency Management Agency requirement or citizen expectations for prompt and reliable messaging because each notification system must be activated separately. He is concerned that the lack of integrated mapping, which is the ability to overlay population density maps with a disaster impact map and with a map of the notification area, will hamper the ability to provide incident command an accurate picture of who has been informed of the event. This will negatively impact CRESA's ability to accurately inform communities of what actions are most applicable to them regarding the emergency.[1439]

Michael Hildebrand also testified about the difficulties of evacuation due to the inability of the notification system to give differing evacuation instructions to different recipients using the existing Emergency Community Notification Systems. An enhanced Emergency Community Notification Systems would allow focused notification to thousands of people with customized messages based on their location; e.g., shelter-in-place, evacuation instructions, or areas to avoid. The current Emergency Community Notification Systems relies on the Incident Commander to determine how large of an evacuation area is required. This initial assessment will be based upon a combination of the initial size-up reflecting actual incident conditions and the recommendations of the Emergency Response Guidebook. Once the fire department Incident Commander makes a decision, the Emergency Community Notification Systems is activated and begins to alert telephone numbers inside the identified evacuation area. One restriction of the current Emergency Community Notification Systems is that it dials only home telephone numbers and not cell phones unless they are registered.[1440]

d. Law Enforcement Capabilities

Clark County Sheriff Chuck Atkins testified about the capabilities of the Sheriff's Office to respond to an emergency at the VEDT.[1441] As discussed above, Chief Atkins is concerned that a VEDT incident would impact the inmates and staff at the JWC and insufficient resources are available to respond.

Chief Atkins is also significantly concerned that the Sheriff's Office lacks the training, expertise, and specialized equipment necessary to respond to a major disruption, explosion, fire

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[1438] PFT of S. Johnson 6.

[1439] PFT of S. Johnson 7.

[1440] PFT of Hildebrand (City of Vancouver) 25.

[1441] Chief Atkins has been in law enforcement for 37 years, elected as Sheriff in 2015. From 2001-2007, Chief Atkins served as Special Operations Commander. In this position, he also continued to serve as the SWAT Team Commander and work in a leadership role in the following units: Gang Task Force, Marine, K-9, and Traffic. As a Special Operations Commander, his responsibilities included planning and, if necessary, executing response scenarios for unusual accidents and situations. He was responsible for planning for situations from small scale localized emergencies to community wide and/or regional natural or manmade disasters. PFT of Atkins 2-3.

or other emergency at the VEDT. County Sheriff's Deputies do not currently receive any training about evacuating a population from an oil terminal related emergency. In addition, aside from a standard fire suppression system, the County does not have any on-site firefighting equipment or other sufficient protective equipment to protect inmates and employees at the JWC from an oil terminal related emergency. This specialized training and equipment would be very costly for the County Sheriff's Office to obtain and would require diverting resources from other programs that serve the community.[1442]

Moreover, a VEDT emergency would exceed the County Sheriff's Office's immediate staffing resources and would likely result in an inability to respond to other calls. This insufficient staffing would result in a need to call in off-duty deputies on an overtime basis in an effort to respond to the emergency. This would have an impact upon the budget and ability to respond to normal calls for service on an ongoing basis.[1443]

e. Mutual Aid

Vancouver's Evidence. Mutual aid is a voluntary reciprocal exchange of resources and services for mutual benefit. Since emergency response actions are inherently episodic and everyone benefits from improved response capabilities, many firefighting and police forces enter into mutual aid agreements with one another.[1444]

Mutual aid agreements are, however, limited. Response to a request is not mandatory. Based on its own needs, a jurisdiction may be unable to provide aid during an incident. Many of the mutual aid fire districts in Clark County are rural districts staffed by volunteers who do not have the same training, experience, and capabilities as the VFD, which is the largest fire district in southwest Washington.[1445] Portland firefighters might have the necessary training and experience, but the mutual aid agreement with Portland Fire Department excludes assistance for hazardous materials incidents. Portland's ability to respond is further restricted by congestion and bridge lifts on the century old Interstate-5 Bridge crossing the Columbia River.[1446]

Tesoro Savage's Evidence. Mr. Rhoads testified that there is an understanding in the emergency response community that no community can handle absolutely everything on their own. Even if hazardous materials were not at issue, large-scale fires, for example, may require a large commitment of resources from any one jurisdiction. Mutual aid companies could come into Vancouver to backfill for units used somewhere else on a large fire. Mr. Rhoads observed

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[1442] PFT of Atkins 6-7.
[1443] PFT of Atkins 7.
[1444] PFT of Molina 7.
[1445] Tr. 2719-20, vol. 12.
[1446] PFT of Molina 7.

that mutual aid is commonly used in mass casualty incidents where large numbers of injured people require transportation to medical facilities.[1447]

f. Summary of the Council's Analysis of Emergency Response Issues

In order to minimize the impact on the adjacent population and environment, it is important to understand the emergency response capabilities of the local jurisdiction. Tesoro Savage emphasizes the state of the art site design and safety features at the facility. In addition, it stresses the emergency planning and prevention at the VEDT along with the hiring criteria and training program. These are all important features in determining risk, but not as to whether, in the event of an incident (explosion, fire, and crude oil spill) there are sufficient emergency response capabilities to protect the citizens and the environment from the damages such an incident would bring.

In looking at the emergency response capabilities, Tesoro Savage looks at the "wider range of public and private resources" available to the City as support for sufficient emergency response capabilities. It also looks at the technology at the facility as supporting a finding of local jurisdiction capabilities.[1448] At the same time, City Manager Eric Holmes, Fire Chief Molina, Clark County Sheriff Atkins, CRESA Emergency Management Division Manager Scott Johnson, and Spokane Assistant Fire Chief Schaeffer all provided substantial evidence about the inadequacies of staff, resources, equipment, training, and emergency management resources to respond to an incident at the VEDT or along the rail line. The detailed information provided by these individuals substantially support a finding that the emergency response capabilities will not be sufficient to successfully respond to a major incident at the VEDT or along the rail line.

In addition, many mutual aid jurisdictions are small and have only volunteer staff. Mutual aid is voluntary and may in some cases be unavailable. So even with the help of other first responders from agencies that have a mutual aid agreement, emergency response capabilities will be taxed as it takes time to request and mobilize additional resources, if they are even available.

There also appear to be major obstacles that emergency responders would need to overcome to get to the location where services are needed. Examples include traffic congestion, road blockages, and the inability of the VFD fire boat to reach all locations where an incident might occur. In addition, if the emergency was at or near the VEDT, emergency responders would be going into a congested area at the same time those at the area were attempting to flee. Finally, based on the capacity of the local emergency response agencies, the ability to respond to an incident might conflict with other important emergency response obligations that occur simultaneously.

[1447] Tr. 2097, vol. 9.

[1448] Applicant Post-Hr'g Br. 52.

Emergency notification systems such as CRESA may be unable to provide prompt and reliable messaging to the public or provide incident command with accurate information to support a rapid emergency response and successful evacuation.

As to the water system, there appears to be agreement that there are areas of weakness in the system. Mr. Corpron acknowledged these areas and proposed solutions. At the conclusion of the hearing, there did not appear to be any agreement that these solutions would be implemented.

Training for emergency planning and response for the types of incidents that could occur at the VEDT is necessary. Such training is available and there is a variety of ways to obtain the training, some of which do not require travel or funding. Tesoro Savage alleges that Chief Molina has refused training as not a priority and then alleges a lack of preparedness. The Council believes that this is inaccurate because Chief Molina said the offered training was not a priority at that time because his department was focusing on the rail traffic that was already traveling through Vancouver and that he was uncertain that the VEDT would ever be constructed.[1449] In addition, even if training is offered at no cost, there may still be a need to backfill for the officers who are at training, which comes at a cost. In any event, the Council believes that training is available and that lack of training is not a deterrent to being prepared to respond to an emergency. However, the lack of staff and other resources is a factor in the lack of emergency response capabilities currently found in the police and fire departments.

6. Socioeconomic – General Population

a. Summary of Parties' Positions

Tesoro Savage asserts that it need not show a net overall economic benefit but that the VEDT will have a "substantial" positive socioeconomic benefit to the state and local community.[1450]

The Port argues that the Council must take into account the benefits to the Port when looking at the VEDT's socioeconomic impacts. The VEDT allows the Port to maximize the use of its property and the revenue derived would be reinvested in the Port's infrastructure and the community.[1451]

The Opponents argue that the negative impacts exceed any positive benefits. The Opponents argue that, in addition to overstating the positive impacts, Tesoro Savage did not provide an analysis of all the negative impacts from the VEDT.[1452] In addition to the economic impacts, the Opponents also argue that the VEDT poses unacceptable environmental justice risks to the Fruit Valley Neighborhood and other workers at the Port.[1453]

[1449] Tr. 2702-03, vol. 12.
[1450] Applicant Post-Hr'g Br. 66.
[1451] Final Port of Vancouver USA's Post-Hr'g Br. 4-5.
[1452] Tr. 5149-50, vol. 22.
[1453] Columbia Riverkeeper Final Adjudication Br. 51.

b. Evidence and Argument

Tesoro Savage hired Todd Schatzki, Vice President of the Analysis Group, to analyze the VEDT's anticipated socioeconomic impacts.[1454]

Mr. Schatzki analyzed the primary economic impact of the VEDT's construction and operation on the economy of ten counties: Clark County, and neighboring counties within a one-hour commute of the VEDT.[1455] He also considered secondary economic impacts of the VEDT.[1456] For both primary and secondary impacts, he measured the VEDT's impact, as compared to the impact if the VEDT was not approved and no other activity took its place. He did not analyze the economic impacts of an alternative activity.[1457] Mr. Schatzki asserted that he conducted a detailed comprehensive analysis of both potential positive and negative impacts, providing an assessment of the VEDT's expected "net impacts." He concluded that there are "significant economic benefits" associated with the VEDT and that claims of "meaningful negative economic benefits" are inaccurate and unsupported.[1458]

Columbia Waterfront LLC hired Jerry Johnson, an economist and principal with Johnson Economics, to provide an independent analysis of the socioeconomic impacts of the VEDT on Vancouver and surrounding region. [1459] Mr. Johnson reviewed Mr. Schatzki's work and conducted his own independent assessment using a net impact analysis, taking into consideration positive and negative impacts. His considered more factors than were considered by Mr. Schatzki.[1460] Mr. Johnson concluded that although the VEDT will create a small number of jobs, the positive economic benefits to the State of Washington are likely outweighed by the VEDT's negative economic impacts.[1461]

(1) Primary Economic Impacts

Mr. Schatzki looked at the VEDT's positive primary economic impacts, which are changes in economic activity from the VEDT's construction and operation. Mr. Schatzki

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[1454] Mr. Schatzki has a B.A. in physics, a Masters in city planning, environmental policy and planning, and a Ph.D. in public policy. For more than 15 years, he has worked with government agencies, regulators, market operators, nonprofit organizations, and private corporations on a range of matters including market design, financial analysis, and evaluation of the economic consequences of energy and environmental regulations. PFT of Schatzki 1-3.

[1455] PFT of Schatzki 4; Ex. 0156-000008-09-TSS.

[1456] PFT of Schatzki 3.

[1457] PFT of Schatzki 4-5.

[1458] PFT of Schatzki 39.

[1459] Mr. Johnson has an undergraduate degree in architectural design and economics and a Masters in urban planning. He has worked as a consulting economist for more than 20 years conducting market and public policy analysis for public sector jurisdictions and agencies as well as economic development analysis and related work for Oregon local governments and private businesses. PFT of J. Johnson 1-2.

[1460] PFT of J. Johnson 7.

[1461] PFT of J. Johnson 31.

looked at positive changes such as increased income for local workers, increased profits for local business owners, and increased tax revenues for local governments.[1462]

Mr. Schatzki used the Impact Analysis for Planning (IMPLAN) model to estimate the primary impacts. The IMPLAN model estimates local economic impacts from changes in economic activity. It is based on region- and sector-specific data from the U.S. Commerce Department's Bureau of Economic Analysis. The model provides detailed estimates specific to the geographic region and industries being analyzed and is widely used for economic impact assessments in the public and private sectors. The IMPLAN model assesses four economic metrics: employment, labor income, tax revenue, and value added. Tesoro Savage provided the data and assumptions.[1463]

Labor income and economic value. Using the data and assumptions provided, the IMPLAN model estimated the expected primary economic impacts from the VEDT. In total, the combined effects of the construction and operations of the VEDT would yield an average of over 1000 jobs annually over the assumed 16-year construction and operation period, totaling over 17,000 job-years [1464]over this period. Other cumulative impacts include nearly $1.6 billion in labor income, and over $2.0 billion in economic value added to Clark County and the surrounding area. On a present value basis, these nominal impact estimates correspond to about $890 million in labor income and about $1.2 billion in economic value added. The detailed numbers for each category are provided in Table 4, Ex. 0155-000003–04-TSS. However, this economic impact does not take into account the expenses that local government may incur due to the presence of the VEDT. For example, local government may need additional fire personnel and equipment.[1465]

Mr. Johnson criticized this analysis for failing to take all factors into account. For example, Mr. Johnson stated that the analysis should have evaluated what benefits alternative uses would have derived and derived a net economic impact of the proposed use. Second, Mr. Johnson found that the analysis did not include, and the benefits were not offset by, the negative economic impacts associated with VEDT operations.[1466] For example, the analysis did not take into account the potential negative economic impact on tourism, the risk inherent in facility operations, or potential life safety risks.[1467]

In addition, Mr. Johnson pointed out the employment numbers were overstated, as the analysis adopts off-site related employment as direct employment, which it is not.[1468]

[1462] PFT of Schatzki 4.

[1463] PFT of Schatzki 5-7.

[1464] It is important to note that this number does not reflect the number of new jobs, but job years. A job-year reflects one job held for one year. This means that one person who holds a new job created by the Project for 10 years would be reflected as “10 job-years.”

[1465] Tr. 1105-06, vol. 5.

[1466] PFT of J. Johnson 3.

[1467] PFT of J. Johnson 6-7.

[1468] PFT of J. Johnson 9.

Mr. Johnson notes that these indirect impacts are being inappropriately modeled as direct: "Typically, in IMPLAN, and, in fact, in Mr. Schatzki's testimony he actually refers to what he's talking about, he talks about it being companies that goods and services is providing to the primary industry, which is exactly what this is, and that would be defined by IMPLAN as a secondary impact, not a primary impact. The reason this is important is the way IMPLAN works is you take the primary impact and it ripples through the economy with your suppliers and then the expenditures from that stays in the economy for a lot longer. So the greater you make the initial impact, the greater all the impacts are in total. So if that's incorrectly categorized, it becomes a real issue. Again, they're esoteric issues. This is a fairly important esoteric issue."[1469]

Tax Revenues and Payments to the Port. Mr. Schatzki also estimated the tax revenue impacts from the VEDT. In total, construction of the VEDT is expected to have a one-time tax impact of over $22 million to state and local governments, and a recurring annual impact of approximately $7.8 million once the VEDT is operating at full capacity. Sales tax increases represent the largest portion of both construction and operation phases, 80 percent of the construction phase and 40 percent of the operations phase. Property taxes are the second largest tax component, representing 12 percent of construction phase tax increases and 39 percent of operations phase tax increases.[1470]

Alastair Smith testified that the Port would receive revenues directly from the VEDT, including market value rent, dockage for every vessel loading at the dock, wharfage, a service facility fee for every barrel of oil that goes across the dock, rail access fees at $25 per rail car, and rail maintenance fees. Mr. Smith estimates the total revenues will be approximately $60 million per year, which will be reinvested into Port infrastructure and into the community.[1471]

(2) Secondary Socioeconomic Impacts

Mr. Schatzki also examined secondary impacts to existing or potential new economic activity from the VEDT. He considered several potential impacts from changes in rail traffic, including dis-amenity such as noise and aesthetic impacts, increased road congestion at at-grade rail crossings, and increased congestion on the rail system. He based his evaluation on a rail traffic increase from zero to four unit trains per day.[1472]

Impacts on Property Values. Mr. Schatzki evaluated the potential impact on property values due to increased rail traffic. This evaluation used two approaches; the hedonic analysis

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[1469] Tr. 3457, vol. 15.
[1470] PFT of Schatzki 14-15.
[1471] Tr. 274-75, vol. 2.
[1472] PFT of Schatzki 15-16.

of property values impact[1473] and the statistical analysis test.[1474] The analysis looked solely at single-family residential, not commercial property values.[1475]

Using the hedonic analysis, Mr. Schatzki used two different studies, each of which estimates the impact on single-family residences. Based on the study that examined impact in Los Angeles (Futch) for varying distances from the rail corridor and assuming an increase in rail traffic of four trains per day, single-family residential properties near the rail line could be reduced by 0.85 to 1.49 percent within one-third mile of the rail line (across the specifications). From one-third to two-third of a mile from the rail line, the estimated impact is smaller, ranging from 0.59 to 0.69 percent, and from two-thirds of a mile to one mile are smaller still (0.37 to 0.67 percent). The other study is based on the city of Cleveland (Simons and El Jaouhari). Estimated impacts range from 0.0 to 1.07 percent for distances up to 750 feet from the rail (which is approximately one-seventh of a mile, thus considerably shorter than the distance evaluated by Futch). In addition, the authors also estimate similar values based on data from 1996. In this year, the authors find that the relationship between the level of rail traffic and property values is not statistically different from zero at any distance for any property size.[1476] Based on these analyses Mr. Schatzki found the additional rail traffic from the project would be expected to reduce residential property values near the existing rail lines by 0 to 1.5 percent, which he concludes is limited in comparison to normal fluctuation in values, and may be fully or partially offset by increases in property values driven by improved economic conditions created by the Project.[1477]

Mr. Schatzki also performed a statistical analysis to test the impact of the VEDT development announcement on property values. This analysis also uses the same hedonic framework and the two different models referenced above. The results were displayed in two tables, Tables 9 and 10.[1478]

Table 9 provided estimates of the percentage difference in property values for each of four discrete distance bandwidths as compared to properties beyond the one mile rail corridor and indicates that properties within 250 feet of the rail sell at a discount (-4.56 percent). However, this impact is not statistically significant. Table 10 assumes that impact diminishes with distance from the rail line, with the impact varying continuously as an arithmetic function of the property's distance to the rail. Assuming that the impact of proximity to the rail varies continuously as the distance from the rail increases (based on a quadratic and logarithmic function), Mr. Schatzki found that there is no statistically significant relationship between property prices and distance from the rail and that there is no statistically significant change in

[1473] The hedonic analysis analyzes how the proximity to the land use of interest affects real estate values.
[1474] PFT of Schatzki 17.
[1475] Tr. 1114, vol. 5.
[1476] PFT of Schatzki 18-19.
[1477] PFT of Schatzki 19-20.
[1478] Ex. 0155-000008-TSS.

these relationships after the announcement of VEDT.[1479] However, Mr. Schatzki did opine that he would not expect the same impact from an announcement as opposed to actual development of the VEDT.[1480]

Mr. Johnson also analyzed the potential impact to property values. He reviewed a number of studies that attempted to quantify similar impacts, finding the literature consistent in finding negative impacts on pricing associated with rail lines and/or increased rail traffic. His office evaluated the impact in Clark County for an area of one-third to one-half miles from the rail line. Properties within these areas of impact were identified, including their estimated Real Market Value and taxable value based on the most current assessor records. He modeled the expected loss of value in the impact area based on a range of assumptions regarding the percentage reduction in value and the assumed impact area.

He concluded that a 1.5 percent real market value reduction in a 1-mile study area produces an overall reduction of almost $148 million in Clark County. Based on existing literature, his analysis indicates a more likely value impact of 5.0 percent within a one-third to one-half-mile radius, which would represent a loss in value along the corridor in Clark County of between $213 and $283 million. The fiscal implication of this loss would be a reduction of between $2.4 and $3.4 million per year for affected taxing jurisdictions. Over a 16-year operating period, this would reflect a reduction of between $36 and $50 million in property tax revenues from this section of the impact area.[1481]

Impacts Based on Delays at At-Grade Rail Crossings. Mr. Schatzki also analyzed the economic costs associated with delays at at-grade road crossings within Vancouver and several other locations outside Vancouver. He found that business impacts are relatively limited. Within Vancouver, intersections potentially affected by incremental rail traffic all have relatively low traffic levels, with half of these occurring in industrial areas near the Port. The incremental impacts to business are all estimated to be less than $1200 annually. Outside of Vancouver, intersections east and west of Spokane, which are likely to have an additional eight trains per day from the VEDT (four loaded inbound trains, and four empty outbound trains), could experience impacts of up to $7000 per year. Although there may be some tangible effects from lost income or value added, compared to the magnitude of economies of the impacted communities, Mr. Schatzki concluded that the impacts are extremely limited.[1482]

Impacts Based on Rail System Congestion. Mr. Schatzki concluded that except for the Spokane to Pasco segment of the rail line, there is sufficient capacity to accommodate increased rail traffic from the VEDT without any capital improvements to the rail infrastructure and without adjustments to other rail traffic. These estimates reflect a static view of the potential impact of the VEDT on the rail system in Washington State. They do not

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[1479] PFT of Schatzki 24-25.
[1480] Tr. 1079-80, vol. 5.
[1481] PFT of J. Johnson 18-20.
[1482] PFT of Schatzki 30-32.

account for the various dynamic adjustments that can occur within an economic market. From an economic standpoint, it is also important to evaluate potential impacts from both short-run and long-run perspectives that account for the dynamic adjustments made by market participants. Mr. Schatzki concluded that the impact of any additional traffic from the VEDT is not expected to be significant and that the VEDT would not be expected to have significant impacts on the rail system, in the form of disruption to other services or significant price increases, in the long-run.[1483]

Impacts from an Accident or Spill. Mr. Schatzki stated that a potential economic impact from accidents associated with the VEDT require consideration of the likelihood of such events and corresponding economic impact. He notes that commercial fishers may be able to change the location or timing of their activities, reducing economic losses in the event of a spill. In the event of a rail spill in the Columbia Gorge, not all tourism or recreational fishing activities would necessarily be impacted and economic impacts from those activities that are impacted may be partially offset by shifts to other forms of recreation. For spills in general, economic activity generated by the spill response should also be considered. [1484]

Disproportionate impact on minority and low income populations (Fruit Valley Neighborhood). David L. Wechner, a professional land use planner, with more than 25 years of experience in environmental and land use planning, provided the Opponent's primary testimony on land use issues. Mr. Wechner testified about a number of the impacts to the Fruit Valley Neighborhood.

The Fruit Valley Neighborhood is a subarea with a higher percentage of Hispanic, Asian, and Native American persons than the rest of Vancouver. The neighborhood also has a high poverty level.[1485] In the Fruit Valley Neighborhood, some residences will be as close as 1100 feet from the inbound route and 240 feet from the outbound route.[1486]

Linda Garcia, a Fruit Valley resident and secretary of the Fruit Valley Neighborhood Association (Association), is a community outreach coordinator for the Fruit Valley Foundation.[1487] She provided testimony on behalf of the Association. She confirmed that the minority population rate is about 36 to 37 percent. In addition, she confirmed that the average income for a family of four in Fruit Valley is $27,000 a year. Because of this poverty level, people in this neighborhood cannot simply move, especially if the value of their residence declines.[1488]

[1483] PFT of Schatzki 32-34.
[1484] PFT of Schatzki 36-38.
[1485] PFT of Wechner 24.
[1486] PFT of Wechner 12.
[1487] Tr. 3736-37, vol. 16.
[1488] Tr. 3745-46, vol. 16.

Ms. Garcia testified that the Association has multiple concerns with the VEDT. One relates to the toxic pollutants that would be emitted on a daily basis. Because of the proximity of the VEDT to the residences, some of which are less than a mile from the site, they are concerned about the health impacts of this toxic exposure.[1489]

Dr. Elinor Fanning, a toxicologist, testified about the impact of toxic pollutants on nearby residents.[1490] She testified that toxic pollutants have a negative effect on human health in general and on respiratory health in particular, especially as the toxic pollutant affects vulnerable populations.[1491] Because of the proximity of the neighborhood to the VEDT, Dr. Fanning opined that the degradation in air quality put the residents, and especially the "sensitive" residents, at a greater risk for "acute and chronic health effects."[1492]

Ms. Garcia's second concern is the potential for an accident or incident with the oil rail cars. This neighborhood is unique in Vancouver in that it is separated by a series of railroad tracks, and the only way into or out of the neighborhood is to cross over those tracks. Therefore, if an incident on the tracks were to occur, accessibility into or out of the neighborhood would be limited, if not impossible.[1493]

Finally, Ms. Garcia's biggest concern was the storage tank facility and the risk of an explosion. Based on other incidents Ms. Garcia had learned about, the Association is concerned that one explosion would level the Fruit Valley Neighborhood.[1494]

Mr. Wechner acknowledged that more than half of the Fruit Valley Neighborhood is zoned industrial.[1495] However, Mr. Wechner also opined that the VEDT will be a disincentive to investment, redevelopment and enhancement of key neighborhood attributes; will concentrate more heavy industrial use adjacent to and within the neighborhood in conflict with pedestrian access and safety; will conflict with parks, open space, wildlife protection, and recreation; and will conflict with sustainable development.[1496]

Ms. Garcia also acknowledged that the neighborhood is in area zoned industrial. She stated that industry and residential neighborhoods can coexist. However, she points out that there needs to be an equal compromise. For the VEDT, the Fruit Valley Neighborhood has not received any compromise.[1497] When asked what kinds of compromises would be meaningful, Ms. Garcia stated that to lessen the concerns about the toxic emissions, the Association talked

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[1489] Tr. 3739, vol. 16.

[1490] Dr. Fanning has a B.A. in biology, a M.A. in molecular biology and a Ph.D. in Environmental Health Science. PFT of Fanning 1.

[1491] PFT of Fanning 9.

[1492] PFT of Fanning 15.

[1493] Tr. 3739-40, vol. 16.

[1494] Tr. 3740, vol. 16.

[1495] Tr. 4177, vol.18.

[1496] PFT of Wechner 26, 28-30.

[1497] Tr. 3741, vol. 16.

about having something similar to a catalytic converter to scrub the air before released. They were told that the cost was prohibitive and that it wouldn't be necessary.[1498]

Ms. Garcia wanted the Council to know that the residents of the Fruit Valley Neighborhood "are not expendable. We are human beings and we deserve every single chance at life that everybody else does, regardless of where we are demographically, where we are socioeconomically, where we are race or ethnicity. It doesn't matter. There's no cost that can be placed on any single head of any single human life."[1499]

Tesoro Savage pointed out that in 2009, before the VEDT was anticipated, Lee McCallister, the Chairman of the Fruit Valley Neighborhood, expressed support of the WVFA Project because it would create industrial opportunities and employment; will reduce air pollution by decreasing truck traffic; and because rail transport is safer than truck transport.[1500] At that time, the WVFA Project anticipated adding 3.5 trains per day.[1501] The VEDT adds more than 3.5 trains per day and, as Mr. Wechner pointed out, the WVFA Project did not involve CBR, and therefore again did not pose the same risks as the VEDT.[1502]

Impacts on Public Facilities and Services. Mr. Eric Holmes stated Vancouver opposes the VEDT. In his professional judgment, current technology, regulations, and operations are insufficient to assure consistently safe handling and transport of crude-by-rail in Vancouver.[1503]

The indirect impacts of the VEDT include an increase in crude-by-rail traffic in excess of 200 percent over 2015 levels.[1504] Because of the length of the trains, each train would have to come in past the downtown out to the Port, unload, move far enough back on the mainline so the train could then take the line north.[1505] This translates into 12–15 trains per day. This would risk blocked crossings and risk associated with the commodity itself, although no at-grade crossings are blocked when the train is backing up. [1506] If the empty trains returned along the Columbia Gorge Route, rather than going north, there would be fewer transits through the City.[1507]

[1498] Tr. 3774-75, vol. 16.
[1499] Tr. 3767, vol. 16.
[1500] Tr. 4183-84, 4181, vol. 18; Ex. 0244-000099-TSS.
[1501] Tr. 4183, vol. 18; Ex. 0244-000031-TSS.
[1502] Tr. 4183, vol. 18.
[1503] Tr. 2858, 2869, vol. 12.
[1504] Tr. 2849, vol. 12.
[1505] Tr. 2850, vol. 12; Ex. 3131-0001-VAN.
[1506] Tr. 2850-51, 2861, vol. 12.
[1507] Tr. 2885-86, vol. 12.

Adjacent to or in close proximity to the rail line are a variety of essential public facilities that are critical to Vancouver's ongoing operations.[1508] These are:[1509]

- Vancouver's west side wastewater treatment plan, which is one of two facilities that treat all the sewage and wastewater from Vancouver and some portions of the unincorporated vicinity.
- City Hall.
- Vancouver Hotel and Convention Centre, with about 30,000 square feet of convention space.
- Marine Park Engineering and Water Reclamation Facility, which is the second of the two water reclamation facilities that handle wastewater from Vancouver and some unincorporated areas. The facility includes all of the engineering services for all Vancouver infrastructure.
- Clark County Public Services, which includes CRESA, the emergency dispatch agency and regional emergency planning agency, the County Courthouse, the Sheriff's Office, the Board of County Commissioners, and is the central location for County public services.
- Vancouver Water Station Number 4, which is one of Vancouver's major sources of domestic and potable water supply, supplying about 14 percent of the Vancouver's water. It is about 300 feet north of the rail line.
- Thirty-two at-grade crossings where public or private streets cross the BNSF main line. Increased baseline traffic could interfere with emergency response capacity.

In addition to impacts in essential public services, Mr. Eric Holmes stated that the VEDT would affect:[1510]

- The Vancouver-owned and operated Pearson Airport that abuts the north side of the mainline.
- The Vancouver-operated Water Resource Education Center, an educational facility and private event venue.
- The Renaissance Trail.
- The Shoreline Enhancement District.
- Fairly significant private employment centers. These include the downtown central business district that has about 10,000 employees during the day, the Columbia Business Center that has about 2000 direct jobs, and the Grand Central and Lower Grand employment areas.

These areas would be directly impacted by operational risk hazards associated with transfer of crude from trains to tanks to vessels. These hazards include risk of spills and

[1508] Tr. 2840, vol. 12.
[1509] Tr. 2840-42, vol. 12.
[1510] Tr. 2842-44, vol. 12.

ignitions, rail-crossing delays impacting property owners and first responders, and environmental impacts.[1511]

c. Summary of the Council's Analysis of Socioeconomic Issues

Tesoro Savage provided a detailed analysis of the positive economic impacts from the VEDT. This would include an increase in jobs, revenue to the Port, taxes collected from the construction and operation activities, and expenditures for other goods and services from this increased economic activity. Tesoro Savage's assessment of these positive impacts and the associated multiplier impacts through the regional economy appears reasonable to the Council although not totally accurate. Although the Opponents contest the amount of positive economic benefit that would be received, there appears to be agreement that there would be some positive economic benefits.

It does not appear that Tesoro Savage provided a complete analysis of all the potential negative economic impacts from the VEDT. These include the value of foregone alternative purposes for the project site, which Mr. Schatzki states are highly likely to occur in practice, although with lower revenues.[1512] Negative economic impacts also likely include reductions in property values throughout the rail corridor, where the applicant acknowledges that increased overall rail traffic from the project may amount to somewhere between zero and $66 million in reductions per year in Clark County. There is no information on these impacts in the remainder of the rail corridor in Washington or beyond.[1513] As with any other annual negative impacts, property value reductions would need to be extrapolated to the 16-year project life period used by Mr. Schatzki to assess positive impacts in order to make a meaningful comparison. Negative economic impacts that represent a loss of economic activity should also be subject to negative multiplier estimates as their effects ripple through the local economy, similar to positive multiplier impacts estimated by the applicant to flow from added economic activity, a point acknowledged by Mr. Schatzki.[1514]

Property value reductions due to the specific nature of the added rail traffic, crude oil shipments, are also likely, but studies in the record of these impacts elsewhere are inconclusive as to magnitude. Mr. Schatzki's finding of no significant value impacts in the Vancouver corridor after the project was announced is not necessarily representative of value impacts that would occur after the project is built, and after accidents projected by Tesoro Savage with frequency somewhere along the full corridor begin to occur. We also note that Opponents' critique of Mr. Schatzki's study as methodologically flawed because it used inappropriate geography and did not account for river views of properties along Vancouver rail corridor were unrebutted.

[1511] Tr. 2844-45, 2849, vol. 12.
[1512] PFT of Schatzki 5.
[1513] Tr. 1085, vol. 5.
[1514] Tr. 1108, vol. 5.

Negative economic impacts also likely include increased vehicle delays at at-grade train crossings. The applicant's estimates of annual delay costs to businesses from between $24 to $7052 per intersection at 19 intersections examined appear reasonable. However, these 19 intersections account for only a small fraction of the total intersections along the corridor and associated business impacts, and do not account for the economic value of delays to non-commercial vehicles.[1515] As with property value impacts, annual vehicle delay impacts would need to considered the full corridor, be extrapolated to a 16-year period, and be subject to negative multiplier estimates to allow for appropriate comparison with positive economic impact estimates.

Despite these uncertainties, the Council believes positive economic impacts from typical project operations are likely large enough to ensure a significant net economic benefit. This belief is strengthened by the fact that estimated revenue from the project provided to the Port will be reinvested in local economic development efforts. The Council does agree with the Opponents however, who note in unrebutted testimony that the job gains from the proposal represent two weeks growth in Clark County, which had been adding 8,800 to 9,000 jobs per year.[1516] This is not to minimize the impacts of the VEDT, which would be in addition to other economic growth that occurs. It does indicate that increasing jobs in a growing local and regional economy, and the multiplier effects from those added jobs, more than cover the VEDT impacts.

Importantly, the Council notes that net positive economic expectations we find for this project are from typical project operation, not necessarily when the potential costs of accidents projected to occur during the life of the project are considered. Mr. Schatzki also acknowledges that although he does not include them in his analysis, projected accident costs may be appropriate considerations for an economic analysis. [1517]

As described in the rail analysis in this order, Tesoro Savage projects derailments resulting in oil spills and reasonably likely fires will occur every 6.4 years in Washington, which equates to approximately to once every 2.1 years in the full corridor. Seven and a half such rail spills would thus be anticipated over the 16-year time frame used by Mr. Schatzki to estimate economic benefits. The costs are unknown but likely to be significant. PHMSA has projected absent further safety improvements, the average cost of each crude oil or ethanol rail accident it classifies as lower consequence will be $21 million. PHMSA has also projected, again assuming current safety conditions, that between 0-10 higher consequence events will occur nationally through 2035, with 5 most likely. The VEDT is projected to account for approximately 21 percent of the total national rail traffic by carload used by PHMSA to base its accident estimates PHMSA projects high consequence events will average $1.4 billion in damages per accident[1518]

[1515] PFT of Schatzki 31.
[1516] Tr. 3511, vol. 15.
[1517] Tr. 1106, vol. 5.
[1518] Ex. 3058-0036-VAN, Ex. 3058-0024-VAN, Ex. 3058-0051-VAN 51.

Other anticipated or potential accidents associated with the proposal may also be costly. Vessel spills averaging 2.8 million gallons are projected by the applicant to occur every 30 years on average, meaning they would have a 50 percent chance of occurring over the 16-year period used by Mr. Schatzki to estimate economic benefits. There are no cost estimates for vessel spills of this particular size in the record. Unrebutted testimony from Opponent witness James Holmes estimated total damages from a Columbia River spill approximately three times this size, 8 million gallons, to be between $455 and $1.16 billion.[1519] At the terminal the cost or likelihood of major accidents is unknown, but as noted in this order a Cascadia subduction level earthquake is predicted to have a 15 percent probability in the next 50 years.

The majority of these costs would likely be borne by the applicant, but for all accidents some costs to local communities ranging from litigation to administration expenses for governments to various private costs appear likely. For costly accidents, the ability of the applicant to fully cover damages is unclear, as described in the financial assurances section of this order. The highest consequence events, which if PHMSA is correct are a statistical likelihood rather than a remote possibility for this proposal during its assumed lifetime, could also eliminate or reduce the applicant's ability to continue production, or continue at levels anticipated, thereby lower anticipated economic benefits.

In light of the range of accidents projected to occur during the Project's lifetime, including during the 16-year period used by the applicant to estimate economic benefits, the Council finds the record is unclear regarding net economic impacts.

The Fruit Valley Neighborhood is in such close proximity to the VEDT that the VEDT will have a greater impact on its residence than other areas of Vancouver. Although the Neighborhood is zoned for industrial uses, this does not mean that the incoming industry should be such that it has a disproportionate adverse impact on its residents. The increase emissions of pollutants, even within acceptable regulatory standards, could have an adverse impact on the health of these residents. To date, Tesoro Savage has not agreed to make any changes that would reduce this impact.

7. Air Emissions and Greenhouse Gases

The VEDT will be a new source of emissions of air pollutants. Air emissions will be produced both at the facility via the transfer and storage of crude oil at the Vancouver terminal, and within the state of Washington via the transportation of the crude oil to the VEDT. As such, the VEDT is governed by federal requirements in the federal Clean Air Act and state requirements in the state Clean Air Act, and regulations adopted under both these Acts.

[1519] Ex. 1503-000076-ENV.

a. General Legal Framework for Assessing Issues Related to Air Quality

As discussed elsewhere in this order, WAC 463-62 does not establish standards for the Council's current consideration of Tesoro Savage's ASC. The Council will nonetheless include in its current analysis consideration of whether Tesoro Savage's ASC complies with WAC 463-62-070, which requires that energy facility site certification agreements meet the air emissions requirements of applicable state air quality laws and regulations promulgated pursuant to the Washington State Clean Air Act, RCW 70.94, the Federal Clean Air Act, 42 U.S.C. §§ 7401–7671q, and WAC 463-78. Because the Council is conducting a separate air quality permitting process for the VEDT, the Council's ultimate consideration of Tesoro Savage's permit compliance will occur outside the scope of this adjudication. For the reasons explained in the balance of this section, if the rule were to apply to the Council's current analysis, the Council believes that Tesoro Savage has demonstrated compliance with WAC 463-62-070 with regard to matters covered by that rule but that showing does not extend to matters outside the scope of the rule, i.e., emissions from mobile sources (which are not regulated under stationary source air permitting requirements) and greenhouse gases (GHG) (which are not regulated at the VEDT under the laws cited in the rule).

In addition to the rules enacted in WAC 463-78, the Council adopted by reference specific provisions of WAC 173-400 (general regulations for air pollution sources) as it existed on December 29, 2012, WAC 173-460 (controls for new sources of toxic air pollutants) as it existed on March 1, 2005, and WAC 173-441 (reporting of emissions of greenhouse gases) as it existed on January 1, 2011, all adopted by Ecology.[1520] Finally, the Council also adopted by reference 40 C.F.R. Part 60 (standards of performance for new stationary sources), in effect on July 1, 2014.[1521]

The Washington Clean Air Act is codified in RCW 70.94. In this Act, the Legislature declared the public policy "to preserve, protect, and enhance the air quality for current and future generations."[1522] The Legislature went on to recognize that "[a]ir is an essential resource that must be protected from harmful levels of pollution. Improving air quality is a matter of statewide concern and is in the public interest."[1523] Therefore, the Legislature provided the intent of the Clean Air Act:

> [T]o secure and maintain levels of air quality that protect human health and safety, including the most sensitive members of the population, to comply with the requirements of the federal clean air act, to prevent injury to plant, animal life, and property, to foster the comfort and convenience of Washington's

[1520] WAC 463-78-005.
[1521] WAC 463-78-115.
[1522] RCW 70.94.011.
[1523] RCW 70.94.011.

> inhabitants, to promote the economic and social development of the state, and to facilitate the enjoyment of the natural attractions of the state.
>
> It is further the intent of this chapter to protect the public welfare, to preserve visibility, to protect scenic, aesthetic, historic, and cultural values, and to prevent air pollution problems that interfere with the enjoyment of life, property, or natural attractions.[1524]

The Federal Clean Air Act (FCAA) is codified in 42 U.S.C. Chapter 85. Congressional findings in the FCAA are:

> (1) that the predominant part of the Nation's population is located in its rapidly expanding metropolitan and other urban areas, which generally cross the boundary lines of local jurisdictions and often extend into two or more States;
> (2) that the growth in the amount and complexity of air pollution brought about by urbanization, industrial development, and the increasing use of motor vehicles, has resulted in mounting dangers to the public health and welfare, including injury to agricultural crops and livestock, damage to and the deterioration of property, and hazards to air and ground transportation;
> (3) that air pollution prevention (that is, the reduction or elimination, through any measures, of the amount of pollutants produced or created at the source) and air pollution control at its source is the primary responsibility of States and local governments; and
> (4) that Federal financial assistance and leadership is essential for the development of cooperative Federal, State, regional, and local programs to prevent and control air pollution.[1525]

The FCAA divides air pollution sources into two broad categories—stationary sources and moving sources. The FCAA specifically authorizes states to regulate emissions from stationary sources.[1526] The FCAA provides, however, that states have only a limited ability to regulate emissions from new moving sources, including motor vehicles (42 U.S.C. § 7543(a)—California may adopt its own standards; all other states may either adopt the federal standards or California standards), railroad engines (42 U.S.C. § 7543(e)(1)(B)—all state regulation prohibited), marine engines or vehicles (42 U.S.C. § 7543(e)(2)—similar to motor vehicles, California may adopt its own standards and all other states may either adopt the federal standards or California standards), and aircraft (42 U.S.C. § 7573—all state regulation prohibited). Washington State is thus prohibited from regulating emissions from railroad engines. Washington has not chosen to adopt either the federal or California regulations governing emissions from marine engines.

[1524] RCW 70.94.011.
[1525] 42 U.S.C. § 7401.
[1526] 42 U.S.C. § 7416.

To carry out the intentions of the state Clean Air Act, the Legislature required that all new and modified stationary sources of air contaminants to file preconstruction notice to the applicable regulator (Ecology, a local air pollution control authority, or, in this case the Council), and to obtain approval (in an order called a Notice of Construction Approval Order) before commencing construction of the new or modified stationary emission source.[1527] Each new or modified stationary source must employ best available control technology (BACT) for each air contaminant emitted from the source.[1528] BACT is an emission limitation determined on a case-by-case basis, based on the maximum degree of reduction possible that, "taking into account energy, environmental, and economic impacts and other costs" the permitting authority determines is achievable for the source through application of production processes and available methods, systems, and techniques for control of each pollutant.[1529]

Each new stationary source must also demonstrate that its emissions will not cause or contribute to a violation of the national ambient air quality standards (NAAQS).[1530] All facilities must also meet the requirements for emissions of toxic air pollutants.[1531]

All stationary sources of air contaminants must also comply with all applicable federal new source performance standards (NSPS) for categories of sources adopted by EPA and found in 40 C.F.R. Part 60.[1532] All stationary sources must also comply with all applicable national emission standards for hazardous air pollutants (NESHAPs) adopted by EPA and found at 40 C.F.R. Parts 61 and 63.[1533] Ecology and the Council have adopted many of the NSPS requirements and NESHAPS by reference.[1534]

In addition to these requirements, new and modified *major* stationary air pollution sources, those that emit more than 100 tons per year (tpy) of any regulated air pollutant (or 250 tpy for some types of sources), must comply with EPA requirements for the prevention of significant deterioration (PSD) of air quality.[1535] These sources must obtain so-called "PSD" permits that require, in addition to the use of BACT and compliance with the NAAQS, sources to complete additional analyses to determine impacts of emissions on national parks, national monuments, national wilderness areas, and other class I areas.[1536]

b. Summary of the Parties' Positions on Air Quality Issues

Tesoro Savage. Tesoro Savage asserts that the VEDT will comply with all federal and state emissions standards. They also state that the predicted total concentrations of criteria air

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[1527] RCW 70.94.152.
[1528] RCW 70.94.152(10).
[1529] RCW 70.94.030(6).
[1530] WAC 173-400-113(3), *as adopted by reference by* WAC 463-78-005.
[1531] WAC 173-460, *as adopted by reference by* WAC 463-78-005.
[1532] 42 U.S.C. § 7411.
[1533] 42 U.S.C. § 7412.
[1534] WAC 173-400-115; WAC 173-400-075; WAC 463-78-115.
[1535] 42 U.S.C. § 7479.
[1536] 42 U.S.C. §§ 7470-7492.

pollutants resulting from emissions from the facility will not cause or contribute to a violation of the National or Washington Ambient Air Quality Standards established to protect human health and welfare. Furthermore, the VEDT Proponents assert that predicted emissions of most toxic air pollutants released from the facility are below Ecology's Small Quantity Emissions Rates (SQER). All those whose emissions are above the SQER result in ambient air concentrations below Ecology's Acceptable Source Impact Levels for toxic air pollutants. Tesoro Savage also asserts that they have minimized GHG emissions from the VEDT, and that the VEDT complies with all GHG requirements. Based on these assertions, Tesoro Savage contends that it has met its burden under WAC 463-62-070.[1537]

VEDT Opponents contend that the VEDT substantially underestimates the amount of emissions from the VEDT, and that these emissions will cause a number of serious human health impacts stemming from increased air pollution. They assert that air pollutants will be produced by the facility, as well as be induced by the facility through increased rail and vessel traffic. VEDT Opponents contend that the vapor pressure of the crude oil transported to the facility may exceed the level for which the storage tanks are designed, which will result in more emissions. They challenge the estimates of fugitive emissions from the facility and vessels as being inaccurate, and state that a number of pollutants associated with the facility are unaccounted for in the permitting process. In addition, VEDT Opponents believe that the facility should be treated as a major rather than a minor source of emissions for air permitting purposes. Finally, VEDT Opponents claim that the VEDT will significantly add to Washington's total GHG emissions, due both to emissions from the facility itself and to emissions induced by the facility from transport and combustion of the crude oil.[1538]

Ramboll Environ (Environ) prepared all of the air quality studies, data and other materials for the ASC and Notice of Construction (NOC) approval order.[1539] Tesoro Savage presented the testimony of Eric Hansen, principal with Environ.[1540] Mr. Hansen testified as to the underlying data, methodology, and analysis performed in preparing the ASC and other permitting application documents.

The ASC focused on the stationary sources at the VEDT.[1541] Mr. Hansen testified that the analysis did not include emissions from mobile sources, which includes trains and vessels. Specifically, he stated that they did not model the mobile sources as part of the air permit application, but did model them as part of the preliminary draft EIS that Environ prepared for Tesoro Savage.[1542]

[1537] Applicant Post-Hr'g Br. 17-28.

[1538] Columbia Riverkeeper Final Adjudication Br. 37-50.

[1539] PFT of Hansen 2.

[1540] Mr. Hansen has been an air quality consultant since 1978, with an expertise in air permitting. PFT of Hansen 1.

[1541] Tr. 757, vol. 4.

[1542] Tr. 713, vol. 4.

Mr. Hansen testified as to the process he used to determine the air emissions associated with the terminal. The first action taken in developing the information used in the air permit was to characterize the physical and operational characteristics of the VEDT's emission units from the stationary sources. The emission units at a stationary source are the physical equipment that's on the ground at the facility site that is under the control of the facility that emits air pollutants. The stationary source for the VEDT includes the Area 600 boilers, marine vapor combustors, storage tanks, emergency engines for fire water pumps, and leaks from the valves and connections from the piping.[1543]

For each emission unit, Mr. Hansen testified that Tesoro Savage identified what they believe is the BACT and applied that to the emission unit.[1544] After these identified BACT emission controls had been identified, Tesoro Savage calculated the potential of the VEDT to emit air pollutants with BACT in place. This was done by considering the crude oil throughput, combustion unit firing rates, and other operational and physical constraints to determine the maximum hourly, daily, and annual emissions from each emissions unit. Maximum operation of the VEDT was assumed in these calculations, which does not always occur. Tesoro Savage believes the emissions are therefore overestimated.[1545]

Mr. Hansen then testified that the annual emissions developed through the maximum potential-to-emit process were used to do dispersion modeling, and to determine the permit path he believes to be appropriate.[1546]

Mr. Hansen testified that they calculated the facility would emit 33 tons of VOCs annually.[1547] Initially, they determined that VOC emissions would exceed the PSD threshold.[1548] However, by adding and modifying emission controls, such as substituting marine vapor combustion units instead of using flare technology, they significantly reduced the facility-related emissions below the PSD permit threshold.[1549] Tesoro Savage maintains that the facility should be permitted under the minor source process and that the PSD regulations don't apply. [1550]

Columbia Riverkeeper. Dr. Ranajit Sahu testified on behalf of Columbia Riverkeeper.[1551]

1543 PFT of Hansen 12; Tr. 708, vol. 4.
1544 PFT of Hansen 2-3.
1545 PFT of Hansen 3, 20.
1546 PFT of Hansen 3-4, Tr. 708, vol. 4.
1547 Tr. 753, vol. 4; Ex.0001-000819-PCE, tbl. 5.1-11.
1548 PFT of Hansen 5.
1549 PFT of Hansen 3, 5-6.
1550 PFT of Hansen 5-6.
1551 Dr. Sahu has over 23 years of experience in the fields of environmental, mechanical, and chemical engineering. He also has over 20 years of air quality consulting experience, providing emissions calculations support including the calculation of potential-to-emit for various pollutant. PFT of Sahu 4-5.

Dr. Sahu testified that the Environ emissions calculations were inadequate because they did not include all emission sources within the VEDT.[1552] Dr. Sahu also questioned whether Tesoro Savage's BACT analysis was sufficient.[1553] Dr. Sahu also claimed that the emissions calculation was flawed, and if correctly done, the facility would be subject to major source permitting requirement.[1554] In addition, Project Opponents argue that the emissions calculation to determine major or minor source must use the emissions before BACT is applied.[1555]

c. Major versus Minor Stationary Source

Under the provisions of the state Clean Air Act, before the construction and operation of the VEDT, Tesoro Savage will need to obtain a notice of construction approval order under RCW 70.94.152. In addition, if the facility meets the definition of "major emitting facility," the VEDT cannot begin construction unless it has been issued a PSD permit.[1556] The Federal Clean Air Act provides that a petroleum storage and transfer facility with a capacity exceeding 300,000 bbl is a major emitting facility if it emits at least 100 tpy of any air pollutant other than greenhouse gases.[1557] Tesoro Savage proposes to construct a facility consisting of six storage tanks, each of which will be designed to hold approximately 380,000 barrels of crude oil.[1558] This facility will therefore be a major emitting facility if it emits 100 tpy of any pollutant other than greenhouse gases.

The pollutant with the highest potential emissions from the Tesoro Savage Project is volatile organic compounds.[1559] VOCs include a large number of air pollutants.[1560] VOCs themselves cause health concerns.[1561] In addition, VOCs mix in the atmosphere with nitrogen oxides to form ozone, which causes human health concerns.[1562] VOCs are regulated under the federal Clean Air Act as precursors to ozone.[1563] A PSD permit would be required for the Tesoro Savage project if VOC emissions exceeded 100 tpy.[1564]

Project Opponents challenge the accuracy of the facility's emission calculations for VOCs from its stationary emission units. The Project Opponents focus their challenges on the

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1552 PFT of Sahu 19.

1553 Tr. 3609-12, vol. 15.

1554 PFT of Sahu 38.

1555 *See, e.g.*, Tr. 743-49, vol. 4.

1556 Vancouver is not located in a nonattainment area, which would be an area where ambient concentrations of one or more criteria pollutants exceed the national ambient air quality standards. Tr. 3713, vol. 15. Therefore, the nonattainment program does not apply to the proposed facility. 42 U.S.C. § 7502(b).

1557 42 U.S.C. § 7479(1); *Utility Air Group v. EPA*, 134 S. Ct. 2427, 189 L. Ed. 2d 372 (2014).

1558 Ex. 00001-000815-PCE n.3.

1559 Ex. 00001-000819-PCE.

1560 40 C.F.R. § 51.100(s); WAC 173-400-030(95).

1561 PFT of Fanning 4-5.

1562 PFT of Fanning 4-5, 11.

1563 42 U.S.C. § 7476.

1564 42 U.S.C. § 7479(1).

assumed vapor pressure of the crude oil arriving at the facility, the amount of emissions coming from the storage tanks, and the amount of emissions coming from marine vessel loading.[1565]

(1) Storage Tanks—Crude Oil Vapor Pressure

Arguments and Evidence. Crude oil will be stored in six storage tanks at the terminal. The storage tanks constitute a "stationary source" as defined in WAC 173-400-030(86). EPA requires, as part of its New Source Performance Standards, that volatile organic liquid storage tanks with a true vapor pressure of up to 11.1 pounds per square inch (psi) (76.5 kPa) install a floating tank roof and a fixed roof.[1566] Subpart Kb includes requirements for ensuring that the physical mechanics of the tank are in proper working order.[1567] There is also a requirement for monitoring and recording and reporting the true vapor pressure of the contents of the tanks.[1568] If the true vapor pressure exceeds 11.1 psi, then the facility must capture and treat the vapors by installing a combustion device for emissions from the tank.[1569]

Tesoro Savage intends to comply with the true vapor pressure limit of 11.1 psi in the tanks and is not proposing to install a combustion device for emissions.[1570] In addition, Tesoro Savage has the storage tanks designed with an internal floating roof and an external roof. The internal floating roof is for vapor emissions reduction and the external roof is to prevent rainwater from commingling with any of the hydrocarbons.[1571]

VEDT Opponents assert that without appropriate testing protocols, the crude oil transported to the facility will exceed the true vapor pressure limit of 11.1 psi established for the tanks. If this occurs without a device to capture and combust the excess vapors, then there will be fugitive VOC emissions from the tanks that will impact air quality.[1572]

True vapor pressure varies with temperature, which is why Reid vapor pressure at 100 degrees Fahrenheit is used as a standardized testing method to determine the properties of oil taken from different areas as well as to determine how much vapor is in the crude oil. True vapor pressure is typically lower than Reid vapor pressure. Therefore, if the Reid vapor pressure is within the vapor pressure limits, then the true vapor pressure is within the limits as well.[1573] It is possible, however, for the Reid vapor pressure to be less than 11 psi in the storage vessels from which the crude oil is loaded onto railroad tank cars, but to have a higher total vapor pressure in the rail tank car when arriving at a terminal because the amount of vapor

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[1565] PFT of Sahu 20-38.

[1566] 40 C.F.R. pt. 60, subpt. Kb (Standards of Performance for Volatile Organic Liquid Storage Vessels).

[1567] 40 C.F.R. § 60.113b.

[1568] 40 C.F.R. § 60.116b, .115b.

[1569] 40 C.F.R. § 60.112b(b).

[1570] PFT of Hack 2; Tr. 703, vol. 4; Tr. 581, vol. 3; Tr. 671-72, vol. 4; Tr. 4875, 4903, vol. 21; Tr. 3614, vol. 15.

[1571] Tr. 564-65, vol. 3; Tr. 672, vol. 4; PFT of Olavson 1-2.

[1572] PFT of Sahu 20; Tr. 3614, vol. 15.

[1573] Tr. 671, vol. 4; Tr. 4874, vol. 21; Tr. 3615-17, vol. 15.

space at the top of a tank car affects the vapor pressure. The less vapor space, the higher the vapor pressure.[1574]

Bakken crude oil has a range of vapor pressures. Some of this oil can have a psi over 11 in terms of true vapor pressure if it's not conditioned. North Dakota has imposed requirements for conditioning crude oil at the wellhead or in the field so that the oil meets certain pressure and temperature requirements before shipment by rail. If conditioning of the oil occurs, the vapor pressure numbers are not substantially different from most of the crude.[1575]

Vapor pressures of Bakken crude oil have been measured and tested at Reid vapor pressures greater than 15 psi. A Reid vapor pressure of 15 psi would translate somewhere into the 13 range of true vapor pressure.[1576] The American Petroleum Institute (API) recently produced a comparison of certain characteristics of Bakken crude oil to other crudes, including vapor pressure. For Bakken crude oil, a chart from this report shows an average Reid vapor pressure of 11.8 and a maximum vapor pressure of 15.37.[1577]

The vapor pressures of Bakken crude oil samples found by the API are not consistent with Tesoro Savage's testing, which produce an average Reid vapor pressure of about ten and one-half. Tesoro's test results have been consistent for over the last two years.[1578]

The American Fuel & Petrochemical Manufacturers also assembled a survey of Bakken crude oil in 2014 for the U.S. Department of Transportation. Based on the data submitted by the survey respondents, Bakken crude oil offered for transportation had Reid vapor pressure values that ranged from 0.8 to 15.54 psia.[1579] This bar graph shows the greatest number of Reid vapor pressure values to be between 12 and 13.[1580] The Manufacturers Survey, however, also contains a chart indicating that the highest pressure value measured in rail tank cars upon arrival at a refinery was 11.3 psig. (The document refers to psig, which presumably refers to true vapor pressure.)[1581]

It is possible for vapor pressure to change in transit if there are large differences in temperature from when it is taken and when it arrives at the terminal.[1582] Because Reid vapor pressure is tested at 100 degrees Fahrenheit, however, the temperature variation would have to be extreme. Movement of the oil inside the rail cars during transit does not affect the vapor

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[1574] Tr. 3658-60, vol. 15.
[1575] PFT of Rhoads 13; Tr. 674, vol. 4.
[1576] Tr. 3624, vol. 15.
[1577] Ex. 5521-000005-CRK; Tr. 675, vol. 4.
[1578] Tr. 674-75, vol. 4; Tr. 4875, 4901, vol. 21.
[1579] Psia means pound per square inch actual.
[1580] Ex. 5523-000056-CRK; Tr. 677-78, vol. 4.
[1581] Ex. 5523-000058-CRK.
[1582] Tr. 3623-24, vol. 15.

pressure.[1583] Testing reported in the North Dakota Petroleum Council Study showed that throughout transportation the vapor pressure in the test rail cars remained consistent.[1584]

It is important when filling rail cars with oil that a representative number of samples are taken. If all the rail cars are being filled by the same storage tank, then a sample from that tank may be sufficient. Testing the vapor pressure from the point of origin is still important to ensure the vapor pressure will not exceed 11-psi true vapor pressure at the Tesoro Savage facility's storage tanks.[1585] A sampling protocol for arriving trains at the Tesoro Savage facility is needed, together with sufficient recordkeeping, and these must be established as enforceable conditions.[1586] API finds that when loading a train from a single storage tank, one sample may be sufficient because the same product is being loaded into all the rail cars. If a unit train is being filled by more than one tank, then samples from both tanks should be taken.[1587]

Tesoro Savage tests the vapor pressure of the crude oil at both the origin and destination. Testing at the origin facility, helps with compliance for properly classifying the oil by hazard class as well as monitoring the floating roof storage tanks. The vapor pressure of the crude oil is tested at the destination to ensure that the floating roof crude oil storage tank is within EPA's total vapor pressure limit of 11.1 psi.[1588]

Tesoro Savage currently conducts testing at its own facilities when it receives oil from its customers, and includes the testing in its agreements and contracts with its customers. The VEDT will take oil from other places in addition to the Tesoro facility in North Dakota, but it will put limits on the oil characteristics it receives from its customers, just as it does at its current facility in North Dakota.[1589]

Tesoro takes samples both from the storage tank at the point of origin and the pipeline as oil is being loaded into rail tank cars.[1590] When a sample is being drawn from the tank, a grab sample from the pipe is also being taken. The results are obtained in about an hour, before the oil ships. It is standard practice to load a unit train by drawing from a single tank. Once the unit train is loaded, nothing is added to the system. No topping off the rail cars is done.[1591] Reid vapor pressure tests are always run for loading rail cars because it is required, but total vapor pressure tests can be run as well.[1592]

[1583] Tr. 693-94, vol. 4.
[1584] Ex. 2005-0000029-CLA.
[1585] Tr. 3619-23, vol. 15.
[1586] Tr. 3623-26, vol. 15.
[1587] Ex. 0238-000030-TSS.
[1588] PFT of Hack 4-6; Tr. 1611, 1614, vol. 7; Tr. 692, vol. 4.
[1589] Tr. 671, 675-76, vol. 4.
[1590] Tr. 4874, vol. 21.
[1591] Tr. 4863-64, vol. 21.
[1592] Tr. 4874, vol. 21.

Some customers want to test the properties of the oil before it goes into the railcar. In that case, the mixers in the storage tanks at the point of origin are turned off, the oil sits, and then samples are drawn from the tank and sent to the lab.[1593] For some other customers, in-line sampling of the oil is conducted during the loading and unloading process by using a sample tube. The tube has holes in it that takes a couple of milliliters of oil at different intervals during the loading or unloading process. The sampler is at the end of the pipe that is loading oil into the rail cars, so all of the material goes past the sampler. The grab sample in the pipe is in an enclosed canister so it is not exposed to the atmosphere. When the sample is pulled, another canister is changed in, and the removed canister is taken to the lab for testing. This produces a cumulative grab sample of oil during the loading and unloading process. Under this batch sampling process, not every car is sampled during the loading and unloading process, but the oil going into the cars are sampled in the aggregate. A third party is responsible for taking the samples.[1594]

There is a sampler in the Area 200 unloading area at the VEDT, which would take a cumulative grab sample when a unit train reaches the Vancouver facility. Testing would be done at a facility in Vancouver to ensure the crude oil meets the ASTM testing standards for the crude oil that will be shipped. There is no need for an onsite lab because the facility in Vancouver can turn samples around very quickly.[1595] For unloading oil at Vancouver, a test for true vapor pressure is done because that is what is required for the tank, but a test for Reid vapor pressure could also be done.[1596]

If a sample from an incoming train at the VEDT shows a vapor pressure in excess of 11 psi, the train would still be unloaded and the oil mixed with other product in a receiving tank.[1597] All of the tanks have mixers to prevent the crude oil from stratifying during storage.[1598] A sample would be pulled from the storage tank and tested to verify that Tesoro Savage is in compliance at the tank. Oil from one train fills about one-fifth to one-quarter of the one tank. Tesoro Savages asserts that it is highly unlikely for a tank to be out of compliance because of the years of history of testing the vapor pressure from different areas of origin. Any violation in the tank would be reported immediately to the Council and Ecology or the clean air agency.[1599]

Tesoro has had no problems maintaining the 11-psi total vapor pressure limit in their storage tanks at their existing facilities. Looking at sampling data for the past year, at both the point of origin facility in North Dakota and the destination in Washington, the total vapor pressure average was less than 7 psi, and the high total vapor pressure reading at Anacortes in a tank was 8.1.[1600] This past evidence suggested to Tesoro that exceeding the total vapor pressure

[1593] Tr. 4862, vol. 21.
[1594] Tr. 679, vol. 4; 4863, 4876, vol. 21.
[1595] Tr. 4864-66, vol. 21.
[1596] Tr. 4877, vol. 21.
[1597] Tr. 4865, vol. 21.
[1598] PFT of Gibbs 6.
[1599] Tr. 4865, 4878, vol. 21.
[1600] Tr. 1614-15, vol. 7.

is not a concern, so the tanks were designed to the vapor pressure that it has seen historically.[1601]

Summary of the Council's Analysis of Storage Tank Crude Oil Vapor Pressure Discussion. The Council finds that the testimony offered by Tesoro's witnesses is credible with respect to the question of whether or not the true vapor pressure of the oil in the storage tanks will exceed the 11-psi limit. Tesoro's history of oil shipments demonstrates that the vapor pressure is below this regulatory limit. Tesoro helps ensure this limit is met by requiring it as a condition in its agreements and contracts with its customers. The survey submitted by the American Fuel & Petrochemical Manufacturers indicated that the highest pressure value measured in rail tank cars upon arrival at a refinery was 11.3 psi.

However, Tesoro Savage did admit that that the vapor pressure may exceed 11.1 psi. In the event that a trainload of oil exceeds 11.1 psi, this oil would be mixed with other oil in the storage tank and then tested. The volume of an entire train would constitute a fifth to one-quarter of the tank volume. Although it is possible for a tank to test higher than 11.1 psi after a train with a slightly higher psi is unloaded, it is very unlikely. Mr. Corpron testified that if the vapor pressure were in excess of 11 psi, it would be reported to the Council and Ecology or the air-permitting agency.[1602]

(2) Storage Tanks – Fugitive VOC Emissions

Storage Tank Roofs. Terminal storage tank design requires a fixed roof as well as an internal floating-roof with primary and secondary seals. The floating roof floats at all times on the surface of the tank contents.[1603] When there is a total vapor pressure in the range of about 7 psi, it is typical to put in an internal floating roof to help seal against emissions because the roof reduces the surface area. It is only the surface area of the tank and not the surface area of the top of the oil as well that will emit.[1604]

Currently the tanks have a mechanical shoe primary seal that presses against the wall of the tank, and a secondary wiper seal mounted above the primary seal so it cleans off the top of the tank as it slides back down. Any residual that's sitting on the tank can off-gas as a fugitive emission.[1605]

Tesoro Savage Estimated Storage Tank Emissions Using AP-42 and TANKS. VEDT Opponents dispute the accuracy of the estimates of VOC emissions from the storage

[1601] Tr. 4901-04, vol. 21.
[1602] Tr. 4878, vol. 21.
[1603] PFT of Hansen 12.
[1604] Tr. 4903, vol. 21.
[1605] Tr. 682, vol. 4; Tr. 4903, vol. 21; PFT of Gibbs 7.

tanks made by the VEDT Proponents. Dr. Sahu estimates that the VOC emissions from the storage tanks are somewhere between three to seven times higher.[1606]

The tanks will have emissions even if the vapor pressure is below 11 psi but there will be more of them if it is above 11 psi. This is why a collection system is installed to pull any vapors when there is a total vapor pressure above 11 psi.[1607]

Tesoro Savage calculated the emissions for the crude oil storage tanks using EPA's AP-42 Chapter 7.1 and TANKS 4.0.9d program (TANKS).[1608] Daily VOC emissions from the storage tanks were calculated at 22.2 pounds.[1609] Annual VOC emissions from the storage tanks were calculated at 1.89 tons.[1610]

AP-42 is a collection of emission factors, a collection of methodologies EPA has had in some form since 1970. Each of the methodologies is rated based upon reliability, with A-rated emission factors considered as more reliable and F-rated emission factors considered as highly unreliable. Higher rated emission factors have more data that supports them. The user is supposed to exercise good judgment and carefully evaluate how different factors apply to the situation.[1611]

TANKS is a computerized version of the equations and the methodologies in AP-42. Some errors have been discovered in the TANKS program implementation of the equations. The EPA website identified several glitches in the program. Skilled modelers know how to avoid these glitches. None of the glitches identified on the website affected the emission calculations for the VEDT.[1612]

EPA no longer supports the TANKS software program for its use in some Windows platforms, and AP-42 contains a warning about software compatibility.[1613] The lack of support pertains to technical software support. EPA continues to support all of the equations in AP-42.[1614]

Columbia Riverkeeper Estimated Storage Tank Emissions Using LIDAR or DIAL. Differential absorption LIDAR, (Light Detection and Ranging) or DIAL, is a field measurement technique, which uses remote sensing to pick up the signatures of various volatile organic compounds. Dr. Sahu relied upon DIAL, rather than a set of equations, to say that the tank emissions are underestimated. DIAL uses long path laser or LIDAR type of measurements to

[1606] PFT of Sahu 36-37; Tr. 3593-97, 99, vol. 15.
[1607] Tr. 3695-96, vol. 15.
[1608] PFT of Hansen 12-13.
[1609] Ex. 0001-000819-PCE, Table 5.1-10.
[1610] Ex. 0001-000819-PCE, Table 5.1-11.
[1611] Tr. 3671, vol. 15.
[1612] Tr. 731-33, vol. 4.
[1613] PFT of Sahu 34; Tr. 3627, 3669, vol. 15.
[1614] Tr. 732-33, vol. 4.

determine how much VOCs are leaving the vicinity of the source. DIAL can show a huge disparity between TANK emission calculations and actual emissions.[1615]

The TCEQ Project observed that DIAL has some limitations, including a lack of official established protocols, its dependence on accurate wind measurements, and the fact that the equipment and data analysis are complicated and expensive.[1616] Although DIAL informs about all the volatiles that might be leaving a vicinity, it doesn't distinguish between tanks and may include emissions from other VOC sources. The TCEQ project took place at a large refinery with many sources of fugitive VOCs, and DIAL was measuring all of them. Therefore, the fact that there were discrepancies between DIAL measurements and tank-specific TANKS emission calculations measurements does not mean that the TANKS program is not operating properly. [1617]

The TCEQ Project reviewing DIAL found that emission measurements with DIAL were five times the hourly tank emissions estimated using TANKS. One possible explanation is that TANKS has a single crude oil parameter default of Reid vapor pressure of 5 psi.[1618] The TCEQ Project recommends that actual vapor pressure and other physical property parameters be input into the TANKS program for crude and mid-refined products with vapor pressures that vary. The Applicant used a vapor pressure of 11 when calculating emissions rather than the TANKS default of 5 psi.[1619] Furthermore, the study recommends that actual storage tank design be input into the TANKS program rather than average settings or design defaults.[1620]

Dr. Sahu did not attempt a detailed calculation of the potential to emit because he did not have the requisite detailed engineering data. Instead, he took the calculations for tank emissions that were estimated by the applicant, and multiplied them by a factor of five to produce his best engineering estimate of the amount of emissions from the tanks.[1621] Dr. Sahu was unaware that the applicant conducted a spreadsheet exercise using the AP-42 methodology to verify the TANKS results.[1622]

The six storage tanks can hold approximately 380,000 bbl each, but internal floating roof tanks are never completely full and are expected to operate at a normal fill capacity of 360,000 bbl.[1623] After the Applicant developed a preliminary design for the storage tanks, the calculations regarding the tanks were updated. Working capacity is slightly lower than normal fill capacity. Each tank was assumed to have a working capacity of 342,000 barrels based upon the design drawings. Annual throughput for each of the tanks will be 919,800,000 gallons per year,

[1615] Tr. 3600, 3627-28, 3671-72, vol. 15; Ex. 5524-000030-59-CRK.
[1616] Ex. 5524-000035-CRK.
[1617] Tr. 734, vol. 4.
[1618] Ex. 5524-000038-CRK.
[1619] Tr. 727, vol. 4.
[1620] Ex. 5524-000057-58-CRK.
[1621] Tr. 3595-97, 3599, vol. 15.
[1622] Tr. 3669, vol. 15.
[1623] Ex. 0001-000815-PCE, n.3.

for a total facility throughput of 131,400,000 bbl per year. Each tank is expected to turn over 64.06 times per year when the facility is working at full capacity.[1624]

Two of the six storage tanks will be heated.[1625] Heated tanks required additional emissions analysis. When crude oil is heated it will volatilize more, similar to how water boils and evaporates faster when it is heated. After the unheated tanks were evaluated using TANKS, a spreadsheet that mirrors those calculations was created to do the special calculations for the higher temperature. The spreadsheet changed the vapor pressures of the crude oil and the constituents of interest to reflect the maximum stock temperature of the heated tanks, which will be 150 degrees Fahrenheit.[1626]

The TANKS program is difficult to use with heated tanks and tanks with hot products. There is limited information on vapor pressures at elevated temperatures. The TCEQ Project that evaluated DIAL recommends that the TANKS program address potential significant issues with heated tanks and hot products.[1627]

Currently, Tesoro Savage does not plan to monitor for fugitive emissions from the storage tanks nor does the federal new source performance standard found at 40 C.F.R. Part 60 Subpart Kb require such monitoring. Mr. Corpron testified that they could look into setting up monitoring stations around the perimeter of the tank farm in order to monitor for fugitive emissions. However, there is no intent to establish that monitoring absent a requirement from the Council.[1628]

Summary of the Council's Analysis of Storage Tank Fugitive VOC Emissions. The Council finds that Tesoro Savage's calculation of the potential to emit VOCs from the unheated storage tanks uses an accepted methodology. The TANKS program, despite some limitations, is still a reliable source of methodologies and calculations and is accepted by EPA. Tesoro Savage did not rely upon the TANKS program default of 5 for vapor pressure when calculating emissions, but instead used the much more accurate vapor pressure of 11. Tesoro Savage verified the calculations made by the TANKS program by the AP-42 spreadsheet exercise. The VEDT Opponents were unaware that the spreadsheet exercise was conducted. The use of field measurements from DIAL may include emissions from other facilities. A number of limitations were also identified in the TCEQ Project that evaluated DIAL. This differs from the information related to vapor emissions from heated tanks. The Council finds that because there is limited information on vapor emissions from heated tanks, and that the TANKS program does not work well with heated tanks, and that by heating the oil there are more vapors created, the Council is not sufficiently confident that the calculations for VOC emissions from heated tanks is correct.

[1624] PFT of Hansen 13; Ex. 0001-000815-PCE.
[1625] PFT of Olavson 1-2.
[1626] Ex. 0122-000005-TSS; Tr. 730-32, vol. 4; Ex. 0001-000816-PCE.
[1627] Ex. 5524-000056-CRK.
[1628] Tr. 682-83, vol. 4.

The Council also finds that there is currently no plan to monitor for actual emissions.

(3) Marine Vessel Loading

Arguments and Evidence. Approximately one vessel per day will call at the dock.[1629] The vessels that come to the VEDT will usually be a 46,000-ton tanker, but there will be some larger ones. These size tankers are approximately 600 feet long. All of these vessels have six sets of tanks for a total of 12 cargo tanks.[1630]

As an empty vessel at the VEDT's dock is loaded with crude oil from the storage tanks, existing vapors from the barge compartments will be displaced as new liquids are pumped into the compartments. Vapors from the crude oil that is being loaded into the vessel will also be emitted. These vapors are meant to be captured by a hose, which takes them to eight MVCUs where the vapors are burned to destroy the VOCs. Any vapors not captured by the vapor hose system will vent to the atmosphere.[1631] It takes approximately 16 to 20 hours to load a vessel. After the ship is loaded, the hoses are drained and disconnected. A vessel will be at the dock approximately 24 hours.[1632]

When discussing an emission control device such as a MVCU, you have to look at two parameters. The first is how much of the vapors the control device collects or captures. The second is how well the control device destroys what has been captured.[1633] For the second parameter (destruction rate), the MCVU vendor guarantees 99.9 percent control efficiency (destruction rate), and Tesoro Savage received test data that confirmed this guarantee. Tesoro Savage used a 99.8 percent control efficiency for its calculations to be more conservative.[1634]

The VEDT assumes that it has a 100 percent capture or collection efficiency. This efficiency rate was provided to the air modeler by Tesoro Savage.[1635] EPA guidance allows a facility to assume 100 percent capture of VOCs during vessel loading if a precisely controlled negative pressure is maintained in the hold of the tank.[1636] The process for loading a vessel at the facility, however, requires the vessel to maintain a slight positive pressure to prevent oxygen from leaking into the holds and creating a risk for explosion.[1637]

EPA's guidance on capture efficiencies for vapor collection systems on tank trucks carrying non-gasoline provides a capture efficiency of 95 percent for tankers with annual leak

[1629] Tr. 861, vol. 4.
[1630] Tr. 4540-41, vol. 19.
[1631] PFT of Sahu 25.
[1632] Tr. 796-800, vol. 4.
[1633] Tr. 729, vol. 4.
[1634] PFT of Hansen 12; Tr. 583, vol. 3.
[1635] Tr. 729-730, vol. 4.
[1636] Tr. 3632-33, vol. 15; PFT of Sahu 30 (citing Emission Estimation Protocol for Petroleum Refineries, Version 3, at 9-7 (Apr. 2015)).
[1637] Tr. 817, vol. 4; Tr. 3631-33, vol. 15.

checks, and a capture efficiency of 97.5 percent for tankers that have semi-annual leak checks.[1638] After a vessel has docked and a pre-meeting and a safety inspection around the ship to ensure that the equipment is properly in place, two 10-inch cargo hoses are connected to the tanks on the ship, and one 10-inch vapor hose is connected onto the forward vapor header of the ship. It is not possible to cross-connect a cargo hose or a vapor hose. Flow is initiated slowly from the terminal to the ship and flow on to the ship is verified. At the same time, when a slight differential of a higher (positive) pressure on the ship and a lower pressure on the shore occurs, then the vapor valve on the ship is opened and the vapors flow to the marine vapor combustion unit. All the ships have pressure vacuum sensors that keep them within a working range.[1639]

Although a slight negative pressure is maintained at a monitoring point close to where the vapors are sent into the combustion unit, the vessel always maintains a positive pressure pursuant to Coast Guard standards.[1640] By meeting this positive pressure safety standard to prevent oxygen from entering, vapors will escape to the outside.[1641]

All vessels coming to the VEDT must be certified vapor tight and will have inert gas composed of CO_2 gas from the vessel's combustion engines. All of the vessels are "vapor tight", meaning there are no fugitive emissions coming from the ships because all gaskets and valves are tight with no vapors leaking to the atmosphere. Third-party independent inspection companies are hired to test the apertures around the ship with a VOC sniffer (detector). The last five or six ships recently tested were found to be 100 percent vapor tight. The VOC sniffers will not be used every time a vessel is loaded, ships will be checked and certified vapor tight periodically.[1642] Tesoro Savage will require annual testing to vet the ships.[1643]

Vapor tightness as part of Coast Guard certification is not a Clean Air Act concept. On an annual basis, the vessel must demonstrate that it can hold pressure within a specified tolerance over a given period of time. Alternatively, vapor sniffers can be used to show that the level of VOCs detected are below a certain level. Annual Coast Guard certificates of vapor tightness do not provide support for 100 percent vapor capture.[1644]

The VOC sniffers are extremely sensitive. A marking pen will set one off. Three types of VOC sniffers are used in areas where their ships operate: a multi-ring, a fox burrow, and a photo vac. These instruments measure VOCs down to 0.1 parts per million and 0.5 parts per million up to 5000 or 10,000 parts per million. One instrument reads out at increments of 0.1 parts per million, and another reads out at increments of 0.5 parts per million. These units are calibrated

[1638] PFT of Sahu 29-30, (citing Emission Estimation Protocol for Petroleum Refineries, Version 3, at 9-7) (Apr. 2015); Tr. 3634-36, 3647, 3687, vol. 15.
[1639] Tr. 796-800, 816-17, vol. 4.
[1640] Tr. 684-86, vol. 4.
[1641] Tr. 3632, vol. 15.
[1642] Tr. 814-15, 819, 860-61, vol. 4.
[1643] Tr. 4551-52, vol. 19.
[1644] PFT of Sahu 26.

annually by the manufacturer. The units calibrate every time it is put into the docking station to charge.[1645]

A VOC inspector will come out to the ship after the start of the loading process and bring the sniffer. The sniffer undergoes a self-check process after it is turned on. The inspector then works around the entire ship and takes readings at the flanges, valves, tank tops, and other potential sources of emissions. The sniffer testing is done within a few inches of the source. If a sniffer gets a reading during a test, an audible and a visual alarm are triggered. The readings at each place are documented and provided at the end of the inspection to the vessel and the terminal.[1646] However, wind conditions may affect a sniffer's ability to detect small VOC leaks.[1647] The Council notes that winds along the Columbia River Gorge can be heavy and sustained.

Summary of the Council's Analysis of Marine Vessel Loading. The Council weighs the expertise of Dr. Sahu and Mr. Bayer in helping it to decide the question of whether a vessel can truly be vapor tight, and the effectiveness of the sniffers in detecting leaks under all conditions. Dr. Sahu is an expert in air quality.[1648] Mr. Bayer has a considerable amount of experience, but he is not an air quality expert. The Council therefore gives more weight to Dr. Sahu's testimony with respect to emissions from marine vessel loading.

Dr. Sahu used the same methodology as Tesoro Savage for calculating an emissions estimate for the vessel loading but used different input values for the calculation. For example, he used a vapor pressure of 13.347 psi, and Tesoro Savage used a true vapor pressure of 11 psi. Dr. Sahu also used a capture or collection efficiency of 95 to 98.7 percent.[1649]

Molecular weight is a factor when calculating mass emissions of a vapor to determine the pounds per hour or tons per year of an emitted pollutant.[1650] Dr. Sahu questions the vapor molecular weight used by Tesoro Savage in the calculations for the facility. The assumptions Dr. Sahu made based upon the components of Bakken oil that are most likely to be volatile, yielded a vapor molecular weight of 110 lb/lb-mole. EPA's AP-42 guidance states that the vapor molecular weight for crude oil with RVP of 5 should be 50 lb/lb-mole. For purposes of his calculations, Dr. Sahu used a vapor molecular weight of 50 lb/lb-mole as an input value.[1651]

Mr. Hansen, who conducted the calculations for Tesoro Savage, noted that AP-42 contains a very extensive discussion of emissions for tanks. He testified that he used a

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[1645] Tr. 861, vol. 4; Tr. 4539-40, vol. 19.
[1646] Tr. 4541-43, vol. 19.
[1647] Tr. 3639, vol. 15.
[1648] Ex. 5520-000010-19-CRK.
[1649] PFT of Sahu 31.
[1650] Tr. 727-28, vol. 4.
[1651] PFT of Sahu 24, 31.

molecular weight of 50 for crude in his calculations, as AP-42 provides.[1652] However when looking at the calculations, Mr. Hansen used a value of 44.868 lb/lb-mole.[1653] Tesoro calculated a daily VOC emission rate of 101 pounds per day.[1654] Tesoro Savage calculated an annual VOC emission rate of 8.64 tons.[1655]

The Council finds that Tesoro Savage over-estimated the efficiency rate of capture of VOCs emissions during vessel loading. The Council is persuaded that the slight positive pressure in the vessel will result in at least some fugitive emissions of VOCs. The Council is unconvinced that the sniffers will always detect small VOC leaks under windy conditions, which are frequently present in the Gorge area. The Council is also unconvinced that annual certification of vessels as "vessel tight" warrants a finding that 100 percent of the VOC emissions will be captured. In addition, the Council finds that Tesoro Savage should have used a vapor molecular weight of at least 50 lb/lb-mol in its emission calculations for the vessel loading.

The Council does not totally agree with Dr. Sahu's calculations. For example, we find that Tesoro Savage's use of a vapor pressure of 11 psi to be appropriate rather than Dr. Sahu's use of 13.347 psi. The Council finds that some percentage of VOC emissions should be assigned to vessel loading, but is unable to state at what level that percentage should be set. It is possible that more information will come before the Council through the air permitting process, which will allow for a more accurate capture efficiency rate to be established.

(4) VOC emissions from other stationary sources

Arguments and Evidence. Tesoro Savage also calculated daily emission rates and annual emission rates for the boilers, the fire water pumps, and components in Area 600.[1656] The VEDT Opponents did not raise concerns about the calculations for the Area 600 boilers or the fire water pumps. The daily VOC emissions calculated for the Area 600 boilers were 22.2 pounds per day; the annual VOC emissions were calculated at 1.89 tons per year. The daily VOC emissions calculated for the fire water pumps was 0.411 pounds per day; the annual VOC emissions was calculated at 0.00689 tons per year.[1657]

Although no specific errors were raised by the VEDT Opponents with respect to calculations of VOC emissions from components of the stationary sources, some questions were raised about their accuracy and the ability to detect leaks.

[1652] Tr. 728-29, vol. 4.
[1653] Ex. 0001-000814-PCE, n.4.
[1654] Ex. 0001-000819-PCE, Table 5.1-10.
[1655] Ex. 0001-000819-PCE, Table 5.1-11.
[1656] Tr. 708, vol. 4; Ex. 0001-000819-PCE.
[1657] Ex. 0001-000819-PCE, Tbls. 5.1-10, 5.1-11.

Sources of fugitive emissions from the Tesoro Savage source include valves, flanges, and seals. Every one of these is given an emissions rate. Tesoro Savage assumed these components would leak because each is a potential source.[1658]

Fugitive VOC emissions from components were calculated by using information and methods by the "Protocol for Equipment Leak Estimates" (EPA 453-R95-017).[1659] The daily VOC emissions from components were calculated at 4.50 pounds per day.[1660] The annual VOC emissions were calculated at 0.822 tons per year.[1661]

Technology helps to address fugitive emission concerns. Most manufacturers have already switched to low emissions valves, which have much, much lower emissions than standard valves. As a valve stem rotates, the movement can allow an emissions release. The current standard is 500 parts per million. The low emissions valve tests observed by Tesoro on 3 valves, in which 5000 cycles are run on a valve, produced emissions of 15 ppm. The tests were conducted at 650 psi and 350 degrees Fahrenheit. Low emissions valves would be used at the facility.[1662]

Flex metallic gaskets will be used at the facility. They are a spirally wound very thin steel material that is compressed. They are a one-time use gasket, so they are expensive. These gaskets will also reduce emissions.[1663]

There is not an automatic leak detection system on the transfer pipelines, but there is a chemical cover on any area of a pipeline that has a flange or gasket. The chemical cover changes color when exposed to vapors, so it would be observable during the daily inspections of the pipeline. The system would be shut down and maintenance would be performed if this occurred.[1664]

There is an automatic tank gauging system, which is a flow measurement system that is accurate to one or 2 millimeters on the tanks, and there are flow meters on the pipeline. Tesoro Savage matches what is coming out of the cars and what is going into the tank, and what is coming from the tank to the Area 400 load-out for vessels. Tesoro Savage is looking into different devices to assist them with being able to tell how much would have to leak before they would notice the difference. The pipeline will also be tested at least yearly at a higher pressure than normal to look for leaks.[1665]

[1658] Tr. 682, vol. 4.
[1659] Ex. 0122-000004-TSS.
[1660] Ex. 0001-000819-PCE, Tbl. 5.1-10.
[1661] Ex. 0001-000819-PCE, Tbl. 5.1-11.
[1662] Tr. 4868, vol. 21.
[1663] Tr. 4869, vol. 21.
[1664] Tr. 4894-95, vol. 21.
[1665] Tr. 565, vol. 3; Tr. 4894-95, vol. 21.

VEDT Opponents argue that emissions from tankers berthed at the loading dock are stationary rather than mobile sources of emissions. The tanker's engines do not continue to operate while the ship is at dock. One generator is operating to keep lights on and keeping the bow's pump operating. The ships only utilize ultra-low sulfur fuel.[1666] VEDT Opponents do not cite to any authority for including these other emissions from the tankers.

Summary of the Council's Analysis of VOC Emissions from Components. The Council finds that the VOC emissions from the Area 600 boilers, the fire water pumps, and the components of the stationary sources were properly calculated.

(5) Emissions from Mobile Sources

Tesoro Savage's ASC focused on the stationary sources at the terminal.[1667] Mr. Hansen testified that the analysis did not include emissions from mobile sources, which includes trains and vessels. Specifically he stated that they did not model the mobile sources as part of the air permit application, but did model them as part of the preliminary draft EIS that Environ prepared for Tesoro Savage.[1668]

Air emission sources are broadly categorized as stationary sources and mobile sources. Air permits are required for the construction and operation of emission units associated with a stationary source. A "stationary source" is defined as: "[A]ny building, structure, facility, or installation which emits or may emit any air contaminant. This term does not include emissions resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in Section 216(11) of the Federal Clean Air Act."[1669] For the purposes of the federal PSD program, "major emitting facility" is defined as a *stationary source* with a *potential to emit* at least 100 tons per year of various pollutants.[1670] EPA has defined "potential to emit" as "the maximum capacity of a *stationary source* to emit a pollutant . . . ."[1671]

Summary of the Council's Analysis of Emissions from Mobile Sources. The Council concludes that, under this regulatory framework, emissions from mobile sources are not considered as part of the emissions evaluated for air permitting. However, this issue should be addressed outside the permitting context.

[1666] Tr. 882-83, vol. 4.
[1667] Tr. 757, vol. 4.
[1668] Tr. 713, vol. 4.
[1669] WAC 173-400-030(86).
[1670] 42 U.S.C. § 7479(1).
[1671] 40 C.F.R. § 51.166(b)(4) (emphasis added).

(6) The Application of BACT and PTE

VEDT Opponents argue that the emissions calculation to determine major or minor source must be applied to facility's emissions before the BACT is applied.[1672] The Federal Clean Air Act provides that a major emitting source is one with a potential to emit at least 100 tpy of any given pollutant.[1673] Potential to emit is defined as "the maximum capacity of a stationary source to emit a pollutant under its physical and operational design. Any physical or operational limitation on the capacity of the source to emit a pollutant, including air pollution control equipment . . . shall be treated as part of its design if the limitation . . . is federally[1674] enforceable."[1675] Here, Washington state law requires each source, whether major and minor, to use BACT.[1676]The BACT requirement must be included in each approval order before a new source may be constructed.[1677] Failure to comply with requirements in an approval order is a violation of the state Clean Air Act punishable by penalty and other measures.[1678] Therefore, the requirement to use BACT is an enforceable requirement applicable to a source. The Council concludes that, under this regulatory scheme, emissions to determine whether a source is major or minor must be calculated after state BACT requirements have been applied.

(7) Greenhouse Gas Emissions

GHG are not included in a determination of whether a source is a major source under the federal Clean Air Act, but if a source is required to get a PSD permit because some other pollutant makes that source a major source, then BACT must be met for GHGs if GHG emissions are above a level of 75,000 tpy.[1679] Tesoro calculated that its potential to emit GHGs is 95,000 tpy.[1680] Under earlier project designs, the GHG emissions for the VEDT exceeded 100,000 tons.[1681] But with changes in design, they were able to bring that rate down.[1682]

Ecology's rules provide that the agency will not evaluate GHG emissions when approving the construction or modification of minor new sources.[1683] The version of this

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[1672] Tr. 743-49, vol. 4.

[1673] 42 U.S.C. § 7479.

[1674] Courts have determined that EPA may not require federal enforceability. *National Mining Ass'n v. U. S. E. P. A.*, 59 F.3d 1351 (D.C. Cir. 1995). EPA has acknowledged that the term "federally enforceable" in this regulation means enforceable as a practical matter. EPA Guidance - Memo from John S. Seitz to Regional Office Addresses, Subject: Release of interim [sic] Policy on Federal Enforceability of Limitations on Potential to Emit, Jan 22, 1996.

[1675] 40 C.F.R. § 51.166(b)(4).

[1676] RCW 70.94.152(10).

[1677] RCW 70.94.152(10).

[1678] RCW 70.94.425, .430, .431.

[1679] *Utility Regulatory Air Group v. E.P.A.*, 134 S. Ct. 2427 (2014); Prevention of Significant Deterioration and Title V Permitting for Greenhouse Gases: Removal of Certain Vacated Elements, 80 Fed. Reg. 50199, 50202 (Aug. 19, 2015).

[1680] Tr. 724, vol. 4.

[1681] Tr. 744, vol. 4.

[1682] Tr. 744, vol. 4.

[1683] WAC 173-400-110(5).

regulation that the Council has adopted by reference predates Ecology's inclusion of this provision. Therefore, the Council is free to evaluate GHG emissions from the VEDT, and to require Tesoro Savage to impose BACT on its GHG emissions. To Council's knowledge, such a decision would be the first time in Washington that BACT for GHGs would be required for a minor source. Given the VEDT design considerations and mitigation for GHG emissions that Tesoro is offering, they might claim that the VEDT is already applying BACT to the GHG emissions.[1684]

(8) Summary of the Council's Analysis of Major versus Minor Stationary Source Permit Requirements

Tesoro Savage estimates VOC emissions as 33.15.7 tpy.[1685] Tesoro Savage intends to limit the vapor pressure within the storage tanks by controlling the vapor pressure of the oil it will accept at the Vancouver facility to 11 psi.

For the unheated tanks, subpart Kb is the appropriate regulatory standard to apply to the tanks. For the heated tanks, however, because of the lack of evidence and the inability for the TANKS program to address heated oil, coupled with the lack of scientific studies and consensus on emissions from heated tanks, there is insufficient evidence to find that the heated tanks will be limited to 11 psi.

The calculations for VOC emissions from marine vessel loading underestimated the amount of emissions. The facility should not assume a 100 percent capture rate of VOCs, and the calculations should be redone using a molecular weight of at least 50 lb/lb-mole, based upon a true vapor pressure of 11 psi. These calculations will then reflect a more accurate impact.

In addition to the marine vapors and storage tank emissions, Tesoro Savage included the appropriate stationary sources at the terminal for its calculation of emissions—Area 600 boilers, emergency engines for fire water pumps, leaks from the valves and the piping.

After reviewing Tesoro Savage's total calculations for VOCs from the stationary sources (1.89 tpy from the boilers, 8.64 tpy from the marine loading process, 21.7 tpy from the tanks, 00.822 tpy from component leaks, and 0.00689 from the fire water pumps for a total of 33.15 tpy), and taking into account the deviations from the findings above, the tpy nevertheless appears to fall below the major source limit, making the VEDT subject to a minor permit (NOC) to address emissions from the facility rather than a PSD permit. Because the Council is conducting a separate air quality permitting process for the VEDT, the Council's ultimate consideration of Tesoro's permit compliance will occur outside the scope of this adjudication and the Council is aware that additional information may come to its attention as part of the air permitting process that may affect its overall recommendation.

[1684] PFT of Hansen 19; Tr. 735-36, vol. 4.
[1685] Ex-0001-000819-PCE, Table 5.1-11.

d. Ambient Air Quality

Ambient air quality standards limit the amount of certain pollutants that may be in the air which people breath. In order to meet this requirement, an applicant conducts an air quality analysis to evaluate the impacts of the emissions from a new proposed stationary source. Air dispersion modeling is frequently required as part of this process. Ambient air quality standards have been established both by the federal government and by the State of Washington. The NAAQS are health protective regulatory levels established by EPA under the Clean Air Act for six "criteria pollutants": ozone, lead, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide.[1686]

The EPA sets out both primary and secondary ambient air quality standards.[1687] Primary standards are designed to protect the health of what are deemed sensitive populations, such as asthmatics, children, and the elderly, with a margin of safety.[1688] Secondary standards are concerned with protecting the environment, and are intended to address visibility, and damage to crops, vegetation, buildings, and animals.[1689] Washington State has adopted ambient air quality standards (WAAQS) that mirror the federal standards.[1690]

EPA has established concentration levels for the criteria pollutants, known as significant impact levels (SILs), to represent the point above which the impact from a new or modified source may cause or contribute to a violation of the NAAQS.[1691] When the VEDT design concentrations of a criteria pollutant exceeds the SIL, then the existing background concentrations of the pollutant are added to get a total (cumulative) concentration for comparison to the NAAQS.[1692] If the VEDT design concentrations are less than the SILs, the project doesn't have a significant effect and it is unnecessary to add background concentrations because it is a de minimums source.[1693]

Washington has adopted separate rules that set air quality standards for new or modified stationary sources of toxic air pollutants (TAPs).[1694] Washington's list of TAPs includes five of the six criteria pollutants for which NAAQS apply, and hundreds of other pollutants.

[1686] 40 C.F.R. pt. 50.
[1687] 42 U.S.C. § 7409.
[1688] 42 U.S.C. § 7409(b)(1).
[1689] 42 U.S.C. § 7409(b)(2); 40 C.F.R.§ 50.2.
[1690] WAC 173-476.
[1691] 40 C.F.R. § 51.165(b)(2).
[1692] EPA Draft Memorandum from Stephen D. Page to Regional Air Division Directors, 1-10, Subject: Guidance on Significant Impact Levels for Ozone and Fine Particles in the Prevention of Significant Deterioration Permitting Program, August 18, 2016 at 11-12.
[1693] Tr. 709-10, vol. 4.
[1694] WAC 173-460-150.

Best Available Control Technology for Air Toxics (tBACT) applies to each TAP in the same manner that BACT analysis applies to other air pollutants.[1695] tBACT requires consideration of production processes, methods, systems, and techniques that are available to control each toxic air pollutant on a case-by-case basis.[1696] If new or modified toxic air pollutant sources increase the emissions of TAPs, the project must undergo first tier review to quantify the increase in emissions for each TAP.[1697] As part of the TAPs regulations, Ecology set small quantity emission rates (SQERs) as the levels of emissions below, which the applicant is not, required to conduct air dispersion modeling.[1698]

If the facility-wide emissions of a TAP exceed a SQER, then the applicant must conduct air dispersion modeling to determine if calculated concentrations attributable to the project exceed the acceptable source impact level (ASIL) established for that toxic air pollutant.[1699] ASILs are set at different levels for different compounds because each compound has different health consequences. ASILs only apply to stationary sources.[1700]

If an ASIL is exceeded, then the VEDT may not be approved unless the applicant either petitions for the conduct of a second tier health impact assessment, or reduces the amount of emissions through enforceable mechanisms to a sufficient level to protect human health.[1701] The second tier review determines the increase in lifetime cancer risk and other non-cancer health effects for persons exposed to the TAP.[1702] The Council may recommend approval of a project if the increased TAP emissions are not likely to result in an increased cancer risk of more than one in 100,000 and the non-cancer hazard is found to be acceptable.[1703] If the second tier review thresholds are exceeded, an applicant may request third tier review, which involves a risk management decision by the Council.[1704]

(1) Air Modeling Results

Based on the VEDT layout and an emissions inventory, Environ applied an EPA-approved air dispersion model to estimate the off-site concentrations of regulated air pollutants emitted by the Tesoro Savage facility. It compared predicted concentrations to ambient air quality standards and toxic air pollutant impact criteria.[1705]

[1695] WAC 173-460-060.
[1696] WAC 173-460-020(3).
[1697] WAC 173-460-080.
[1698] WAC 173-460-080(2)(b).
[1699] WAC 173-460-080.
[1700] WAC 173-460-040.
[1701] WAC 173-460-090(1).
[1702] WAC 173-460-090.
[1703] WAC 173-460-090.
[1704] WAC 463-78-030. In adopting Ecology's rules, the Council specifically provided in WAC 463-78-030(2) the "ecology", "authority", "director", and "permitting authority" shall be synonymous with energy facility site evaluation council unless a different meaning is plainly required by context. WAC 173-460-100.
[1705] PFT of Hansen 4.

Environ estimated off-site concentrations of air pollutants emitted by the facility by using EPA'S AERMOD dispersion model. The model is governed by EPA's Guideline on Air Quality Models, and the work is checked by Ecology's air quality modeling experts.[1706]

Dispersion modeling used a meteorological database of surface and upper air data. The National Weather Service station located at Pearson Field in Vancouver was used for the surface meteorological data. Upper air data was taken from McNary field airport located in Salem, OR. A number of other variables and parameters, such as surface characteristics, were added to the AERMOD modeling system.[1707]

Five years of local meteorological data were put into AERMOD to calculate pollutant concentration at each of more than 8,000 receptors for every hour of a five-year period. The predicted concentrations were then compared to state and national air quality standards.[1708]

The dispersion model results for criteria pollutants from the VEDT are shown in Table 5.1-21.[1709] The total design concentrations of pollutants for the VEDT alone are shown, which were compared with the significant impact levels (SIL) established by EPA. Some of the pollutant concentrations attributable to facility emissions are less than the SILs. Short-term concentrations of NO_2, particulate matter 2.5 and 10, and sulfur dioxide were over the SILs.[1710]

The background concentrations that are based on monitoring data were added to the VEDT impacts for those criteria pollutants that exceeded the SILs. After adding the background concentrations, Tesoro Savage concluded that the total concentrations for all of the criteria pollutants are less than the NAAQS.[1711] Tesoro Savage asserts that the modeling predicts that the concentrations of all pollutants comply with primary and secondary standards at all off-site locations.[1712]

The VEDT has the potential to emit TAPs other than the criteria pollutants. Facility-wide TAP emissions were calculated and compared to the SQERs established for each pollutant. Eight TAPs were found to exceed their SQERs.[1713] Six toxic air pollutants in addition to nitrogen dioxide and sulfur dioxide will be emitted at rates that exceed their SQERs. These six chemicals, which are all human carcinogens, are: arsenic, benzene,

[1706] PFT of Hansen 4; Ex. 0001-000833-34-PCE; 40 C.F.R. pt. 51, App. W.
[1707] Ex. 0001-000836-PCE.
[1708] PFT of Hansen 4.
[1709] Ex. 0001-000842-PCE.
[1710] Ex. 0001-000842-PCE
[1711] Tr. 709-11, vol. 4; Ex. 0001-000843-PCE.
[1712] PFT of Hansen 5.
[1713] Ex. 0001-000820-PCE.

cadmium, hexavalent chromium, 7,12-dimethylbenz(a)anthracene, and diesel engine particulate.[1714]

Tesoro Savage developed maximum predicted TAP concentrations attributable to the VEDT stationary sources for the eight TAPs that exceeded their SQERs. The predicted concentrations for all of these TAPS are less than the ASILs established by Ecology.[1715]

(2) Health Concerns Regarding Pollutants

Although the health impacts of emissions from the VEDT meet the requirements of the air permitting process, the Council's current analysis is not limited to consideration of permit compliance. The Council must consider health impacts when balancing the need for the VEDT against its impacts on the environment, including health impacts on local populations.[1716]

Adverse health effects occur at exposure levels below regulatory air quality standards. Regulatory compliance does not ensure public health protection. Pollutants that will be emitted by the VEDT have documented health harms at very low exposure levels.[1717]

Combustion emissions. Combustion emissions from the VEDT will include the criteria pollutants carbon monoxide, sulfur dioxide, nitrogen dioxide, ozone formation matter, and diesel exhaust particulate matter.[1718] Diesel exhaust particulate is a known lung carcinogen.[1719]

Non-combustion emissions. There are a number of carcinogens that are not necessarily related to combustion that will also be emitted by the VEDT. Benzene can evaporate from fuels and produce leukemia, which is a blood cancer.[1720] Elderly people with chronic obstructive pulmonary disease (COPD), which includes emphysema and other diseases characterized by increasing breathlessness, are particularly susceptible along with children to respiratory effects of air pollution.[1721]

(a) Particulate matter

Particulate matter is regulated by a weight or mass, so a weight in a particular volume of air, micrograms per meter cubed of air. However, this assumes that any equal weight of

[1714] PFT of Fanning 4; Ex. 0001-000820-PCE, Table 5.1-12. However, the table shows 10 toxics that exceed the SQER - the 8 mentions plus H2S and formaldehyde. The narrative on Exhibit 0001-000819-PCE states that 8 toxics exceed the SQER.

[1715] Ex. 0001-000820-PCE, Ex. 0001-00840-PCE.

[1716] RCW 80.50.010.

[1717] PFT of Fanning 8; Tr. 3084, vol. 13.

[1718] Tr. 3087, vol. 13.

[1719] Tr. 3094, vol. 13.

[1720] Tr. 3094-95, vol. 13.

[1721] Tr. 3090, vol. 13.

particles behaves equally. This is not the case because particulates are very complicated and can have very different composition depending where it came from. Particulate matter not only varies in size, but in chemical composition and toxicity.[1722]

Particulate air pollution is highly varied and complex. It can be formed during incomplete combustion, after emission of precursors to air, or when dusts are re-entrained into the air. Particles of less than 2.5 microns are referred to collectively as $PM_{2.5}$, derive from combustion sources, and are the most toxic.[1723]

Diesel exhaust particulate matter ($DPM_{2.5}$) is a subset of $PM_{2.5}$, and is composed of soot with sulfates, hydrocarbons, metals, and other toxic species condensed on the soot.[1724] It is clear that the standards for $PM_{2.5}$ may not capture the actual health risks of diesel particulate very well.[1725] $DPM_{2.5}$ is a highly toxic air pollutant that has been the subject of much scientific literature. It is a toxic air pollutant under Washington law.[1726] $DPM_{2.5}$ is not a criteria pollutant, so there is no NAAQS associated with it.[1727]

The reason why $DPM_{2.5}$ has emerged as a top priority pollutant and health concern by Ecology and the Department of Health is because these particles are especially small.[1728] They can be inhaled very deeply into the lungs and tend to have highly toxic properties.[1729] Even low levels of diesel particulate matter below federal standards have been linked to adverse health effects in children, the elderly, and other vulnerable populations.[1730] Children have a higher breathing rate per body size than adults do, so they are taking in more air pollutants. Air pollution is shown to reduce lung development in children.[1731] Diesel exhaust particulate is a lung carcinogen.[1732] A recent study of a Medicare population showed that both short- and long-term exposure to $PM_{2.5}$ were associated with all-cause mortality, even for exposure levels not exceeding the newly revised EPA standards.[1733]

[1722] Tr. 3089-90, vol. 13.

[1723] PFT of Fanning 3.

[1724] PFT of Fanning 3.

[1725] Tr. 3117, vol. 13.

[1726] WAC 173-460-150.

[1727] Tr. 3117, vol. 13; *see also* 40 C.F.R. pt. 50 (listing particulate matter in general as a criteria pollutant for which NAAQS have been set, but not diesel particulate matter).

[1728] Ecology released a toxic air pollutants priorities study in 2008 which found that diesel exhaust particulate and residential wood-burning were the agency's greatest concern due to their carcinogenic potency and role in cardiopulmonary illnesses and deaths, high emission volumes, and long-term widespread human exposure. Ex. 5532-000279-CRK, Ex. 5532-000282-CRK. Limiting diesel engine emissions was ranked as the greatest opportunity for reducing public health risks from TAPs. Ex. 5532-000289-CRK.

[1729] Tr. 3084-85, vol. 13.

[1730] Ex. 5560-000037-CRK (citing a 2009 EPA finding).

[1731] Tr. 3090-91, vol. 13.

[1732] Tr. 3094, vol. 13.

[1733] Ex. 5531-000007-13-CRK.

Dr. Fanning believes that it is clear from studies that with even low increases in human exposure to particulate matter, there is a statistically robust increase in mortality from cardiovascular causes. A 10 microgram per meter cube increase in particulate matter is associated with approximately a 10 percent increase in daily mortality from cardiovascular causes.[1734]

Although Dr. Fanning testified regarding increases of 10 micrograms in particulate matter, Tesoro Savage asserts this is not relevant here, because the largest increase identified for $PM_{2.5}$ is less than 6 micrograms from the VEDT and it's right on the fence line. Looking at a place where the public would be exposed, the Fruit Valley neighborhood is nearly a mile away and the concentrations of $PM_{2.5}$ are on the order of a quarter of a microgram per cubic meter, which is a very small number. It isn't close to the increase of 10 micrograms that Dr. Fanning is citing.[1735]

There are many other sources of $DPM_{2.5}$ in the general area of the VEDT, including Interstate 5. Dr. Fanning is concerned that this is an already burdened air basin, and the additional pollutants from the mobile and stationary sources from the terminal move the amount of diesel particulates in the wrong direction.[1736]

There is no standard test method for $DPM_{2.5}$. It is often characterized just by saying all the $PM_{2.5}$ from a diesel engine source is $DPM_{2.5}$. It's convoluted, because in the real world, $PM_{2.5}$ includes both a filterable part and a condensable part. However, the science on which Ecology based its $DPM_{2.5}$ standard only considers the filterable part, the part that is directly emitted from the diesel engine.[1737]

There is also a condensable part of diesel emissions, meaning some of the emissions are still gases that condense in the atmosphere and form particulate matter later on. That is why sometimes you'll see a plume that is not right at the smokestack. It happens a little bit downwind, because the gases will condense and form particulate matter. The condensable portion of particulate matter is included as part of the test method for mobile sources, but when evaluating $DPM_{2.5}$ from stationary sources, only the filterable part is considered.[1738] When you try to be precise about $DPM_{2.5}$ and compare it with an ambient standard, it's challenging.[1739]

Tesoro Savage evaluated the only stationary source of $DPM_{2.5}$ at the VEDT, which is the maintenance testing of the diesel engines that power the fire water pumps. This maintenance testing is only done occasionally. The results did not exceed the ASIL Ecology

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[1734] Tr. 3093, vol. 13.
[1735] Tr. 721-22, vol. 4.
[1736] Tr. 3132, vol. 13.
[1737] Tr. 716-17, vol. 4.
[1738] However, when determining whether concentrations of PM, as a criteria pollutant, comply with NAAQS requirements, both filterable and condensable PM are analyzed.
[1739] Tr. 717, vol. 4.

has set. However, the results do not include emissions from mobile sources at the VEDT.[1740] If all the maximum emission rates for the stationary sources are calculated correctly, then the stationary sources would not exceed the $PM_{2.5}$ health-based standard.[1741]

Ecology has established an ASIL for $DPM_{2.5}$ under its toxic air pollutant program. The Council finds that the VEDT stationary sources meet the established ASIL for $DPM_{2.5}$. The Council may, however, look further at the health impacts from these emissions using its authority under RCW 80.50.010 to balance the need of the VEDT versus the impacts.

(b) Ozone

VOCs can mix with nitrogen oxides in the atmosphere to form ozone, which is a pollutant that is relevant for human health concerns.[1742]

Ozone is a powerful respiratory irritant. On hot summer days when ozone spikes, emergency room visits and hospital admissions also rise for respiratory causes.[1743] Ground level ozone is linked to the development of asthma and exacerbation of existing asthma cases. Asthma is the primary cause of school-age absenteeism. People who spend more time being active in the outdoors are at greater risk for adverse health effects from ozone exposure than people who spend more time inside or who are sedentary.[1744]

Ozone events, in which substantial increases of ground level ozone occur, could be triggered by process upsets, leaks, or spills that release large amounts of VOCs when the sunlight is strong. Ozone levels that exceed the NAAQS are rare in Vancouver. The addition of a major source of VOCs in the area, however, will make such exceedances more likely.[1745]

Although ozone could be a concern, there was no ozone modeling done.[1746] Tesoro Savage asserted that no ozone analysis was required. This is due to its conclusion that an ozone analysis is required if the VEDT is a major source for purposes of requiring a PSD permit, and the VEDT is not a major source.[1747] In addition, modeling is not required if the emissions of a pollutant are below significant emission levels.[1748] EPA has recognized two precursors to ozone formation—volatile organic compounds (VOCs) and nitrogen oxides (NOx).[1749] The potential of a facility to emit ozone is considered significant only if a project will emit more

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[1740] Tr. 718, vol. 4.
[1741] Tr. 3127, vol. 13.
[1742] PFT of Fanning 4-5; WAC 173-400-030(95).
[1743] PFT of Fanning 11.
[1744] Ex. 5560-000052-CRK.
[1745] PFT of Fanning 11.
[1746] Tr. 3103, vol. 13.
[1747] Tr. 745, vol. 4.
[1748] 40 C.F.R. § 51.166(m)(1)(i)(a).
[1749] 40 C.F.R. § 51.166(b)(49)((i)(b).

than 40 tons of VOCs per year, or 40 tons of NOx per year.[1750] Emissions of both VOCs and NOx are estimated to be below the 40 tons per year threshold (VOCs 33 tons per year; NOx 12 tons per year).[1751] Therefore, emissions from the project do not trigger the need for an ozone modeling analysis.

Even though the ozone analysis meets permit requirements, the Council may look further at the health impacts from ozone events under RCW 80.50.010.

(c) Secondary Aerosol

Dr. Fanning maintains that the formation of secondary aerosol was not properly evaluated. Secondary aerosol—also known as secondary particulate matter, consists of particulate matter from gases well after the gases are emitted from the stack—was not properly evaluated.[1752] Tesoro Savage contends that consideration of secondary aerosol formation was not warranted as part of the permitting process. This is because Tesoro Savage's emissions of the chemical that can form secondary particulate matter are so low that they don't trigger the need for further analysis of secondary $PM_{2.5}$ formation from this source.

EPA has recognized sulfur dioxide (SO_2) and nitrogen oxides (NOx) as the chemicals that are responsible for the subsequent formation of secondary particulate matter.[1753] Significant levels of emissions of these two pollutants as precursors to secondary $PM_{2.5}$ are 40 tons per year for sulfur dioxide and 40 tons per year for nitrogen oxides. Emissions from the VEDT are expected to be about 12.2 tons per year of nitrogen oxides and 7.97 tons per year of sulfur dioxide.[1754] These levels are well below the significance level for precursors to $PM_{2.5}$.

Furthermore, the standard air dispersion model AERMOD does not have the capacity to evaluate secondary aerosol formation. AERMOD is used for near field evaluations.[1755]

In light of these considerations, Tesoro Savage was justified in not analyzing secondary particulate formation. However, the Council may look at the health impacts from secondary aerosol formation using its authority under RCW 80.50.010.

(d) Other Pollutants

Dr. Fanning expresses concern with respect to nitrogen dioxide (NO_2) exposure in the Fruit Valley Neighborhood. Tesoro Savage looked at the maximum concentration that its model predicted, which includes around the fence line of Tesoro Savage inside the Port of

[1750] 40 C.F.R. § 51.165(a)(1)(x)(A).
[1751] TR. 753, vol. 4.
[1752] PFT of Fanning 5, 7.
[1753] 40 C.F.R. § 52.21(b)(23)(i).
[1754] Ex. 0001-000819-PCE.
[1755] Tr. 714, vol. 4.

Vancouver's property. Tesoro Savage predicted values that were fairly close to the 1-hour NOx ambient air quality standard.

Tesoro Savage observes this is true for almost every project because the NOx 1-hour standard is a very, very stringent standard. Dr. Fanning cites to this standard and says there are going to be health impacts in the neighborhood when emissions are less than half that standard. Tesoro Savage acknowledges this is a challenge that is hard to meet.[1756] When asked how an applicant can address adverse health impacts that occur at any level of exposure, Dr. Fanning replied, "I don't know."[1757]

Dr. Fanning noted that heavy tar sands oils differ from Bakken oil in chemical composition. They are likely to be higher in sulfur and metal content. Heavy crudes are diluted with volatile and toxic diluents to facilitate transport.[1758] These concerns about the tar sands are more relevant to a refinery, especially with respect to metals. The metals will not be combusted and released at the Tesoro Savage facility; nor will the metals volatilize.[1759] Dr. Fanning acknowledges that these hazards are particularly relevant to areas near refineries.[1760]

The Council may look at the health impacts from other pollutants that nonetheless comply with regulatory standards using its authority under RCW 80.50.010.

(e) Nearby Populations Impacted by Pollution

The predominant wind direction at the site is east/southeast. This is away from the Fruit Valley Neighborhood, but wind doesn't always blow only on that level. In addition, there are times when the air is relatively still and a plume can gather around the VEDT.[1761]

Tesoro Savage spent many weeks calculating emissions and applying dispersion models to identify the pollutant concentrations at the fence line and in the Fruit Valley Neighborhood. They calculated concentrations at 8,000 model receptors and believe they know what the exposure to the population is within five miles or so of the VEDT.[1762]

The residents of the adjacent Fruit Valley Neighborhood are of mixed age and presumably of mixed health status. They will experience worsened air quality that is likely to affect sensitive people.[1763]

[1756] Tr. 722-23, vol. 4.
[1757] Tr. 3128, vol. 13.
[1758] PFT of Fanning 5.
[1759] Tr. 720, vol. 4.
[1760] PFT of Fanning 5.
[1761] Tr. 3124-25, vol. 13.
[1762] Tr. 719, vol. 4.
[1763] PFT of Fanning 17.

The inmates at the jail facility may experience short-term respiratory health effects, especially if they have asthma. The staff at the jail facility may be subject to higher levels of chronic exposure and chronic health harms.[1764]

Dr. Fanning would like to see a more complete health risk assessment for the Fruit Valley Neighborhood community that takes into account all the toxic air contaminants from all sources that are associated with operating the VEDT.[1765] She believes that Ecology could set-up a site-specific community based monitoring program as a relevant way to monitor emissions in the Fruit Valley Neighborhood. The federal reference method monitor is filter-based, but it is not always considered a good method for ultrafines and for diesel.[1766]

(f) Emissions from Mobile Sources

As discussed earlier, mobile sources are not regulated under the permitting process. However, the amount and effects of mobile source emissions are part of this adjudication and a pertinent subject for the Council to consider. The Council may look at the health impacts from mobile sources in accordance with its authority under RCW 80.50.010 to balance the need of the VEDT versus the impacts.

Emissions from mobile sources associated with the VEDT will include combustion emissions from locomotives, tugboats, marine vessels while they are docked, vehicles, and off-road diesel equipment.[1767] Criteria pollutants identified with emissions from mobile sources include nitrogen dioxide, carbon monoxide, sulfur dioxide, and particulate matter. Major sources of nitrogen dioxide will be tugboats, locomotives, and vessels while they are docked.[1768] Nitrogen dioxide exacerbates asthma, particularly in children. Approximately one in ten people in Clark County have asthma. Low exposure levels of nitrogen dioxide, below current regulatory levels, can have effects on asthma. Studies have not found a level below which no affects occur.[1769]

A study conducted by the Yale Center for Perinatal, Pediatric, and Environmental Epidemiology observed that children experienced worse asthma symptoms and used more medication in relation to increasing exposure to nitrogen dioxide. The effects were detectable for 5 ppb increases at exposure levels as low as 6 ppb.[1770]

Major sources of carbon monoxide will be employee passenger vehicles and tugboat engines. In addition, sulfur dioxide emissions are highly dependent upon the sulfur level in the

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[1764] Tr. 3133-34, vol. 13.
[1765] Tr. 3103, vol. 13.
[1766] Tr. 3140, 3145, vol. 13.
[1767] PFT of Fanning 2-3; Tr. 712, vol. 4.
[1768] PFT of Fanning 3-4.
[1769] PFT of Fanning 10.
[1770] PFT of Fanning 11.

fuel used by the marine vessels.[1771] The marine vessels that will transport the crude oil will use only ultra-low sulfur fuel.[1772]

Sources of diesel particulate matter will be locomotives, marine vessels, vehicles, and off-road diesel equipment.[1773] Northbound trains were not included as part of the assessments and the tracks are within 300–500 meters of residential homes.[1774]

Because vessels and railroad locomotives are here today and somewhere else tomorrow, it's a little difficult to regulate them in the same format as you would a stationary source. Tesoro Savage did not model emissions from mobile sources as part of its permit application, but did model them as part of the preliminary draft EIS it prepared.[1775]

Dr. Fanning acknowledges that an ASIL is designed to look at stationary sources, and if it is applied to a mixed exposure situation that includes mobile sources, it starts to step outside its regulatory purpose. However, if the ASIL is the only tool available, it could be used as a screening assessment. If it showed that emissions near transportation sources are over accepted source levels, perhaps the emissions are too high.[1776]

Mobile sources are regulated through a range of other programs. For example, emission standards for cars have become more stringent over the years and have resulted in better air quality despite more people driving and more traffic.[1777]

The Council finds that there will be emissions from mobile sources that may result in health impacts to workers and inmates at the Clark County Jail Facility, and the Fruit Valley Neighborhood, as well as populations along the rail corridor. These emissions impacts should be considered as part of the overall impact of the VEDT.

(3) Greenhouse Gas Emissions

Arguments and Evidence. Tesoro calculated GHG emissions using 40 C.F.R. Part 98, tables C-1 and C-2, which uses emission factors based on the carbon content of the different fuels burned at the VEDT.[1778] Emissions of GHGs are calculated to be 95,000 tpy (short tons),[1779] which constitutes about 0.1 percent of state GHG emissions.[1780] Tesoro Savage made changes, including changing the firing rate for the boilers that provide steam to unload the rail

[1771] PFT of Fanning 4.
[1772] Tr. 882-883, vol. 4.
[1773] PFT of Fanning 3; Tr. 3122, vol. 13.
[1774] Tr. 3104, vol. 13.
[1775] Tr. 712-13, vol. 4.
[1776] Tr. 3111, vol. 13.
[1777] Tr. 712, vol. 4.
[1778] Tr. 779-80, vol. 4.
[1779] 95,000 short tons is equal to about 86,000 metric tons. Tr. 779, vol. 4.
[1780] Tr. 724, vol. 4.

tank cars and changing the heat source for the storage tanks to electricity, that reduce GHG emissions from the VEDT by 39 percent below their original estimates. These voluntary limits exceed Ecology's 11 percent target for GHG reductions.[1781] The air permit is expected to include limits on natural gas consumption that reflect these changes, and these limits will limit GHG emissions.[1782]

In addition to analyzing GHG emissions for permitting purposes, Tesoro Savage also estimated GHG emissions from ships, tugs, and trains associated with the project.[1783]

Tesoro Savage has offered a one-time mitigation payment of $496,440 to the Climate Trust for the implementation of projects to reduce GHG emissions applying a formula to the Terminal emissions similar to the formula established by state law for power generation facilities.[1784]

Tesoro claims the crude oil passing through the Terminal will satisfy a feedstock shortfall needed to supply an existing demand and will not increase consumption or combustion of petroleum products, because the Project is not proposing or even facilitating any increase in refining capacity. Indeed, it is uncontested that foreign sources, though unstable and unreliable, could be used to fill the feedstock shortfall in the absence of the VEDT. As even Opponents' witnesses concede, Washington refineries have been operating at essentially full capacity without the VEDT.[1785]

VEDT Opponents claim that Tesoro Savage erred in looking only at GHG emissions from incoming trains, and looking at those only insofar as they occurred in Washington.[1786] GHG emissions will affect all the citizens of Washington no matter where they come from in the Project. Therefore, Tesoro Savage must look beyond its facility and consider GHG emissions and impacts from transporting the crude oil, as well as refining and use of products derived from the crude.[1787]

Tesoro Savage states that emissions from the VEDT comprise only 0.1 percent of GHG emissions in Washington State.[1788] However, when you add Tesoro Savage's estimated transport-related emissions (one-way rail from Spokane to Vancouver and ship and vessel emissions leaving the terminal up to some point) to the VEDT emissions estimate of 86,000 metric tons, you get roughly a quarter million metric tons just using Tesoro Savage's

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[1781] Ecology has withdrawn the SEPA guidance containing the 11 percent reduction target. *Columbia Riverkeeper v Cowlitz Cty.*, SHB No. 17-010c, at 16 (Shorelines Hr'gs Bd. Sept. 15, 2017); PFT of Hansen 19; Tr. 735-36, vol. 4.

[1782] Tr. 770, vol. 4.

[1783] Ex. 0005-000045-PCE.

[1784] Ex. 0001-000346-PCE. Applicant Post-Hr'g Br. 26-27.

[1785] Applicant Post-Hr'g Br. 26.

[1786] PFT of Sahu 3, 38.

[1787] PFT of Sahu 38-42.

[1788] Tr. 3603, vol. 15.

own estimates. This raises Tesoro Savage to almost 0.4 percent of state GHG emissions. Those transport-related emissions are not complete.[1789]

Other emissions that need to be considered include emissions from trains leaving as well as inbound trains, emissions from trains all the way from the point of origin, and emissions from ships all the way to their destinations—say, Hawaii or Alaska. When these are included, Tesoro Savage's emissions are up to 1–2 percent of Washington's GHG emissions. If you add GHG emissions from the refining of the crude oil from the VEDT, you get to 7-8 percent of Washington's GHG emissions. And if you add in emissions from the combustion of the finished products, you're up to 54 percent of Washington's GHG emissions.[1790]

VEDT Opponents point out the contrast between the analysis in this case and the analysis for the Millennium Bulk Terminal. There, the EIS acknowledges the full arc of transportation necessary to support and supply the Terminal, including transportation GHG emissions beyond Washington's border. Millennium also more fully analyzes what will happen to the fossil fuel and factors in burning the coal made available through the transloading project. The Millennium report even considers increased motor vehicle GHG emissions from delayed traffic at rail crossings.[1791]

Tesoro Savage has made the argument that the VEDT will not result in any increase in the consumption or combustion of petroleum products.[1792] VEDT Opponents argue that if Tesoro Savage wants to make the argument that this is a zero sum game (the crude will go somewhere if the VEDT doesn't take it, so the VEDT will not increase GHG emissions), then the onus is on Tesoro Savage to show that, in fact, this is going to be a zero sum exercise. All indications are that Bakken crude production is increasing. Therefore, it's reasonable to assume, that Tesoro Savage's GHG emissions don't start at the Washington State boundary.[1793] The same argument applies to emissions from refining and from the ultimate use of the fuel. If Tesoro Savage is going to claim that they're not going to do an emission analysis by assuming a zero sum argument, it's their burden to show that there's no growth from the Bakken market, that, in fact, what is coming here is a loss that's going to someplace else.[1794]

VEDT Opponents point out that Washington has made firm and clear commitments to address the causes of climate change, and has committed to promote alternatives to projects that generate GHG emissions and mitigate those that cannot be avoided. The VEDT, with massive direct and indirect GHG emissions, needs to be evaluated in light of those statutory

[1789] Tr. 3601-04, vol. 15.
[1790] Tr. 3602-03, vol. 15.
[1791] PFT of Sahu 42-43.
[1792] Applicant Post-Hr'g Br. 26.
[1793] Tr. 3674-75, vol. 15.
[1794] Tr. 3676, vol. 15.

and regulatory commitments, as well as the urgent need to combat a warming climate.[1795] More available crude for west coast refineries will only increase overall refinery emissions.[1796]

Summary of the Council's Analysis of GHG Issues. The Council takes into account the impacts from GHG emissions in accordance with its authority under RCW 80.50.010. The Council may analyze the VEDT's consistency with the state's energy strategy, utilities' integrated resource plans, regional power plans, and state policy directives favoring deployment of renewable technology. The Council may also take into account the statute governing GHG emissions in Washington[1797] and the statute governing State Energy Strategy,[1798] providing that the state's energy strategy is to be based, in part, on reducing dependence on fossil fuel energy sources and improving the efficiency of transportation energy use.

The Council concludes that Tesoro Savage's current mitigation efforts are insufficient because GHG emissions that need to be mitigated include emissions caused by transport of crude oil (and possibly the emissions due to refining and end use). Ecology's Clean Air Rule requires sources of GHG emissions to reduce those emissions over time.[1799] During the first compliance period, sources that emit at least 100,000 metric tons per year of GHGs are subject to the Clean Air Rule.[1800] However, during the fourth compliance period (2026–2028), sources emitting at least 85,000 metric tons[1801] per year are required to comply. Thus, the VEDT, which is estimated to emit 86,000 metric tons of GHGs per year, will eventually be required to reduce its emissions in accordance with the Clean Air Rule.

Based on this evidence the Council concludes that, even with Tesoro Savage's proposed mitigation, the added GHG emissions that this project will cause in the state of Washington are inconsistent with requirements in RCW 70.235.020, because that provision requires reductions in GHG emissions from *all* sources in Washington, not just stationary industrial sources.

(4) Discussion, Findings and Conclusions on Ambient Air Quality

The Council finds that the emissions from the VEDT comply with ambient air quality standards when looking at the results for both the criteria pollutants and the TAPS from stationary sources. Tesoro Savage has demonstrated that many of the criteria pollutants were within the ASILs established by EPA. For those criteria pollutants that exceeded the ASILs, background concentrations were added. The total concentrations for all of the criteria

[1795] Columbia Riverkeeper Final Adjudication Br. 41-44.
[1796] PFT of Sahu 41.
[1797] RCW 70.235.
[1798] RCW 43.21F.
[1799] *See* WAC 173-442.
[1800] WAC 173-442-030.
[1801] 85,000 metric tons is equivalent to the 95,000 short tons mentioned earlier in this section.

pollutants are less than the NAAQS. The modeling predicts that the concentrations of all criteria pollutants comply with primary and secondary standards at all off-site locations.

With respect to toxic air pollutants, most of the TAPs were within the SQERs established by Ecology. Tesoro Savage developed maximum predicted TAP concentrations attributable to the VEDT for the eight TAPs that exceeded their SQERs, and they are all less than the ASILs established by Ecology. It is unnecessary for Tesoro Savage to conduct ozone modeling. Permitting agencies must conduct ambient air quality analyses (including air dispersion modeling) only for facilities with the potential to emit significant amounts of a pollutant, and emissions of both VOCs and NOx are estimated to be below the 40 tons per year significance threshold (VOCs 33 tons per year; NOx 12 tons per year). Similarly, the Council finds that the Applicant is not required to do a secondary aerosol formation analysis.

The Council also finds, however, that the project is likely to cause health impacts to the Fruit Valley Neighborhood, and the workers and inmates of the Clark County Jail facility located at the Port. This is primarily due to the amount of diesel exhaust particulate matter ($DPM_{2.5}$) and the nitrogen dioxide emitted at the site, along with the health risks associated with these pollutants. The Council also takes into account the health impacts from ozone events and secondary aerosol formation, impacts from other pollutants, including GHGs, in accordance with its authority under RCW 80.50.010 to balance the need of the project versus the impacts.

8. Noise Impacts

a. Governing Law

As discussed elsewhere in this order, WAC 463-62 does not establish standards for the Council's current consideration of Tesoro Savage's ASC. The Council will nonetheless include in its analysis consideration of whether the VEDT complies with WAC 463-62-030, which provides that site certification agreements for energy facilities shall meet the noise standards established in RCW 70.107, the Noise Control Act of 1974, and state rules adopted to implement those requirements in WAC 173-60, Maximum environmental noise levels.[1802]

b. Tesoro Savage's Evidence and Argument

Tesoro Savage hired Kristen Wallace, Senior Manager with Ramboll Environ, to examine the noise impacts of the VEDT and compliance with state and local noise limits that would apply outside of the Council context.[1803] Ms. Wallace has practiced in the field of environmental noise for over 20 years, conducting numerous noise studies of varying complexity for private developers and government agencies.[1804] Her testimony was not subject to cross-examination.

[1802] WAC 463-62-030(1) adopted WAC 173-60-010 through -050, WAC 173-60-080 and -090.
[1803] There are no federal regulations that establish noise limits on sounds coming from the facility.
[1804] PFT of Wallace 1.

Ms. Wallace first characterized the existing sound environment at representative receiving locations near the project by using sound data collected for a noise impact study conducted in 2011 for a different project on Port of Vancouver property.[1805]

Next, she used modeling to quantify construction and operational sound levels. For construction noise, she used representative construction equipment sound level data identified by EPA. She also estimated impact pile driving construction sound levels using the CadnaA noise model[1806] and other sound level data she obtained from pile driving activities from other projects. Ms. Wallace calculated sound levels for construction activity at distances representing the nearest and most affected receivers for the project. Ms. Wallace also used the CadnaA noise model to estimate the sound levels for operational noise at nearby source receptors, and also included an evaluation of low frequency noise.[1807]

Ms. Wallace identified the otherwise applicable state and local noise limits for construction and operation for energy facilities in WAC 173-60 and Vancouver Municipal Code (VMC) 20.935. Permissible noise levels vary depending upon the classification of the land where the noise is generated, and the classification of the land impacted by the noise.[1808]

Industrial property and storage, warehouse, and distribution facilities are classified as Class C environmental designation for noise abatement (EDNA).[1809] In a Class C EDNA, higher noise levels are allowed because the land involves economic activities where a greater amount of noise is expected, and residential uses are generally excluded from such an area.[1810]

Otherwise applicable state regulations establish maximum permissible decibel levels that different classes of noise sources may have upon different classes of EDNA.[1811] The VEDT, as a Class C noise source, is limited to generating a sound level of no more than 60 decibels in a Class A (residential) EDNA during the hours of 7 a.m. to 10 p.m., and is limited to no more than 50 decibels upon a Class A EDNA between the hours of 10 p.m. and 7 a.m.[1812]

WAC 173-60-050, however, exempts a number of activities from these noise levels, including noise from construction activity between the hours of 7 a.m. and 10 p.m.[1813] That exemption for construction activity does not apply with respect to the reception of noise within

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1805 PFT of Wallace 3.

1806 The CadnaA noise model considers distance, topography, intervening structures, atmospheric conditions, and ground types when calculating how sound weakens as it travels. PFT Wallace 3 n.3.

1807 PFT of Wallace 3.

1808 PFT of Wallace 3-4; WAC 173-60-030, -040.

1809 WAC 173-60-030(1)(c).

1810 WAC 173-60-030.

1811 WAC 173-60-040.

1812 PFT of Wallace 3-4.

1813 WAC 173-60-050(3)(a).

Class A EDNAs between 10 p.m. and 7 a.m.[1814] Vancouver adopted these same state standards regarding noise performance standards and their exemptions.[1815] Vancouver did adopt its own separate restriction on construction activity providing that outdoor construction activity may not occur earlier than 7 a.m. or later than 8 p.m., seven days a week.[1816]

Tesoro Savage has committed to limiting construction to daytime hours in order to comply with the regulations, and intends to conduct the noisiest construction during the hours of 7 a.m. to 8 p.m. Ms. Wallace testified that if any outdoor construction work is required outside of these hours, Tesoro Savage will consult with Vancouver and notify the Council in advance. She further stated that Tesoro Savage will not conduct any work outside of these hours until the Council has reviewed and approved the planned activities.[1817]

Ms. Wallace estimated sound levels during construction and operation of the VEDT upon the JWC, the Tidewater Office Building, and the residences in the Fruit Valley Neighborhood closest to the project site. Ms. Wallace also measured for potential impacts on an additional residence on the Port property west of the site.[1818]

The JWC has a housing unit that is located just over 400 feet from the proposed pipeline that would run from the storage tanks to the vessel loading dock. The Tidewater Office Building is located just over 100 feet from the nearest proposed rail line associated with the VEDT. The nearest residences are approximately 3000 feet from the proposed storage tank area.[1819]

After characterizing the existing sound environment at representative receiving locations near the project by using existing sound data, Ms. Wallace estimated that the impacts on sound levels at the Fruit Valley residences and the additional residence on Port property would be less than existing sound levels. She projected noise increases at the JWC and the Tidewater Office Building.[1820]

In order to characterize noise impacts due to increases over existing levels of noise, Ms. Wallace used the noise impact criteria and methodologies developed by the Federal Transit Administration (FTA).[1821] Her conclusions with regard to the JWC and the Tidewater Office Building are explained below.

[1814] WAC 173-60-050(3).

[1815] VMC 20.935.030.

[1816] PFT of Wallace 4; VMC 20.935.030.A.4.

[1817] PFT of Wallace at 5; Ex. 0001-000614-PCE. The Council observes that WAC 173-60-080 contains a process for obtaining a variance from noise requirements because of special circumstances.

[1818] PFT of Wallace 5-6.

[1819] Ex. 0001-000604-PCE, Ex. 0001-000606-PCE.

[1820] PFT of Wallace 5-6.

[1821] PFT of Wallace 4-5.

c. Construction Noise

For construction noise, the FTA general assessment methodology includes several requirements, including calculating construction noise levels as hourly Leqs[1822] that are a sound measurement that has been found to closely track community response to noise.[1823]

The suggested FTA guidelines use an hourly Leq of 90 decibels at residential uses and 100 decibels at industrial or commercial uses. If calculated construction noise levels are below these levels, then the noise is not expected to result in adverse community impact.[1824]

Ms. Wallace, using the FTA guidelines, selected the two noisiest pieces of equipment during the noisiest construction phase. She used the jackhammer and a derrick crane during foundation work as the pieces of equipment to model. The two pieces of equipment were assumed to be operating at maximum power for a full hour at the nearest possible locations to the receiving locations.

Ms. Wallace considered the calculations to be extremely conservative for two reasons. First, the jackhammer is an unlikely piece of equipment that would be used during foundation work, and is much louder than any other piece of equipment. The highest calculated sound levels would also be relatively short-term. Second, the FTA methodology places the equipment in the center of the construction area. Ms. Wallace placed the equipment at the nearest possible location to the receiving location. Much of the construction activities would occur at a much greater distance from the Tidewater Office Building and the JWC than where it was calculated.[1825]

The highest calculated construction sound level at the Tidewater Office Building was 84 decibels, which is below the 100 decibels suggested for commercial and industrial receivers. Ms. Wallace also noted that the sound in the office building can be reduced by at least 20 decibels simply by shutting the windows.[1826]

The highest calculated construction noise at the JWC is 82 decibels, which is lower than the suggested level of 90 decibels applied to residential uses.[1827]

[1822] The Leq is an equivalent sound level measurement used by the FTA and the Federal Highway Administration for assessing construction noise impacts. The Leq is an energy average expressed as a hypothetical constant sound over a period of time. The calculation factors in more intense noise and assigns greater value to these higher peaks. The Leq can be used to describe the noise level from each piece of equipment separately, and can be combined to represent the noise level from all equipment operating during a given period.

[1823] PFT of Wallace 10-12.

[1824] PFT of Wallace 11.

[1825] PFT of Wallace 5-6, 10-12.

[1826] PFT of Wallace 12-13.

[1827] PFT of Wallace 13.

Ms. Wallace stated that the construction noise would only result in slight impacts on the Tidewater Office Building and the JWC based upon her calculations, particularly given the conservative assumptions used in her methodology.[1828]

d. Operational Noise

Operational noise at the VEDT is addressed in WAC 173-60-040. Sounds from trains in motion prior to the unloading process (transfer of care and custody) of loaded cars to the VEDT are not subject to the noise limits under an exemption for trains engaged in interstate commerce, but sounds from stationary and moving trains during the unloading process are subject to the noise limits.[1829] Ms. Wallace nevertheless included in her assessment both sounds from trains during the unloading process and from trains arriving and departing from the site.[1830]

The model-calculated sound levels from the operation of expected on-site noise sources demonstrated compliance with both the daytime and nighttime noise limits near the nearest residences to the site, at the JWC, and at the Tidewater Office Building.[1831]

e. Opponents' Evidence and Argument

Opponents to the VEDT focus on health impacts of the noise from construction and operational activities.

VEDT Opponents provided pre-filed testimony from Dr. Frank James relating to the health impacts from noise. Dr. James is a licensed medical physician practicing in Washington for almost 30 years. For the last 5 years, Dr. James has been part of a group of medical professionals concerned about the human health impacts from proposed coal and oil shipping terminals in Washington.[1832] His pre-filed testimony was not subject to cross-examination.

Dr. James testified that there would be increased noise both along the rail corridor and at the VEDT. Dr. James testified that noise can cause the following potential health impacts in humans: cardiovascular disease, including increased blood pressure, arrhythmia, stroke, and ischemic heart disease; cognitive impairment in children; and sleep disturbance resulting in fatigue and work time accidents. He believes that these impacts are the most difficult to modify, but are very easy to measure.[1833]

VEDT Opponents also submitted the comments of retired audiologist, Dr. Alice H. Suter, finding that the noise impacts from construction and decommissioning of

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[1828] PFT of Wallace 12-13.
[1829] WAC 173-60-050(4)(c).
[1830] PFT of Wallace 6.
[1831] PFT of Wallace 6.
[1832] PFT of F. James 1-2.
[1833] PFT of James 4.

the project would be extremely serious.[1834] Dr. James testified that he reviewed Dr. Suter's comments and agreed with her conclusion that the 60 decibel Day-Night Sound Level (DNL) is an inappropriate metric to use to measure the noise impacts on people living or working near the VEDT. The reason it is an inappropriate measure is that the DNL uses averaged sound levels, is based only on community surveys of "highly annoyed" individuals, and is too high of a decibel measure.[1835]

f. Summary of the Council's Analysis of Noise Issues

As discussed elsewhere in this Order, the Council's current analysis of the VEDT's ASC is not limited by WAC 463-62, which establishes standards for the contents of site certification agreements. The Council will nonetheless evaluate whether Tesoro Savage has demonstrated that increased noise from construction and operation of the VEDT would comply with the noise standards set forth in WAC 173-60 and WAC 463-62-030.[1836] The Council finds that the VEDT would comply with both. The Council also concludes that health impacts will not occur from noise that is within these limits.

Ms. Wallace is an expert in the matters she has testified to and has provided credible testimony. The Council accepts the modeling conducted by Ms. Wallace, which appears to be both thorough and conservative. The Opponents offer no alternative modeling, nor do they point to any errors in the modeling conducted by Ms. Wallace. Their counter-arguments go to whether a person hearing the additional noise would find it insignificant or minor. This is not relevant to the question of whether the construction and operational activities of the VEDT would comply with WAC 173-60. However, because the Council's current consideration of the noise impacts of the proposed project is not limited by the provisions of WAC 173-60, the Council will also consider whether, as the Oppenents suggest, the regulatory standards applied by Ms. Wallace are too low and the Council should apply a more stringent standard. Dr. James's testimony does not sufficiently link temporary increases in noise, like the noise that would be caused by VEDT construction, and the adverse health effects that he cites to enable the Council to conclude that any such health impacts are likely to result from VEDT construction. Thus, the Council will not impose more stringent regulatory standards.

The Council observes that construction noise is exempt from state noise regulations except as to the reception of noise within Class A EDNAs between the hours of 10:00 p.m. and 7:00 a.m.[1837] Tesoro Savage has voluntarily committed to limit construction activity to the hours allowed under VMC 20.935.030A.4, i.e., 7:00 a.m. and 8:00 p.m., unless preapproval is obtained from the Council after consultation with Vancouver. The Council is basing its noise impact findings on Tesoro Savage's commitment to limit its construction activity to the hours between 7:00 a.m. and 8:00 p.m. Therefore, if the project is approved, Tesoro Savage will have

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[1834] Ex. 5563-000008-CRK.

[1835] PFT of F. James 5.

[1836] There was no evidence, credible or otherwise, presented relating to noise impacts on wildlife.

[1837] WAC 463-62-030; WAC 173-60-050(3)(a).

to seek approval from the Council under the waiver process contained in WAC 173-60-080 and incorporated by reference into WAC 463-62-030(1)(f) should construction between 8:00 p.m. and 7:00 a.m. prove necessary. Because the construction and operation of the VEDT will comply with the noise standards in WAC 173-60 and WAC 463-62-030, the Council finds that no other additional mitigation for noise impacts is required. The Council will therefore not move noise impacts into its balancing analysis in Section IV of this Order.

E. FINANCIAL & ECONOMIC IMPLICATIONS OF THE VEDT

1. Need for the VEDT

Tesoro Must Demonstrate the Need for this Facility at this Location. Tesoro Savage has the burden of demonstrating the need for the VEDT at the proposed location. As discussed in Section V, even if one accepts the premise that there is a "pressing need for energy facilities," the Council must determine the appropriateness of the proposed location and operation of the VEDT in light of the need for energy from that facility.

Tesoro Savage's evidence. Tesoro Savage's key witness who testified about the need for the energy to be supplied by the VEDT was Brad Roach, Senior Director of Market Analysis and Senior Economist in the Strategy and Business Development Department for Tesoro Companies, Inc. Keith Casey, Executive Vice President of Operations for Tesoro Companies Inc., provided additional testimony supporting aspects of Mr. Roach's testimony.

Mr. Roach testified that Tesoro grew from being a modestly sized independent refiner to being now the largest refiner on the West Coast. This growth has allowed for system optimization and economies of scale, but has been accompanied by challenges including increased complexity of managing large throughput of supplies of crude and distribution of refined product. Tesoro thus seeks competitively and economically secure crude supplies from multiple sources to ensure an advantageous supply chain.[1838]

Oil production declines. According to Mr. Roach, the VEDT project was conceived in response to continued declines in endogenous oil production in PADD V, particularly from the Alaska North Slope (ANS), which threaten the supply of crude oil to refineries in Washington and California.[1839] Production of crude oil in Alaska and California, which continue to supply refiners in PADD V, has been declining for decades and is projected to continue declining.[1840] ANS production has declined from a peak of roughly 2 million bpd in the late 1980s to 517,000 barrels per day in 2016. Projections prepared by the Alaska Department of Revenue show further declines, to about 300,000 bpd by 2025, and ANS supplies could be further impacted in scenarios where low demand leads to operational issues for the Trans-Alaska

[1838] PFT of Roach 2.
[1839] PFT of Roach 3-10.
[1840] PFT of Roach 15; Ex. 0144-000001-TSS.

Pipeline System.[1841] In rebuttal to Ian Goodman's testimony for the Oppenents, Mr. Roach stated that this time window is too narrow and does not even get you to the midpoint of the project duration.[1842] Mr. Roach asserts that you need to look out further, and in doing so there is a decline of 55 percent from where we are today in the ANS crude production. Mr. Roach concludes that this takes away approximately 260,000 barrels of crude oil supply from the system due to the natural decline in the ANS field.[1843]

Demand. Demand projections show a relatively consistent overall need for refined petroleum products in California, which comprises two-thirds of total demand in PADD V, through 2025, with increased demand from population and economic growth projected to be offset to some degree by adoption of renewable technologies and increased efficiency (which are not currently expected to occur quickly enough to reduce overall demand). Projections suggest a gradual shift in the mix of refined products, with diesel and kerosene demand slowly increasing and gasoline demand decreasing after 2020. Regulatory factors, such as low-Sulphur standards, could require refiners to shift the types or qualities of refined products they produce.[1844]

Other supply sources. Mr. Roach testified that the availability of new supplies of mid-continent crude provides a market opportunity to Tesoro, and discussed his views concerning the relative benefits and weaknesses of various potential modes of transporting this crude to PADD V. Noting that PADD V is not currently connected to other regions by crude oil pipelines, and is generally isolated from other PADDs, Mr. Roach concluded that rail was the most feasible way for mid-continent crude to reach PADD V, and that the VEDT transloading facility would allow distribution to refineries throughout PADD V.[1845] Mr. Roach did state that crude-by-rail infrastructure already exists in PADD V and, mid-continent crude does get delivered in California via rail and all but one of the refineries in WA have a rail terminal that receives such crude.[1846]

Keith Michael Casey, Executive Vice President of Operations for Tesoro, testified that there has been an increasing amount of foreign crude oil being brought to PADD V. These crude oil supplies come from West Africa, the Middle East, Russia, Canada and other areas.[1847] However, Mr. Roach testified that foreign sources of crude oil to serve PADD V refineries are typically from regions that are more open to corrupt business practices and subject to geopolitical tensions, thereby posing supply risks to refiners. [1848]

[1841] PFT of Roach 16; Ex. 0144-000001-TSS.
[1842] Tr. 4978, vol. 21.
[1843] Tr. 4979, vol. 21.
[1844] PFT of Roach 9; Ex. 0136-000001-TSS.
[1845] PFT of Roach 3-10, 15-19; Ex. 0136-000001-TSS; Ex. 0137-000001-TSS; Ex. 0143-000001-TSS; Ex. 0144-000001-TSS.
[1846] Tr. 165-68, vol. 2.
[1847] Tr. 1991, vol. 9.
[1848] PFT of Roach 17. Although this assertion was made, there was no additional evidence to support this statement.

Project impact on current refinery throughput. The VEDT would not change throughput or capacity for refineries in Washington or elsewhere in PADD V, but would provide an additional supply chain option.[1849]

Project benefit for refiners. Mr. Roach and Mr. Casey indicated that a prime benefit of the project would be providing refiners with a reliable logistics channel, made particularly valuable by its flexibility to meet refiners' needs for specific types of mid-continent crude at specific times, including through the VEDT's capability to blend different crude stocks. Tesoro has indicated its intent to purchase one-sixth of the VEDT's capacity, 60,000 bpd, and the remainder, up to 300,000 bpd, would be available to other refiners.[1850] However, Mr. Roach also testified that at this time, there are no firm commitments or contract in place from other refiners for delivery of VEDT crude oil.[1851] Crude markets can change rapidly in response to geopolitical events, circumstances in the general economy, changing regulatory requirements, and natural disasters, but the decline in endogenous supply of crude in PADD V has been relatively consistent, making VEDT an important part of the region's energy future in Tesoro's opinion.[1852]

Project benefit for consumers. Mr. Roach testified that price of crude oil is the main factor in determining the consumer prices at the pump. Thus, consumers would be unlikely to notice differences in retail prices attributable to the VEDT. In fact, Mr. Roach testified that "it would be difficult for me to say that a consumer would see a benefit, that they would notice a benefit because there's a much bigger dynamic occurring with crude oil prices that could mask any benefit, either way."[1853] Mr. Roach nevertheless maintained that, inasmuch as the VEDT project allows refiners to acquire economical crude from alternative sources, and inasmuch as refiners operate in a competitive environment, benefits refiners derive from VEDT could, but does not have to, get transmitted through the supply chain to the benefit of consumers.[1854]

Summary. Summarizing how the project benefits the transportation fuel needs of Washington State and the West Coast generally, Mr. Roach stated, "[i]t basically provides the flexibility as a cost benefit; the flexibility of refiners to access crude from much more attractive areas with quality that can meet some of their specific needs to allow them to optimize their refineries and to operate at the most cost-effective level. Again, through the competitive nature of our business, those benefits tend to get competed all the way to the retail level and the consumers see a benefit from that."[1855]

[1849] PFT of Roach 19.
[1850] Tr. 4991-96, vol. 21; Tr. 201-03, vol. 2; 1989-94, 2044, vol. 9.
[1851] Tr. 5003, vol. 21.
[1852] Tr. 198-99, vol. 2.
[1853] Tr. 196, vol. 2.
[1854] Tr. 196-97, vol. 2.
[1855] Tr. 197-98, vol. 2.

Opponents' evidence. Project Opponents presented Ian Goodman, President and founder of The Goodman Group, Ltd., a consulting firm specializing in issues related to energy regulation and economics. Mr. Goodman majored in civil engineering at the Massachusetts Institute of Technology, specializing in transportation systems. He has over 35 years of experience in the analysis of energy systems.[1856] Mr. Goodman offered rebuttal to Mr. Roach's testimony, stating that there was no economic need for the VEDT project to supply Washington energy consumers.[1857] In addition to his narrative testimony, Mr. Goodman provided a technical appendix with data on sourcing of crude oil to, and the disposition of products refined by, Washington and California refiners.[1858]

Existing supply to Washington. Mr. Goodman described Washington as having extensive energy facilities that not only meet Washington's needs for refined petroleum products but also provide sizeable supplies to neighboring states and international markets. Washington is a net exporter of refined petroleum products, thus Washington consumers are already amply supplied with abundant energy at reasonable cost.[1859]

Oil production declines. Mr. Goodman testified that the VEDT was not necessary to assure a supply of crude to Washington refiners as the rate of decline of current supplies was gradual, and noted that the capacity of the proposed terminal exceeded the total amount of crude Washington refiners sourced from Alaska.[1860] Mr. Goodman's did look at declines after 2020 and surmised that even if you look further out in time, the decline is small relative to the size of the VEDT; the decline would still not support the need for the VEDT. In addition, Washington refineries have a number of alternatives to replace production from Alaska, if necessary.[1861]

New supply sources. Mr. Goodman observed that Washington refiners had adapted to reduced ANS supplies by sourcing crude from other sources, including Canada by pipeline, foreign nations by tanker, and mid-continent by rail. While 90 percent of crude oil refined in Washington was sourced from Alaska as recently as 2003, more than half of the 560 kbpd in total crude supplies to Washington refiners now come from sources other than ANS. These include 140 kbpd of Canadian crude transported via pipeline (about 25 percent of total supply), 140 kbpd of mid-continent crude transported by rail ("CBR" – 25 percent), and 30 kbpd of foreign sources arriving by tanker (5 percent).[1862] In California, refiners have already replaced declines in endogenous production that began in 1985, with 50 percent of crude supplies now sourced from foreign nations.[1863]

[1856] Tr. 3237-38, vol. 14.
[1857] PFT of Goodman 62-63.
[1858] Ex. 5588-000029-59-CRK.
[1859] PFT of Goodman 9-10.
[1860] PFT of Goodman 14-16.
[1861] Tr. 3246, vol. 14.
[1862] Ex. 5588-000034-35-CRK.
[1863] Ex. 5588-000041-CRK.

Construction of Crude-by-Rail (CBR) facilities in Washington. Mr. Goodman documented construction of CBR unloading facilities at four of Washington's five refineries, noting that the fifth refinery also had a facility in permitting.[1864] Completed facilities have capacity of 195 kbpd, and the facility in permitting would have capacity of 61 kbpd.[1865] He inferred from these facts that this showed Washington refiners interested in CBR prefer to receive such crude directly rather than incur additional costs for transloading and marine transportation of crude sourced through the VEDT.

Changing economics of CBR. Mr. Goodman expressed his view that the rapid increase in CBR transportation nationwide that had occurred in the early 2010s was due to a brief interval where exceptionally high crude prices combined with the lack of transportation modes to distribute mid-continent crude had resulted in its availability at relatively low cost. He noted that CBR volumes to destinations other than PADD V had dropped off rapidly in response to falling crude prices, and testified that the construction of CBR receiving facilities at Washington refineries coupled with multi-year contracts were responsible for the continued delivery of CBR to PADD V. Mr. Goodman concluded that the subsequent development of pipelines connecting mid-continent sources meant that even if crude prices return to historic highs, mid-continent crude transported by rail would no longer be priced below other options.[1866]

Future declines in ANS production. Mr. Goodman argued that additional supply needs attributable to further decreases in ANS production could be met by procuring additional crude from any of the existing channels: that foreign oil would remain available and tanker transport costs were highly competitive, that there was excess CBR capacity already built or under consideration at Washington refineries, and that proposed pipeline expansion projects could increase the availability of Canadian crudes. Mr. Goodman testified that foreign supplies were stable and had continued even during acute international crises.[1867]

Project benefits for refiners. Mr. Goodman stated his view that the large throughput capacity of the VEDT, as well as its ability to provide a variety of blends of crude, suggested its purpose was to supply California refiners, export markets, or both. Because CBR facilities have been difficult to permit in California, there could be greater potential for refiners there to seek to access mid-continent crude through the VEDT, although declining endogenous supplies could also be replaced from foreign sources.[1868]

Project benefits for consumers. Mr. Goodman testified that benefits of sourcing crude through the VEDT would accrue to the refiners themselves, and would not reach consumers of

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[1864] The Council takes administrative notice that the fifth refinery withdrew its permit for a CBR unloading facility.
[1865] Ex. 5588-000038-CRK.
[1866] Tr. 3251-60, vol. 14; Ex. 5588-000029-59-CRK.
[1867] Ex. 5588-000029-59-CRK.
[1868] PFT of Goodman 16-21.

refined products. He argued that regardless of the destination of crude transported through the VEDT, its construction would not result in a reduction of retail prices consumers pay for refined products, either in Washington, or in California. Rather, refiners would retain any benefit stemming from crude price impacts directly or indirectly attributable to the availability of the VEDT as a supply channel.[1869]

Mr. Goodman concluded that the balancing of interests that the Council must consider under its governing statutes does not support siting a terminal in Washington when the primary purpose of building and operating the VEDT is to supply California refineries. Mr. Goodman supported this argument by detailing past economic analyses of energy logistic facilities that show the benefits of such facilities accrue largely downstream from hosting jurisdictions while the negative impacts are experienced in, and upstream of, the hosting jurisdiction.[1870]

Tesoro Savage's rebuttal evidence. In rebuttal, Mr. Roach noted that refineries owned in common operate in an interconnected manner, thus even if crude transported through VEDT were destined for California, Washington refiners could benefit. Refiners would experience these benefits whether oil prices stay relatively low or rebound to historic highs. Moreover, according to Mr. Roach's perspective on the broader market, the VEDT and associated supply chain, unlike foreign-sourced crude, would be insulated from corruption and geopolitical risk.[1871]

Location. Mr. Roach argued that, while siting a large CBR project in California would be attractive, public opposition, limited real estate, and stricter regulations preclude that option.[1872] Still, even with the additional cost of trans-loading and marine transportation, and even if crude prices remain relatively low, he argued that VEDT would represent an economic supply option to PADD V refiners. The promise of reliability, and the ability to source crude types matched to particular refineries' configurations, could be more important factors than delivered price in a refiner's procurement decisions.

New supplies. Mr. Roach also disputed the likelihood of pipeline expansion projects discussed by Mr. Goodman ever being completed, and noted that even if such capacity were constructed, it would not guarantee increased supply to Washington refiners.

Alternative crude sources. Refiners could replace potential future declines in ANS/CA crude supplies with foreign supplies of crude delivered by tanker, incremental increases of CBR using existing infrastructure, or other existing supply channels.[1873] It is not possible to determine what mode of transporting crude will be most economical for refiners in

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[1869] Ex. 5588-000049-CRK.
[1870] PFT of Goodman 28-29, 32-33; Tr. 3264, vol. 14; Ex. 5588.
[1871] Tr. 4985-89, vol. 21.
[1872] Tr. 5028-29, vol. 21.
[1873] Tr. 5007-12, 5052-53, vol. 21.

the future.[1874] The balance between the modes of transportation of crude oil to PADD V in the context of an ever-changing picture determined by the economics of the crude oil and the market at the moment.[1875]

Summary of the Council's Analysis of Need for the VEDT. From the parties' evidence and arguments, it appears they agree that consumer demand for refined petroleum products in PADD V is likely to remain roughly stable over the life of the project. The parties also agree that sufficient refinery capacity exists to meet state and PADD V consumer demand for refined petroleum products during this time period. The parties further appear to agree that consumer energy prices would not be directly affected by the VEDT.

The parties disagree as to: (a) whether the VEDT is necessary to secure refiners' access to reliable supplies of crude oil, (b) if so, whether consumers would realize benefits from the project, and (c) if so, whether those benefits outweigh negative impacts attributable to the project.

Whether Tesoro has demonstrated that the VEDT is necessary to supply refiners with crude oil. The stated purpose of the VEDT is to, "provide an important structural component of the supply chain to address declining sources and provide domestic crude oil supply alternatives to replace those existing sources."[1876] Tesoro Savage argues that the VEDT is necessary to replace declining sources of crude oil for refineries in Washington and other western states.[1877]

Opponents argue that there is no need for the VEDT project because Washington is already a net exporter of refined petroleum products, existing crude sources will continue to adequately supply state and regional refiners, and to the extent PADD V refiners need to replace declining supplies at some future point, there is no void in the slate of crude oils available, and refiners can do so through other existing or proposed logistic routes.[1878]

On balance, the Council agrees with Opponents that there is little evidence that the VEDT will benefit Washington refiners directly. The existence of CBR unloading facilities at four of five Washington refineries implies that refiners would tend to procure mid-continent crude directly. CBR receiving capacity in Washington exceeds current delivery levels, meaning additional declines in ANS supplies could already be met with existing infrastructure. Incremental additional supplies could also be sourced from overseas or through any pipeline expansion, as was the case before Washington refiners constructed CBR facilities.

[1874] Tr. 5030-44, vol. 21.
[1875] Tr. 167, vol. 2.
[1876] Applicant Pre-Hr'g Br. 5.
[1877] Applicant Post-Hr'g Br. 10-12.
[1878] Columbia Riverkeeper Final Adjudication Br. 20-21.

The Council agrees with Tesoro Savage that the difficulty in obtaining approval for new or expanded CBR facilities in California could make sourcing CBR through the VEDT attractive to refiners in California or elsewhere in PADD V. Given the interconnected nature of petroleum markets, and specifically given that firms such as Tesoro own refineries in both Washington and California, Washington refiners could indirectly benefit from the availability of VEDT-sourced crude to California refineries, for example if it reduced competition for ANS crudes allowing Washington refiners to continue sourcing from ANS despite declining production.

The Council thus concludes that, notwithstanding uncertainty surrounding the extent to which the VEDT's capacity would actually be used; Tesoro Savage has provided substantial evidence to show that refiners in PADD V, particularly California refiners, could benefit from the ability to source crude from the VEDT. To the extent future market conditions favor procuring through the VEDT, refiners' benefits would come in the form of supply-chain flexibility and reliability, access to a variety of crude types and blends, and potentially competitive pricing. To the extent conditions disfavor use of the VEDT, refiners' (other than Tesoro's) ability to access other available sources of crude would not be constrained by the VEDT's existence. Under some market conditions, Washington refiners could benefit from procuring crude directly through the VEDT. More likely, Washington refiners would benefit only indirectly, to the extent that the additional procurement option for California refiners reduces market pressures on Washington refiner-preferred sources like ANS and Canadian crudes.

While Tesoro Savage has shown at least potential benefits to refiners from the VEDT, the Council does not find substantial evidence in the record that the VEDT is *necessary* to secure refiners' supplies of crude oil. Crude oil is a major commodity, traded internationally. It is undisputed that sources of crude oil will remain available to PADD V refiners whether or not the VEDT is constructed.[1879] While Mr. Roach asserted concerns regarding the reliability of international supplies, due to corruption and geopolitical instability, no evidence of supply disruption was provided. Thus, the benefit to refiners from the project is the marginal value refiners in Washington and across PADD V would derive from sourcing crude from the VEDT rather than some other channel, and any resulting indirect benefits experienced by consumers of energy.

Crude oil market conditions can change rapidly, and are inherently unpredictable. Presumably, due to the wide variety of factors at play in refiners' procurement decisions, and the inherent difficulty in forecasting future crude oil market conditions, the VEDT has not executed any long-term contracts. Aside from Tesoro's indication that it will retain and might use up to one-sixth of the VEDT's throughput capacity, no witnesses testified to the extent to which refiners would procure crude oil through the VEDT, or the magnitude of benefits they

[1879] *See* Tr. 5007-12, 5052-53, vol. 21.

would derive from doing so.[1880] This further undermines assertions that the VEDT is necessary to respond to declining ANS production or other supply-chain issues.

Whether Tesoro has demonstrated that the VEDT will provide consumers with abundant energy at reasonable cost? The parties agree that sufficient refinery capacity exists to meet state and PADD V consumer demand for refined petroleum products over the projected life of the project. The parties also appear to agree that consumer energy prices would not be directly affected by the VEDT.[1881]

Tesoro Savage asserts in conclusory terms that flexibility for refiners, resulting in consistency of supply, or availability of preferred products, would ultimately result in unspecified indirect benefits to consumers, due to the competitive nature of the refining industry. The Opponents counter that consumers would not benefit because the project is unlikely to supply Washington refiners, and to the extent that refiners in Washington or elsewhere in PADD V secured cheaper supplies of crude stocks through VEDT, the refiners themselves would retain that benefit.

No evidence was presented by either Proponents or Opponents to suggest that the magnitude of supply-chain efficiencies achieved by refiners due to the VEDT would be sufficient to noticeably impact consumer pricing, or to otherwise materially benefit consumers. Rather, the parties agree that such impacts would likely be negligible relative to the changes in refined product pricing driven by underlying crude oil costs.

The Council concludes that Tesoro Savage has not provided substantial evidence to show that consumers of refined products, in Washington or elsewhere in PADD V, would benefit from the refiners' supply-chain efficiencies. Tesoro Savage's expert witness opined that supply chain efficiencies were generally competed downward, thus benefitting consumers. These bare assertions, offered without substantial evidence, are insufficient to persuade the Council that the VEDT would materially benefit consumers.

2. Financial Assurances and Potential Uncovered Costs to the Public

Position of Parties. Tesoro Savage asserts that it has committed to providing financial assurances that are sufficient to mitigate for the risk of damage or to the physical or human environment caused by project construction, operation, abandonment, termination or when operations cease at the end of the project's life. Tesoro Savage has agreed to obtain insurance

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[1880] WAC 463-60-116 allows an applicant to submit amendments to the application within 30 days after conclusion of the hearing. Amendments may include "all commitments and stipulations made by [Tesoro Savage] during the adjudicative hearings." Tesoro Savage timely submitted an amended application in Oct. 2016, which included the following provision: "[t]o ensure availability of feedstocks to Washington state refineries, in-state refiners will have first call on all commercially available barrels." This stipulation or commitment appears to have been first made in the amended application. Because it was not made by Tesoro Savage or any witness during the adjudicative hearing, the Council declines to consider it for purposes of this order.

[1881] Applicant Post-Hr'g Br. 10-12; Columbia Riverkeeper Final Adjudication Br. 21.

sufficient to meet the requirements of laws that they contend are binding on the Council, and the ground lease with the Port, and that as a company it has the ability to obtain the necessary coverage. It argues that the law does not require an applicant to commit to a specific amount of insurance coverage prior to approval of the VEDT, and that the amount of insurance coverage can be specified after approval, but before VEDT construction and operation.[1882] In fact, Tesoro Savage contends that it would not be able to obtain coverage prior to application approval and VEDT construction. In addition, Tesoro Savage argues that it is only responsible for the financial assurance associated with the VEDT and that railroad company and the vessel operators are required to provide financial assurances for their own operations, as this is not a legal obligation of Tesoro Savage. Finally, Tesoro Savage asserts that the required coverage should be for the reasonable worst case scenario because it would be inconsistent with the plain meaning of the statute (RCW 88.40.025) and unrealistic to require the company to provide coverage for a worst case scenario, especially one with a low probability of occurring. Such a requirement would make it impossible to operate.

The opposing parties assert that Tesoro Savage has not provided sufficient evidence of financial assurances. There is no evidence in the record as to how much financial coverage will be available in the case of an incident, so there is no way to know if the state and local government, as well as the public will be compensated for loss or damage and when any such compensation might actually be paid. In addition, Project Opponents argue that Tesoro Savage's lack of significant assets and its corporate structure do not provide the ability to fill the gap if coverage is insufficient. They also argue that the ASC includes all 3 facets of the operation; crude-by-rail, terminal operations, and marine transport and therefore, Tesoro Savage should be responsible for ensuring financial assurances for an incident in any one of these facets of the project. They contend that some types of damages, such as cultural and ceremonial harms to tribal rights, cannot be monetized and therefore may not be covered by insurance. Finally, they contend that coverage should be set based on the worst-case scenario (maximum foreseeable loss); otherwise, the coverage may be inadequate leaving the possibility that damage recovery may not be enough for the potential loss.

a. Evidence and Argument

Assurance of Financial Coverage. Keith Casey is the Executive Vice President of Operations for Tesoro and part of the executive team for Tesoro Savage, reporting directly to Tesoro's Chief Executive Officer. He is accountable for all operations where Tesoro has people and assets.[1883] Mr. Casey described the corporate structure of Tesoro Savage. Tesoro Savage is a joint venture between Tesoro Refining and Marketing Company and Savage Services. It was formed as a limited liability company in Delaware.[1884] The company is managed by a management committee made up of two Savage Services representatives and

[1882] Applicant Post-Hr'g Br. 61.
[1883] Tr. 1988, vol. 9.
[1884] Tr. 2000, vol. 9.

two Tesoro representatives. The management committee functions as a board of directors, meeting quarterly and making decisions by consensus.[1885]

Currently Tesoro Savage has only one employee, Jared Larrabee, Tesoro Savage's general manager.[1886] He has full accountability for day-to-day operations and activities within the terminal, including rail unloading and marine vessel loading.[1887] Tesoro Savage is being funded by contributions of the two joint venture partners,[1888] and Tesoro Savage currently has no assets. However, after the VEDT is operating, the company will have assets, namely the facilities built on the Port for terminal operations and revenues from service contracts that will be entered into by Tesoro Savage. Mr. Casey estimated that these assets will be worth $200 million.[1889] The revenues generated, however, will be distributed back to the joint venture partners.[1890]

Mr. Casey stated that the joint venture will have its own insurance policy for the activities at the VEDT.[1891] He does not know the liability limits for most of those policies, as those limits will be decided later, upon the recommendation of the company's insurance experts.[1892] In addition, any service contract for services performed at the VEDT will include "appropriate insurance and indemnification" for the work being performed at the site.[1893]

Michelle Hollingsed is currently the Risk Manager for Savage.[1894] At this time, she has not as yet placed any insurance, nor for the most part, recommended coverage limits.

Ms. Hollingsed stated that Tesoro Savage intends to carry insurance that is, at a minimum, sufficient to meet the levels required by the ground lease. The lease requirements include property insurance in amounts equal to the replacement values of the VEDT; commercial general liability insurance of at least $10 million per occurrence, with a $15 million aggregate limit; contractor's pollution liability insurance; operational pollution legal liability insurance with combined limits not less than $25 million; environmental impairment liability insurance with combined limits not less than $25 million; and automobile and worker's compensation insurance.[1895]

[1885] Tr. 2000-01, vol. 9.
[1886] Mr. Larrabee is an employee of Savage, but on loan to Tesoro Savage. Tr. 2004, vol. 9.
[1887] Tr. 2002, vol. 9.
[1888] Tr. 2018, vol. 9.
[1889] Tr. 2007, vol. 9.
[1890] Tr. 2019, vol. 9.
[1891] Tr. 2005, vol. 9.
[1892] Tr. 2008-09, vol. 9.
[1893] Tr. 2005-06, vol. 9.
[1894] Ms. Hollingsed has a degree in accounting, an MBA and is a licensed CPA. She is a certified property casualty underwriter, a certified risk manager, and has worked as a broker. Her group at Savage places the insurance policies for the company. It will be her responsibility to develop the insurance program, bonds, and other risk management instruments, as well as place the insurance for Tesoro Savage. Tr. 1709-11, vol. 8.
[1895] Ex. 0001-0000056-57-PCE; Ex. 3068-0009-10-VAN; Tr. 425-26, vol. 3; Tr. 1715-16, vol. 8.

Ms. Hollingsed also stated that the approach to insurance coverage by Savage is a conservative one. First, she needs to understand the risks and to make sure the limits are adequate to protect the company's assets, so the insurance group takes a very conservative approach. She expects that her group would take this same approach with the joint venture.[1896]

Vancouver presented the testimony of Robert J. Blackburn, founder of Blackburn Group, a company that specializes in marketing products and services for the risk, insurance, and claim management field.

Mr. Blackburn testified about Tesoro Savage's ability to cover losses beyond that, which is covered by insurance. As organized, Tesoro Savage has limited to no assets from which a loss may be covered. In addition, as a limited liability company, it may have effectively shielded its parent companies from liability, meaning that the parent companies' assets may be unavailable to cover Tesoro Savage's losses. This is a significant gap in the financial assurances provided by Tesoro Savage.

Extent of Tesoro Savage's Financial Assurances. Ms. Hollingsed testified that Tesoro Savage would be liable for damages occurring at the VEDT or from VEDT operations, and would not be financially responsible for incidents occurring during rail transportation prior to the time Tesoro Savage employees took control of inbound trains, nor for spills occurring after oil was loaded onto vessels.[1897] In a large incident for which Tesoro Savage was responsible, the intention would be for Tesoro Savage insurance policies to respond first. If damages exceed the amount of insurance, Tesoro Savage's assets would respond, and potentially other entities could also be held responsible, including the owner of the crude oil being transported.[1898]

Ms. Hollingsed testified that Tesoro Savage would be liable for damages occurring at the VEDT only or from VEDT operations, and would not be financially responsible for incidents occurring during rail transportation prior to the time Tesoro Savage employees took control of inbound trains, nor for spills occurring after oil was loaded onto vessels at the VEDT.[1899]

Jared Larrabee is the General Manager of Tesoro Savage. He clarified when, what activities would be covered by insurance for Tesoro Savage, and for which the company would take responsibility. The covered activities would be those performed on the VEDT site, and those related to Tesoro Savage's care and custody of the crude oil. Tesoro Savage's responsibility for activities related to the crude oil would not begin until the train enters the Port and control is turned over to a Tesoro Savage employee. That will happen just before the train enters the loop track area. Before that time, BNSF would have the care and custody of the

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[1896] Tr. 1718, vol. 8.
[1897] Tr. 1738, vol. 8.
[1898] Tr. 1747-49, vol. 8.
[1899] Tr. 1738, vol. 8.

crude oil and would be responsible for damages from any train incident. Tesoro Savage would maintain responsibility until the oil is transferred to the marine vessel. At that point, the marine vessel owner has the care and custody of the crude oil and would be responsible for all damages related to any vessel incident. This will be true even if the vessel is at the dock.[1900]

Ms. Hollingsed also stated that insurance would only be available in the event Tesoro Savage was deemed liable for an incident, and that policies would specify which "goes first" in paying claims.[1901] She stated that Tesoro Savage's response to an incident, and its insurance carriers' responses, would be very fact dependent, but that in some cases Tesoro Savage might immediately start paying claims to help citizens. She described this as a "best practice" in response to an incident.[1902] However, she acknowledged that some claims require litigation to determine legal liability, which can go on for "some time".[1903] However, when asked about what happens if the insurance coverage is insufficient to cover an incident, Mr. Casey stated that he believes Tesoro, Savage, and Tesoro Savage would work to do the right thing as much as they can to alleviate that situation.[1904] However, Mr. Casey did clarify that he cannot offer an ultimate guarantee that if there was insufficient insurance coverage and it is "somebody else's" liability that Tesoro Savage or Tesoro will step in.[1905]

Maximum Foreseeable Loss. Ms. Hollingsed testified that Tesoro Savage anticipates actual insurance amounts would be higher than the levels required by the lease, in an amount to be determined later based on a study to be conducted by Tesoro Savage, taking into consideration the reasonable worst-case release, as well as mitigation efforts such as facility design, redundancies, spill containment and other factors.[1906] She testified that the study, which she called a "Black Swan" study, would examine other large, comparable, losses experienced by similar facilities. The study would be narrow, looking only at VEDT operations including safety and mitigation measures, and would not look at any incident related to the transport of the oil.[1907] Based on this Black Swan study, she would recommend an insurance program based on balancing the level of coverage and the cost of the policy, and that this would result in a level of coverage based on a reasonable worst-case analysis, which is below the maximum level of foreseeable loss.[1908] Ms. Hollingsed indicated that Tesoro Savage would not provide information about the quality and scope of coverage based on its study before the Council makes its recommendation; rather, it would go to the marketplace and start negotiating coverage at a later point, after permits were issued and likely not until the VEDT is nearly complete.[1909]

[1900] Tr. 412-13, vol. 3.
[1901] Tr. 4931-32, vol. 21.
[1902] Tr. 4949, vol. 21.
[1903] Tr. 4951, vol. 21.
[1904] Tr. 2034, vol. 9.
[1905] Tr. 2050, vol. 9.
[1906] Tr. 1722, vol. 8.
[1907] Tr. 1768, 1776, vol. 8.
[1908] Tr. 4952-53, 4964, vol. 21.
[1909] Tr. 4962-63, vol. 21.

Mr. Blackburn testified that in order to determine the potential costs, the maximum foreseeable loss (MFL) must be determined. The MFL is estimated based on other associated major incidents, which Mr. Blackburn estimates to be $5–6 billion.

In order to determine the MFL, Blackburn set forth a two-phase analysis. The first phase looks at the operational data of the organization. Absent that data, which is absent in this case, one can look at data from the marketplace for potential exposures for the type of organization that is seeking the coverage.[1910] The second phase is more detailed risk profiling. This phase includes tempering the information related to expected and future claims and identifying key exposures, factors that need to be managed as part of those operations.[1911] In looking at MFL, Mr. Blackburn asserts that one must look at the operations beginning with its entry into Washington by rail, the transport by rail to the VEDT, operations at the VEDT, and the marine transport out of Washington.[1912] Using these concepts, Mr. Blackburn concluded that the potential loss from oil-by-rail incidents may reach $6 billion; neighborhood losses may reach $2–3 billion.[1913]

Terminal Incident Related Damages. Ms. Hollingsed anticipates the insurance program for the VEDT would eventually include coverage limits in excess of the damage estimates described in the studies commissioned by the Council for the Environment, which were about $120 to $200 million.[1914] Ms. Hollingsed also estimated coverage requirements for a similar facility in Alaska to be $90 million and California to be up to $300 million. She further indicated these amounts of insurance coverage would be readily available, and that coverage of up to $1 billion or $1.5 billion was available in the market.[1915] Considering only the risks posed by operations at the VEDT, and not considering risks posed by rail transport before care and custody is transferred to Tesoro Savage or by marine transport after care and custody is transferred to marine shippers, the market's capacity to insure a reasonable worst-case damage amount is unknown because Tesoro Savage has deferred calculation of that amount to its future Black Swan study. Moreover, the market would lack capacity to insure a maximum foreseeable loss that could be as high as $6 billion.

Ms. Hollingsed testified that the intention was for the VEDT's liabilities to be insured through a "completely standalone insurance program," separate from both Savage and Tesoro's insurance programs. While Tesoro and Savage would be named insureds on Tesoro Savage policies, the intent would be that the insurance cover both Tesoro and Savage employees working at the site.[1916]

[1910] Tr. 2578, vol. 11.
[1911] Tr. 2579, vol. 11.
[1912] Tr. 2592, vol. 11.
[1913] Tr. 2596, vol. 11.
[1914] Tr. 1730, vol. 8.
[1915] Tr. 1727, 1733, vol. 8; Tr. 4967, vol. 21.
[1916] Tr. 1747-49, vol. 8.

Ms. Hollingsed stated that she would be responsible only to provide coverage in an amount adequate to cover the joint venture's assets, rather than those of the parent companies.[1917] She opined that such assets would include the VEDT facilities and the revenue stream generated by the VEDT.[1918] She further testified that one purpose of a limited liability corporation is for it to stand on its own and limit others' liabilities, unless any indemnification agreements were in place, and that while she was not privy to details of the corporate structure, it might be the case that by structuring the project as a joint venture through an LLC, the assets of the parent companies would be protected.[1919]

Marine Incident – Oil Spill. Tesoro Savage asserts that it has limited responsibility for an oil spill into the water and is responsible only when a spill occurs from activities on the VEDT site. Tesoro Savage is not responsible if the spill occurred from a vessel at the dock once the crude oil is totally loaded onto the vessel.

An oil spill into the Columbia River, whether from a vessel on the water, or from the dock or rail can have a significant negative impact on the water, marine life, wetlands and other natural resources. It is very difficult to quantify damages to natural resources. The habitat equivalency analysis, which is included in the Abt report, is one method to quantify the damages.[1920] Ernie Niemi testified that the Abt report quantified the potential economic costs from a vessel spill to be $200 million. The report, however, only focused on a small slice of the value—the direct costs of a spill. The report did not take into account the passive-use costs from an oil spill. An analysis conducted in 2009-2012 for Ecology and for the Bureau of Reclamation concluded that the value from an oil spill to Washingtonians would be about $3.1 billion from the loss of about 180,000 adult fish per year.[1921]

Eric English also testified about the costs of an oil spill into the Columbia River, as it relates to commercial fishing, recreational anglers, and recreational fishing. He found the following:

> The estimated lost revenue from commercial landings is $4.7 million. This is a measure of the economic losses to commercial fishermen. Lost revenue may differ from total losses because commercial fishermen may recoup some costs while the fishery is closed, or may continue to incur losses after the fishery is reopened due to public perceptions about fish harvested from the river.
>
> The estimated decline in expenditures by recreational anglers is $14.4 million. This is a measure of the potential disruption to local economic activity, with the most direct impacts on local businesses, such as bait shops and marinas. If

[1917] Tr. 1775, vol. 8.
[1918] Tr. 1769, vol. 8.
[1919] Tr. 1779, 1771, vol. 8.
[1920] Tr. 3543, vol. 15.
[1921] Tr. 3527, vol. 15.

anglers make up for lost trips on the Columbia River by taking additional trips to other sites nearby, some of these expenditures may not be diverted from the local area.

The estimated decline in the value of recreational fishing is $17.8 million. This is the monetary quantification of lost enjoyment by recreational anglers whose preferred fishing opportunities are degraded or eliminated by the spill. This estimate includes the lost value from angler trips that are canceled, relocated to other sites, or reduced in quality because of the spill.[1922]

Gregory Challenger disagreed with these assessments of damages. He stated that compensatory mitigation means the service that was lost pending the primary restoration of the impacted area. Natural resource damages under the OPA are a measure of the cost to assess injury and effect restoration. This includes any service that was lost pending the period of recovery.[1923] A resource equivalency analysis looks at the number of birds and bird years, for example.[1924] Mr. James Holmes assumed a 90 percent loss of services, which included birds, fish, and everything from bank to bank in the river. Mr. Challenger considered this to be probably high because it is unlikely that 90 percent of all of these areas would be exposed to a heavy oiling condition.[1925] The ABT report places an overall damage value on the worst-case discharge scenario in the range of $171.3 million.[1926] Although Mr. Challenger questions some of the methodology, he believes that $171.3 million could very well be within the range of Natural Resource Damage Assessment settlements.[1927]

Tesoro Savage anticipates that Ecology and/or the Council would require a study to establish insurance requirements, as outlined in RCW 88.40, which requires consideration of the amount of oil that could be spilled into the navigable waters from the VEDT, the cost of cleaning up the spilled oil, the frequency of operations at the VEDT, the damages that could result from the spill, and the commercial availability and affordability of financial responsibility. Tesoro Savage then argues that financial responsibility could then be established by any one of, or a combination of, the following methods acceptable to the Council: (1) evidence of insurance; (2) surety bonds; (3) qualification as a self-insurer; or (4) other evidence of financial responsibility.[1928]

Rail Incident. Tesoro Savage also asserts that it is not liable for, nor has the responsibility of providing financial assurances for damages from an incident along the rail corridor. It is only responsible once care and custody is transferred at the terminal and during

[1922] PFT of English 3.
[1923] Tr. 1931-32, vol. 8.
[1924] Tr. 1933-34, vol. 8.
[1925] Tr. 1935, vol. 8.
[1926] Tr. 1935-36, vol. 8.
[1927] Tr. 1936, vol. 8.
[1928] Ex. 0001-000058-PCE.

the rail unloading activities. Given the safety measures, Tesoro Savage minimizes the potential liability exposure.

However, in looking at the MFL for a rail incident, Mr. Blackburn looked at risk levels taking into account such factors including the volatility of the material being transported, the population base that could be affected, and the environmental cleanup and infrastructure replacement costs. He estimated that a catastrophic accident in the region could result in a loss of approximately $5–6 billion.[1929]

PHMSA projected that, absent further safety improvements, there will be 15 mainline derailments for 2015, falling to a prediction of about 5 mainline derailments by 2034 for a total of 207 derailments nationwide over 20 years. In addition, based on population densities along mainline track nationwide, PHMSA further projects that the United States would experience between 0 and 10 additional high consequence events, each with over $1.15 billion in total environmental damages and monetized injury and fatality costs exceeding $5.75 billion and 49 fatalities, over 20 years. PHMSA also projects one event exceeding $5.75 billion with 245 fatalities.[1930]

Damages and losses that would not be covered by insurance. In looking at the insurance needs, Mr. Blackburn testified that there would be a shortfall between the amount of insurance procured on the market and the maximum potential loss. In that case, the state, local governments, and the public may not be compensated for their losses.[1931] The applicant itself only agrees to provide environmental impairment liability insurance to the extent such coverage is available on a commercially viable basis.[1932] In addition, policies include caps and exclusions, further exacerbating the potential gap between total loss and insurance coverage.

Insurance only responds to financial loss. As Ms. Hollingsed testified, if one cannot quantify the loss, it will not be covered. So cultural impacts, which cannot be quantified in terms of dollars, would not be compensated from insurance.[1933]

There are many losses that cannot be monetized, especially as it relates to the tribal damages. Damages to cultural or archeological sites cannot be repaired by money, nor can damages to fish that effect ceremonial aspects of the tribal culture. Roger Dick, an enrolled member of the Yakama testified about losses that cannot be monetized.[1934] Fishing is not just a commercial endeavor, but also a cultural one. It is very difficult to assign a monetary value to treaty fishing. Mr. Dick stated that it would be analogous to asking the average American

[1929] Tr. 2595-96, vol. 11; PFT of Blackburn 6.
[1930] Ex. 3058-0004-VAN; Ex. 3058-0051-52-VAN.
[1931] PFT of Blackburn 8.
[1932] PFT of Blackburn 11.
[1933] Tr. 1782, vol. 8.
[1934] Roger Dick is the harvest coordinator for Yakama Nation fisheries. Tr. 3996, vol. 17.

citizen to assign a monetary value to the right to vote or free speech; rights could not be properly compensated.[1935]

The Yakama Nation testified about losses that cannot be monetized. Fishing is not just a commercial endeavor, but also a cultural one. It is very difficult to assign a monetary value to treaty fishing. Mr. Dick stated that it would be analogous to asking the average American citizen to assign a monetary value to the right to vote or free speech. Damages to such rights could not be properly compensated.[1936]

An example is a chemical spill occurring near The Dalles Dam. The spill went downriver along a large platform area commonly known as the Lone Pine in-lieu treaty fishing area. About 30 to 40 tribal members had fished along that area downriver of the spill, and the tribal fishers were told it was unsafe to harvest eel and lamprey there anymore. The company involved with spill cleanup promised the tribal fishers they would be notified when it was safe to harvest fish again in the area. Tribal fishers have not received confirmation it is safe to harvest there, so the Indian fishers have never returned to fish for lamprey or eel at Fifteenmile Creek.[1937]

Site Closure. Tesoro Savage intends to provide a performance bond to address the requirements of decommissioning the VEDT after the end of the lease. Decommissioning costs will be approximately $11 million.[1938] Ms. Hollingsed testified that she believes there will be no problem to obtain a performance bond in that range to address decommissioning costs. Even if the amount is higher than expected, for example $20 million, Ms. Hollingsed still does not believe there will be a problem obtaining a performance bond. If soil contamination was found during decommissioning, the pollution liability insurance would cover the cleanup costs, not the performance bond.[1939] Tesoro Savage intends to provide a performance bond to address the requirements of decommissioning the VEDT after the end of the lease.

Tesoro Savage's application provides that no set-aside from operating funds is anticipated for site abandonment, but a site closure bond in an amount to be determined by the Council upon approval of an initial site restoration plan. Mr. Blackburn testified that site abandonment and site restoration should be linked, so that adequate bonding is provided for both.[1940]

Summary of the Council's Analysis of Financial Assurances. Tesoro Savage is a limited liability company with limited assets. The majority of the assets will be the structures at the VEDT; the land will be leased from the Port. Based on its corporate structure, without

[1935] Tr. 4002, vol. 17.
[1936] Tr. 4002, vol. 17.
[1937] Tr. 3921, vol. 17.
[1938] Ex. 0278-00002-TSS.
[1939] Tr. 1714-15, vol. 8.
[1940] PFT of Blackburn 13.

specific indemnification provisions in its contract with its two parent companies, the joint venture partners will not be liable for any loss results from VEDT operations. Therefore, outside of insurance coverage, there will be little to no other funds available to compensate third parties for potential losses.

The Council takes notice that should Tesoro Savage, as a limited liability company, file for bankruptcy upon a catastrophic incident, any insurance (1) may not be immediately available; and (2) could become part of a bankruptcy estate, distributable under the bankruptcy laws in accordance with the normal priorities to creditors, including the state and other persons or entities damaged.

Tesoro Savage argues that it only needs to provide financial assurances for incidents at the VEDT and that rail and marine coverage is the responsibility of the owners of each, and that other statutes guide these determinations.

The lease with the Port requires a certain level insurance for property damage. In addition, the lease requires third-party liability coverage for bodily injury and property damage from incidents that occur on the terminal site; $10 million per occurrence and $15 million aggregate in a policy year. A contractor's pollution liability policy will be in place during the VEDT construction, while a pollution legal liability policy in the amount of $25 million will be in place once the VEDT is operational.[1941] As both Proponents and Opponents stipulate, based on the potential incidents that could occur at the site and the resulting damages, the Council finds these limits to be too low.

Tesoro Savage has not yet committed to any particular type or level of insurance beyond the lease provisions. It intends to evaluate potential losses through a Black Swan study after project approval. The Black Swan analysis seems to be a very conservative model that looks at only a limited number of factors based on Tesoro Savage's view that the level of coverage should be based on a reasonable worst-case analysis, rather than based on the MFL. The MFL is more comprehensive but may take too broad a look and therefore produce a larger number than is reasonable. Neither analysis is perfect, but the MFL seem to be more reasonable in determining the potential scope of damages in the event of an incident related to the VEDT. The object of each is the same, determining the potential loss that must be considered in determining insurance coverage.

There are state statutes that relate to financial responsibility regarding oil spills. In regards to onshore or offshore facilities, RCW 88.40.025 provides that an onshore or offshore facility shall demonstrate financial responsibility in an amount determined by Ecology as necessary to compensate the state and affected counties and cities for damages that might occur during a reasonable worst-case spill of oil from that facility into the navigable waters of the state. The statute requires Ecology to consider such matters as the amount of oil that could be

[1941] Tr. 1715-16, vol. 8.

spilled into the navigable waters from the facility, the cost of cleaning up the spilled oil, the frequency of operations at the facility, the damages that could result from the spill and the commercial availability and affordability of financial responsibility.

However, this and other similar statutes do not restrict the Council's ability to look at the financial responsibility requirements for the VEDT onshore facility taking into account the damages resulting from an incident at the VEDT, or from an incident on the vessel or rail routes. RCW 80.50.110 specifically provides that:

> (1) If any provision of this chapter is in conflict with any other provision, limitation, or restriction which is now in effect under any other law of this state, or any rule or regulation promulgated thereunder, this chapter shall govern and control and such other law or rule or regulation promulgated thereunder shall be deemed superseded for the purposes of this chapter.
> (2) The state hereby preempts the regulation and certification of the location, construction, and operational conditions of certification of the energy facilities included under RCW 80.50.060 as now or hereafter amended.

Ms. Hollingsed testified that coverage of up to $1 billion to $1.5 billion is available on the market to Tesoro Savage. Considering only the risks posed by operations at the VEDT, and not considering risks posed by rail transport before care and custody is transferred to Tesoro Savage or by marine transport after care and custody is transferred to marine shippers, Tesoro Savage has not demonstrated market capacity exists to insure a reasonable worst-case damage amount. This is because Tesoro Savage has deferred calculation of that amount to its future Black Swan study. Moreover, the market clearly lacks capacity to insure a maximum foreseeable loss that Mr. Blackburn estimates could be as high as $6 billion. Moreover, even if coverage turns out to be available, payment of large insurance claims following an incident could be delayed by litigation.

The Council must necessarily also look at potential incidents and resulting damages on the rail and vessel corridors. But for the VEDT, the transportation of crude oil to and from the VEDT would not occur. Thus, but for the existence of the VEDT, these potential losses would not pose a risk. As a result, the financial assurances need to include assurances that the risk of damage is covered for all 3 segments of the facility operations. This is not the same as saying that Tesoro Savage is the entity that must obtain insurance for events along the rail line or in the Columbia River. The Council must, however, consider the possibility of uncovered losses and the lack of financial assurances.

As noted previously in this Order, PHMSA considers damages in excess of $5.75 billion a conceivable result of a crude-by-rail accident. With the VEDT's storage capacity equivalent to six unit trains, the Council notes the possibility of losses an order of magnitude larger than the incidents described as comparable by Ms. Hollingsed.

If the Council accepts the proposition that the Council may only require financial assurances from Tesoro Savage for VEDT operations, it leaves as an unknown the potential loss from rail or vessel incidents and the existence of adequate financial assurances to cover those losses. This leaves a substantial hole in the protection of the state, local government, and the public if an incident occurred due to rail or marine operations leading to an oil spill, explosion, or fire. The loss of life and property, the damage to the environment, and impact on tribal concerns may not be covered. This would be an unacceptable risk to the public.

Taken together this evidence indicates an impact on the public interest associated with financial assurances. The Council therefore moves this issue into its balancing analysis in Section IV of this Order.

III. LEGAL FRAMEWORK AND ANALYSIS

A. STATE LAW

1. RCW 80.50.010 Provides the Central Legal Framework for the Council's Siting Decision

RCW 80.50.010 in EFSLA provides the central legal framework for the Council's siting recommendation.

> The Legislature finds that the present and predicted growth in energy demands in the state of Washington requires the development of a procedure for the selection and utilization of sites for energy facilities and the identification of a state position with respect to each proposed site. The Legislature recognizes that the selection of sites will have a significant impact upon the welfare of the population, the location and growth of industry and the use of the natural resources of the state.
>
> It is the policy of the state of Washington to recognize the pressing need for increased energy facilities, and to ensure through available and reasonable methods, that the location and operation of such facilities will produce minimal adverse effects on the environment, ecology of the land and its wildlife, and the ecology of state waters and their aquatic life.
>
> It is the intent to seek courses of action that will balance the increasing demands for energy facility location and operation in conjunction with the broad interests of the public. Such action will be based on these premises:
>
> (1) To assure Washington state citizens that, where applicable, operational safeguards are at least as stringent as the criteria established by the federal government and are technically sufficient for their welfare and protection.
>
> (2) To preserve and protect the quality of the environment; to enhance the public's opportunity to enjoy the esthetic and recreational benefits of the air,

water and land resources; to promote air cleanliness; and to pursue beneficial changes in the environment.

(3) To provide abundant energy at reasonable cost.

(4) To avoid costs of complete site restoration and demolition of improvements and infrastructure at unfinished nuclear energy sites, and to use unfinished nuclear energy facilities for public uses, including economic development, under the regulatory and management control of local governments and port districts.

(5) To avoid costly duplication in the siting process and ensure that decisions are made timely and without unnecessary delay.[1942]

Tesoro Savage bears the burden of proving, by a preponderance of evidence, that the VEDT meets this and other requirements of law. Tesoro Savage has both the burden of going forward and the burden of persuasion.[1943]

2. RCW 80.50.010 Requires the Council to Balance Need and the Public Interest to Determine Whether a Proposed Facility at a Particular Site Will Produce a Net Benefit

Citing RCW 80.50.010, the Washington Supreme Court has described EFSLA as seeking to "'balance the increasing demands for energy facility location and operation in conjunction with the broad interests of the public.'"[1944] The Council applies RCW 80.50.010 by weighing and balancing the need for the proposed facility against its impacts on the broad public interest, including human welfare and environmental stewardship. The Council then determines whether a proposed facility at a particular site will produce a net benefit justifying a recommendation of project approval. The Council has referred to this balancing as determining "need and consistency."[1945]

The parties emphasize different aspects of the statute's directives. Among other arguments, Tesoro Savage suggests that it does not have to demonstrate need for the VEDT;[1946] that facilities must be sited despite significant impacts; and that the Council should put greater weight on the need side of the scale.[1947] Project Oppenents argue that the Council must "fully account for all harms and risks to the environment and human health,"

[1942] *See also* WAC 463-14-020.

[1943] Council Order No. 733, at 6 n.12, *In re Olympic Pipeline Co.*. (No. 96-1) (May 19, 1999), Order on Motions in Limine and Motions to Strike.

[1944] *Columbia Riverkeeper v. Port of Vancouver*, 188 Wn.2d 80, 95, 392 P.3d 1025 (2017) (citing RCW 80.50.010).

[1945] Council Order No. 753, at 12, *In re Chehalis Generating Facility* (Feb. 12, 2001).

[1946] Applicant Post-Hr'g Br. 10.

[1947] Applicant Post-Hr'g Br. 4.

emphasizing the portions of RCW 80.50.010 that requires siting actions to "preserve and protect the quality of the environment; . . . enhance the public's opportunity to enjoy the esthetic and recreational benefits of the air, water and land resource; . . . promote air cleanliness; and . . . pursue beneficial changes in the environment."[1948] As the following responses to the parties' legal arguments demonstrate, neither position accurately captures the precise task before the Council.

Tesoro Savage Must Demonstrate the Need for this Facility at this Location. Tesoro Savage appears to suggest that WAC 463-60-021 relieves it of an obligation to demonstrate the pressing need for the VEDT.[1949] WAC 463-60-021 says that "RCW 80.50.010 requires the council to 'recognize the pressing need for increased energy facilities.' For that reason, applications for site certification need not demonstrate a need for the energy facility."

WAC 463-60-021, along with WAC 463-14-020, acknowledges that RCW 80.50.010 requires the Council to recognize the pressing need for increased energy facilities. The Council addressed the implications of this requirement when it declined to exclude the issue of need from its consideration of the Satsop Combustion Turbine Project application, stating that the Council may not override the statutory statement but that the Council may use evidence of need as one of the factors it considers.[1950] The Council's determination recognizes that it is impossible to balance need and the public interest without evaluating the urgency of the need for a particular facility at a particular location. The statutory purpose of EFSLA is the "*selection* and utilization *of sites* for energy facilities."[1951] Thus, even where the "pressing need for energy facilities" is taken as a given, the evaluation of the impacts and appropriateness of the proposed location and operation of a particular facility in light of the need for energy from that particular facility is the Council's central task. Tesoro Savage has tacitly acknowledged the pragmatic necessity of this inquiry into the need for the VEDT when in its presentations to the Council it addressed in detail the need for this facility at this location.[1952]

Energy Logistics Facilities are Not Categorically Excluded from Consideration under EFSLA. The Opponents repeatedly emphasize that the VEDT is an energy logistics facility,[1953] and as such, the economic benefits for Washington, as the hosting jurisdiction, would be small and the costs and risks large. [1954] Tesoro Savage argues that an energy logistics facility, sometimes called a "conduit" or "pass-through" facility, may meet energy needs under EFSLA because the definition of the facilities that trigger the Council's jurisdiction includes

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[1948] Columbia Riverkeeper Final Adjudication Br. 6, 1; *see also* Vancouver Closing Br. 6-10; The Counsel for the Environment's Closing Br. in Opp. to the Project 3-5; Pre-Hr'g Br. of Columbia Waterfront 3.

[1949] Applicant Post-Hr'g Br. 10; Applicant Pre-Hr'g Br. (Corrected) 29.

[1950] Council Order No. 694, at 6, *In re Satsop Combustion Turbine Project* (No. 94-1) (Mod. Apr. 15, 1996).

[1951] RCW 80.50.010 (emphasis added).

[1952] *See for example*, Applicant Pre-Hr'g Br. (Corrected) 29-30; Applicant Post-Hr'g Br. 10-17.

[1953] Columbia Riverkeeper Final Adjudication Br. 10-23.

[1954] Columbia Riverkeeper Final Adjudication Br. 17-18.

energy transmission facilities that don't produce energy.[1955] Tesoro Savage makes this argument in response to its characterization of the Oppenents' position as a categorical denial that an energy logistics facility can ever meet such energy needs.[1956] The Council does not agree, as a categorical statement, that an energy logistics facility could by definition never meet energy needs under EFSLA. So, while the VEDT project is distinct from the majority of those reviewed by the Council as it is an energy logistics, rather than generation, facility, past Council orders confirm that in reviewing applications for all facilities, including logistics facilities sites, the need for the particular facility at the particular location is a central consideration in the balancing of interests with which the Council is charged.[1957]

Tesoro Savage May Demonstrate that the Proposed Facility Will Benefit Refiners rather than End Users. In evaluating need, RCW 80.50.010(3) requires the Council to consider whether a proposed facility will provide abundant energy at reasonable cost. The Council has evaluated this factor as part of its overall analysis of need. The parties disagree about whose need for abundant energy at reasonable cost must be analyzed under RCW 80.50.010. Tesoro Savage emphasizes the needs of refineries.[1958] The Opponents emphasize the needs of end users.[1959]

Neither emphasis is exactly correct. RCW 80.50.010 clearly provides for the "balance[ing] of the increasing demands for energy facility location and operation in conjunction with the broad interests of the public." The Council has in the past addressed the role that end user need plays in its analysis, concluding that although an applicant had shown a proposed plant would provide energy benefits in the form of mitigating to some extent forecasted energy and capacity constraints, and contributing to reliability of the Western states power grid generally, the applicant in that proceeding had not shown that the project would confer direct benefits on any identifiable segment of that market such as Washington's citizens or lead to lower energy costs in the state or regionally.[1960] The Council stated that it would therefore permit the costs of a modest amount of environmental degradation to remain externalized in exchange for the general benefits the applicant had demonstrated but that in the absence of more direct, specific benefits being demonstrated, no more than a modest amount of environmental impact would be allowed. The Council ultimately concluded that the costs of that project outweighed the energy benefits presented at that time.[1961]

[1955] Applicant Post-Hr'g Br. 13.

[1956] Applicant Post-Hr'g Br. 13.

[1957] Council Order No. 636, at 477, *In re Northern Tier Pipeline Co.* (No. 76-2) (Jan. 27, 1982); Prehearing Order No. 29, Council Order No. 730, at 5, *In re Olympic Pipeline Co.*(No. 96-1) (Apr. 7, 1999).

[1958] Applicant Post-Hr'g Br. 10-12.

[1959] Columbia Riverkeeper Final Adjudication Br. 19.

[1960] Council Order No. 754, at 16, *In re Sumas Energy 2, Inc.* (No. 99-01) (Feb. 16, 2001).

[1961] However, following additional hearings the Council later recommended project approval. Council Order No. 768, *In re Summas Energy 2, Inc.* (No. 99-01) (Apr. 15, 1996).

Thus, Tesoro Savage may demonstrate that the VEDT will benefit only refiners, rather than end users, but the lack of demonstrated benefit to end users may impact the outcome of the Council's balancing analysis.

Tesoro Savage is not required to restrict its Evidence about Need to Geographic Locations in Washington. The parties further disagree about the proper geographic focus of the Council's analysis of need. Tesoro Savage states that an applicant may demonstrate need for a facility based on the needs of Washington citizens, needs in other geographic locations, or both.[1962] Tesoro Savage also argues that past Council decisions support considering regional need, and asserts that rejection of the VEDT due to a perceived lack of need within Washington alone would violate the Dormant Commerce Clause of the United States Constitution.[1963] Opponents argue that the Council's authorizing statutes direct the Council to balance Washington's needs and benefits against impacts to its citizens and natural environment, and that "need" should thus focus on end users in Washington.[1964]

As the Council has previously stated, the proper weight to be given to need for energy versus the broader public interest will vary from facility to facility depending on the facts.[1965] Tesoro Savage is correct that the Council's past evaluations of need have in some cases looked beyond Washington's borders to consider regional and sometimes national need.[1966] When the Council has done so, it has not excluded Washington's energy needs from its analysis.[1967]

The Council determines in this case, considering the nature and intended use of the VEDT, that it should not limit its inquiry to impacts and benefits exclusively within Washington. Thus, the Council does not reach Applicant's argument that rejection of the VEDT due to a perceived lack of need within the state of Washington alone would violate the Dormant Commerce Clause of the United States Constitution.[1968]

[1962] Applicant Post-Hr'g Br. 13-14.

[1963] Applicant Post-Hr'g Br. 15.

[1964] Columbia Riverkeeper Final Adjudication Br. 10-23.

[1965] *See for example,* Council Order No. 753, at 12-13, *In re Chehalis Generating Facility* (Feb. 12, 2001); Council Order No. 754, at 13, *In re Sumas Energy 2, Inc.* (No. 99-01) (Feb. 16, 2001); Council Order No. 803, at 16, *In re BP Cherry Point Cogeneration Project* (No. 2002-01) (Oct. 26, 2004).

[1966] Applicant Post-Hr'g Br. 15.

[1967] Council Order No. 814, at 36, *In re Wild Horse Wind Power Project* (No. 2004-01) (May 25, 2005); Council Order No. 803 Revised, at 16, *In re BP Cherry Point Cogeneration Project* (No. 2002-01) (Oct. 26, 2004); Council Order No. 768, at 25-28, *In re Sumas Energy 2, Inc.* (No. 99-01) (May 24, 2002); Council Order No. 698, at 10-13, *In re Chehalis Generation Facility* (No. 94-2) (June 17, 1996); Council Order No. 694, at 6-7, 22, *In re Satsop Combustion Turbine Project* (No. 94-1) (Apr. 15, 1996); Council Order No 697, at 10, *In re Northwest Regional Power Facility* (No. 93-2) (June 10, 1996); Council Order No. 645, at 51-58, *In re Creston Generating Station* (No. 80-1) (Dec. 17, 1982); Council Order No. 636, at 9-15, 475, *In re Northern Tier Pipeline* (No. 76-2) (Jan. 27, 1982).

[1968] Applicant Post-Hr'g Br. 15-16.

Tesoro Savage Must Demonstrate that the Proposed Project's Impacts on the Public Interest are Outweighed by the Need for this Facility at this Location. Tesoro Savage also focuses on the Legislature's finding of a pressing need for energy facilities by arguing that EFSLA requires the siting of facilities despite significant impacts on the public interest: "EFSEC's authority is . . . accompanied by a statutory acknowledgment that a project will have significant impacts;" that "facilities must be sited despite such [environmental] impacts;" and that "EFSLA assumes that facilities will have 'significant impact.'"[1969] Tesoro Savage bases this argument largely on the presence of the word "and" in the second sentence of RCW 80.50.010: "It is the policy of the state of Washington to recognize the pressing need for increased energy facilities, *and* to ensure through available and reasonable methods, that environment, ecology of the land and its wildlife, and the ecology of state waters and their aquatic life."[1970]

The presence of the word "and" in the second paragraph of RCW 80.50.010 does not require that a needed facility be sited regardless of its impact on the public interest. The first paragraph of RCW 80.50.010 specifically found that the state required a body to consider the selection and utilization of proposed sites for the energy facilities that the Legislature had acknowledged were needed. RCW 80.50 establishes a procedure for such "selection . . . of sites," clearly implying that not all proposed sites will be found suitable for a given energy project even if that project demonstrated some level of need.

Moreover, the second paragraph of RCW 80.50.010 requires the Council to not only "recognize" the need for energy facilities, but also "ensure" through available and reasonable methods that the location of such facilities will produce minimal impacts on the environment. As the Washington Supreme Court has stated, the policy of EFSLA is to "promote facilities that 'will produce minimal adverse effects on the environment.'"[1971] Thus, a particular facility's impact on the public interest is, like need, a central consideration and determining that a particular location or site is inappropriate for a particular facility does not negate or disregard the premise that Washington has a need for energy facilities or require that such facilities be sited regardless of their impacts on the public interest.

In addition to considering the language in RCW 80.50.010, the correct application of this statute depends also on the requirements of RCW 43.21C.030 and RCW 43.21C.020 in the State Environmental Policy Act (SEPA), and on WAC 463-47-110(1), The Council's rule implementing these SEPA provisions. RCW 43.21C.030 requires that state laws, policies, and regulations be interpreted and administered in accordance with SEPA's policies "to the fullest extent possible." Such SEPA policies are detailed in three subsections of RCW 43.21C.020. First, agencies are to use all practicable means to foster the general welfare, create conditions under which human beings and nature can coexist, and fulfill the requirements of present and

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[1969] Applicant Post-Hr'g Br. 6, 4, 7.
[1970] RCW 80.50.010 (emphasis added).
[1971] *Columbia Riverkeeper v. Port of Vancouver*, 188 Wn.2d 80, 95, 392 P.3d 1025 (2017).

future generations.[1972] Second, consistent with other considerations of state policy, agencies are to take various actions including fulfilling the responsibilities of each generation as trustee of the environment for future generations; assuring that Washington citizens have safe and healthful surroundings; using the environment without degradation or risk to health or safety; maintaining an environment which supports diversity and variety of individual choice; achieving a balance between population and resource use to permit high standards of living; and enhancing the quality of renewable resources.[1973] Third, the Legislature recognized that "each person has a fundamental and inalienable right to a healthful environment."[1974]

The Council implemented these SEPA requirements in WAC 463-47-110. WAC 463-47-110(1)(a) summarizes that "[t]he overriding policy of the council is to avoid or mitigate adverse environmental impacts which may result from the council's decisions." In this context, the word "overriding" means "dominant, principal, primary."[1975] WAC 463-47-110(1)(b) and (2)(c) then explicitly incorporate the policies in RCW 3.21C.020 by setting out the policies and procedures that the Council shall follow.

The Washington Supreme Court recognized these SEPA requirements in the Council context when it said that the policy of EFSLA is not only to expedite review of energy projects but to promote facilities that produce minimal adverse effects on the environment and that the Council's decision "must be consistent with '[t]he overriding policy of [the Council] . . . to avoid or mitigate adverse environmental impacts' and [be] consistent with the principle that 'each person has a fundamental and inalienable right to a healthful environment.'"[1976]

In light of all of these considerations, EFSLA does not require the Council to recommend project approval notwithstanding significant impacts on the public interest that protective measures cannot adequately mitigate. The Council must determine whether the facility Tesoro Savage proposes for this site will produce a net benefit, giving appropriate weight to impacts based on their likelihood and severity,[1977] with the proper weight varying depending on the facts.[1978] The Council has discretion in this regard because, as the Washington Supreme Court has noted, EFSLA is a "unique statutory framework" that grants "much discretion to both the Council and the governor," with the restrictions placed on the Council characterized as "largely procedural with some guidance as to what issues should be considered.[1979]

[1972] RCW 43.21C.020(1).
[1973] RCW 43.21C.020(2).
[1974] RCW 43.21C.020(3).
[1975] *Webster's Third New International Dictionary* 1609 (1981).
[1976] *Columbia Riverkeeper v. Port of Vancouver*, 188 Wn.2d 80, 101, 392 P.3d 1025 (2017).
[1977] Applicant Pre-Hr'g Br. (Corrected) 24.
[1978] *See for example*, Council Order No. 753, at 12-13, *In re Chehalis Generating Facility* (Feb. 12, 2001); Council Order No. 754, at 13, *In re Sumas Energy 2, Inc.* (No. 99-01) (Feb. 16, 2001); Council Order No. 803, at 16, *In re BP Cherry Point Cogeneration Project* (No. 2002-01) (Oct. 26, 2004).
[1979] *Friends of Columbia Gorge v. EFSEC*, 178 Wn.2d 320, 334, 310 P.3d 780 (2013).

3. The Council Rules Do Not Require the Council's Balancing Analysis to Apply a Three-Tier Decisional Hierarchy

After proffering its interpretation of RCW 80.50.010, Tesoro Savage then interprets WAC 463-60 and WAC 463-62 as requiring the Council to implement the following three-tier decisional hierarchy. First, for the six topics identified in WAC 463-62 (seismicity, noise, fish and wildlife, wetlands, water quality, and air quality), the Council must view compliance with the standards stated in that rule as sufficient for site certification unless the Council exercises its substantive SEPA authority.[1980] Second, for topics other than the six identified in WAC 463-62, the Council must look at the Council's WAC 463-60 application guidelines to determine whether the guidelines "identify federal and state laws and regulations that set the legal standard for the Council's recommendation."[1981] If the application guidelines do so, the application guidelines set the legal standard for the Council's recommendation on that topic.[1982] Third, if the application guidelines do not reference federal and state regulatory standards, the Council is to apply the balancing test in RCW 80.50.010.[1983] For the reasons explained below, the Council disagrees with Tesoro Savage's contention that this decisional hierarchy is applicable.

WAC 463-62 Does Not Establish Standards for the Council's Current Consideration of Tesoro Savage's Application. Tesoro Savage is incorrect that with regard to six very significant topics—seismicity, noise, fish and wildlife, wetlands, water quality, and air quality—WAC 463-62 limits the Council's adjudication review to determining whether the project meets the stated standards.[1984] The six topics covered by WAC 463-62 are central to the Council's present balancing of need and the public interest. Nothing in WAC 463-62 purports to remove consideration of these topics from the Council's statutorily required balancing analysis.

WAC 463-62 is titled "Construction and Operation Standards for Energy Facilities." WAC 463-62-010(2) applies the chapter to the "construction and operation of energy facilities" and WAC 463-62-010(1) says the chapter contains "performance standards and mitigation requirements specific to seismicity, noise, fish and wildlife, wetlands, water quality, and air quality. WAC 463-62-010(3) provides that "[c]ompliance with the standards within this chapter shall satisfy, in their respective subject areas, the requirements for issuance of a site certificate for construction and operation of energy facilities . . . provided, however, that the council may require additional mitigation in the event that documents prepared pursuant to 43.21 RCW (State Environmental Policy Act), demonstrate that the project poses a probable significant adverse impact that is not mitigated by the provisions of this chapter."

[1980] Applicant Post-Hr'g Br. 5.
[1981] Applicant Post-Hr'g Br. 6-7.
[1982] Applicant Post-Hr'g Br. 7.
[1983] Applicant Post-Hr'g Br. 5-7.
[1984] Applicant Post-Hr'g Br. 5.

The Washington Supreme Court has declared that the WAC 463-62 regulations "do not control the application and review process," but instead "apply to the [site certification agreement] and later ongoing operation and construction of the facility."[1985] WAC 463-62-010(1) clearly states that the Council will apply WAC 463-62 "*to site certification agreements* issued in connection with applications" and that the chapter "*sets forth performance standards and mitigation requirements . . . associated with site certification* for construction and operation of energy facilities . . . ."[1986] RCW 80.50.100(2) states that the Council only submits a draft site certification to the Governor if the Council recommends project approval. As the Washington Supreme Court recognized: "once a project is approved, the [site certification agreement] can impose additional studies and ongoing requirements"[1987] and at that point WAC 463-62-010(3) requires the Council to exercise substantive SEPA authority if it wants the site certification agreement to include mitigation measures that exceed the standards in WAC 463-62.

Thus, WAC 463-62 is inapplicable to the Council's current balancing process. However, in order to analyze all of the issues raised by Tesoro Savage, the Council has in this Order nonetheless evaluate whether Tesoro Savage has demonstrated that its application meets the WAC 463-62 criteria for seismicity, noise, fish and wildlife, wetlands, water quality, and air quality.

WAC 463-60 Does Not Establish Standards for Project Approval. Tesoro Savage is also incorrect that in evaluating topics other than the six topics identified in WAC 463-62, the Council must look at the Council's WAC 463-60 application guidelines to determine whether the guidelines "identify federal and state laws and regulations that set the legal standard for the Council's recommendation" and, if the guidelines identify such laws or regulations, they provide the legal standard for the Council's recommendation.[1988] As Tesoro Savage concedes elsewhere,[1989] WAC 463-60 is procedural and does not establish substantive standards. By its own terms, WAC 463-60-010 defines WAC 463-60 as containing "guidelines" for applicants about what an application should contain.[1990] The Washington Supreme Court has confirmed that the goal of WAC 463-60 is to give the Council an informational starting point for the rest of its information-gathering process.[1991] Nowhere does the chapter purport to expand its reach beyond application contents to set actual substantive regulatory standards that the Council must apply.[1992]

1985 *Friends of the Columbia Gorge*, 178 Wn.2d at 340.

1986 Emphasis added.

1987 *Friends of the Columbia Gorge*, 178 Wn.2d at 336.

1988 Applicant Post-Hr'g Br. 7.

1989 Applicant Pre-Hr'g Br. (Corrected) 21-22.

1990 *See also* WAC 463-60-012, -065, -105, -115.

1991 *Friends of the Columbia Gorge*, 178 Wn.2d at 335-36.

1992 WAC 463-60-352, cited in the Applicant's Post-Hr'g Br. 7 n.15, is illuminating. WAC 463-60-352(4) asks applicants to "identify all federal, state, and local health and safety standards *which would normally be applicable* to the construction and operation of a project of this nature and shall describe methods of compliance therewith." (Emphasis added.) This language acknowledges that in EFSEC proceedings RCW

The Council's RCW 80.50.010 Balancing Applies to all Relevant Topics, Regardless of Whether they are Mentioned in WAC 463-62 or WAC 463-60. Tesoro Savage suggests that for topics that are neither identified in WAC 463-62 nor associated with a federal or state regulatory standard in WAC 463-60, "EFSEC's consideration of the subject matter is pursuant to RCW 80.50.010 and EFSEC must seek to achieve all of the statutory goals, including the need for abundant energy <u>and</u> other public interest factors."[1993]

The Council weighs and balances the need for the proposed facility against all of its impacts. This analysis must, of necessity, consider all subject matter areas, not just those that WAC 463-62 or WAC 463-60 do not address.

4. Mitigation Measures Imposed by The Council Pursuant to RCW 80.50.010 Must be "Available and Reasonable"

RCW 80.50.010 supplies the standard applicable to the Council's imposition of mitigation: the Council is to ensure "through available and reasonable methods" that the location and operation of facilities will produce minimal adverse effects. Tesoro Savage correctly reads this requirement and the Washington Supreme Court's decision in *Friends of the Columbia Gorge, Inc. v. EFSEC*[1994] as relieving the Council of the obligation to impose every possible mitigation measure to objectively minimize each impact.[1995]

This does not mean, however, that if there are no available and reasonable methods to minimize impacts[1996] that the project must be permitted. This concept is recognized in the second paragraph of RCW 80.50.010, which states that Washington's policy is to "ensure, *through available and reasonable methods*, that the location and operation of . . . facilities will produce minimal adverse effects on the environment . . . ."[1997] The degree to which available and reasonable methods reduce impacts is something the Council takes into account in its balancing analysis.

Tesoro Savage suggests that constitutional principles of nexus and rough proportionality require the Council to make an individualized determination that mitigation is related in both nature and extent to the impact of the proposed development.[1998] Tesoro Savage

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80.50.110 and .120 preempt state and local laws and regulations and that those laws and regulations are therefore not the automatically applicable regulatory standards. WAC 463-60 asks applicants about such laws and regulations because such information is self-evidently useful but a request for information does not establish regulatory standards.

1993 Applicant Post-Hr'g Br. 7 (alteration in original).

1994 *Friends of the Columbia Gorge*, 178 Wn.2d at 344.

1995 Applicant Pre-Hr'g Br. (Corrected) 23-24 (citing *Friends of the Columbia Gorge*, 178 Wn.2d at 344).

1996 An inability to mitigate adequately one or more adverse impacts may result from a lack of means necessary to address the impact(s), or because it is economically unviable to make such means available.

1997 Emphasis added.

1998 Applicant Pre-Hr'g Br. (Corrected) 24.

cites two cases for this proposition: *Nollan v. California Coastal Commission*[1999] and *Dolan v. City of Tigard*.[2000]

In *Koontz v. St. Johns River Water Management District,* the United States Supreme Court described *Nollan* and *Dolan* as a special application of the doctrine of unconstitutional conditions which prevents the government from forcing people to give up constitutional rights,[2001] in this case by protecting land-use permit applicants from governmental pressure to voluntarily give up property protected by the Fifth Amendment in order to protect a permit that is more valuable than any just compensation that the landowner could hope to receive for the property.[2002] Although *Nollan* and *Dolan* allow the government to condition approval of land-use permits on dedication of property, the Court emphasized that many proposed land uses threaten to impose costs on the public that dedications of property can offset and that the Court has long sustained against constitutional attack the responsible land-use policy that landowners internalize the negative externalities of their conduct.[2003]

Tesoro Savage suggests without citation to authority that *Nollan* and *Dolan* impose a general limitation on the Council's ability to recommend mitigation, even when such mitigation does not require Tesoro Savage to dedicate real property to a public use or provide a monetary extraction in lieu of a dedication of real property. The Council does not read *Nollan* and *Dolan* as creating such a general limitation on the Council's authority.

[1999] *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987). In *Nollan,* the California Coastal Commission granted a development permit to replace a small beachfront bungalow on condition that the landowners create a public easement parallel to the ocean. *Nollan,* 483 U.S. at 827. The United States Supreme Court held that the Commission could, without paying compensation, require an easement as a condition for granting the development permit that the Commission could deny, so long as the requirement would substantially advance the same government interest that would furnish a ground for denial. *Id.* at 837. The Court held that the Commission's exaction of the easement violated the Takings Clause of the Fifth Amendment because there was no nexus between the identified impact of the project (obstruction of the beach view from Highway 1) and the easement requirement (dedication of public access on the back side of the property along the beach). *Id.*

[2000] *Dolan v. City of Tigard*., 512 U.S. 374 (1994). In *Dolan,* a city in Oregon conditioned a building permit on a requirement that Dolan dedicate a portion of her property for improvement of a storm drainage system and for a bicycle and pedestrian pathway. *Dolan,* 512 U.S. at 379-80. The Supreme Court held that while there was a nexus between the conditions and Dolan's proposed development, the conditions violated the Takings Clause because conditions were not roughly proportional to the development's impacts, with an individualized determination that the development condition is related in nature and extent to the impact of the proposed development. *Dolan,* 512 U.S. at 387-88. The City had not explained why the floodplain had to be dedicated to prevent flooding or how the traffic would be reduced by the bicycle path. *Id.* at 394-96.

[2001] *Koontz v. St. John River Water Mgmnt. Dist.*, 133 S. Ct. 2586, 2594, 186 L. Ed. 2d 697 (2013).

[2002] *Koontz,* 133 S. Ct. at 2595.

[2003] *Koontz*, 133 S. Ct. 2586. The Court also extended the principles in *Nollan* and *Dolan* to situations in which the government denies a permit because an applicant refuses to turn property over to the government, rather than just restricting the protections to situations in which the government approves a permit on condition that the applicant turn property over to the government. *Koontz,* 133 S. Ct. at 2595, 2603. The Court also included monetary extractions in lieu of a dedication of real property. *Koontz,* 133 S. Ct. at 2599, 2603.

5. The Council May Consider Relevant State Energy Policies

While the Council's responsibility is focused on the appropriate siting of energy facilities, it does not operate in a policy vacuum. Previous Council decisions have analyzed projects' consistency with the state's energy strategy, utilities' integrated resource plans, regional power plans, and state policy directives favoring deployment of renewable technology, as part of determining each project's need and benefits. The Council thus notes the following state statutes that, while not binding on the Council, establish state energy policies of relevance in developing a state position with respect to the proposed location of the VEDT:

State Energy Strategy. RCW 43.21F.010 and 43.21F.088, governing development of Washington's energy strategy, are predicated on the idea that energy drives the entire modern economy, and call for policies that maintain competitive energy prices that are fair and reasonable for end users and businesses while fostering a clean energy economy and meeting the state's greenhouse gas reduction obligations. The state's energy strategy is to be based on principles that include maintaining economic competitiveness, reducing dependence on fossil fuel energy sources, and improving the efficiency of transportation energy use.

Greenhouse Gas Reduction. RCW 70.235 establishes state greenhouse gas emission reduction targets. The chapter establishes the Legislature's intent that the state will (a) [l]imit and reduce emissions of greenhouse gas consistent with the emission reductions established in RCW 70.235.020; (b) minimize the potential to export pollution, jobs, and economic opportunities; and (c) reduce emissions at the lowest cost to Washington's economy, consumers, and businesses.

Energy Freedom Program. RCW 43.325.005, establishing the energy freedom program, includes legislative findings that excess dependence on fossil fuels jeopardizes Washington's economic security, environmental integrity, and public health; that climate change is expected to have significant negative impacts in the region in the near and long-term; and that importing fossil fuels represents a drain on Washington's economy.

The Council is not bound to implement these policies, but past Council decisions have recognized alignment with other state energy policies as a factor to consider when analyzing need and consistency. Accordingly, these statutes inform the Council that Washington State energy policies include the objectives of reducing dependence on fossil fuels and transitioning to a clean energy economy, with these goals balanced against the need to maintain the availability of energy at competitive prices for consumers and businesses.

B. CONSTITUTIONAL FEDERALISM ISSUES

The Legislature created the Council to balance the increasing demands for energy and energy facilities against the broad interests of the public.[2004] This is recognition that providing

[2004] RCW 80.50.010.

for the energy need should not come at the cost of the public's right to a clean, healthy, and safe environment. In previous energy facility siting cases, the Council has recognized the role that the public interest plays in this balancing. The Council has observed that it must determine whether a proposed energy facility "at a particular site will produce a net benefit after balancing the legislative directive to provide abundant energy at a reasonable cost with the impact to the environment and the broad interests of the public."[2005] The Council's genesis was the concern surrounding the siting of nuclear power plants.[2006] This origin highlights the central task of the Council, which is the *location* of energy facilities. So, again in the instant case, the dispute is over the same essential question: should a crude oil receiving, storage, and transshipment facility be located at the Port? To answer this question, the Council must assess risks and harms from the proposed VEDT, determine whether the VEDT would serve the goal of providing energy to the public at reasonable cost, and decide whether the project is in the broad public interest.

One of the primary issues in this adjudication is whether the Council's powers under state law in issuing its findings and conclusions and order, and thereafter its report to the Governor, are limited by the principles of preemption by federal law. Tesoro Savage argues that any state actions or regulations, insofar as they relate to either the rail route, rail operations at the VEDT, or to vessel operations, both at the VEDT site and in their transit by vessel down the Columbia River are infringements of the United States Constitution and the powers of the federal government thereunder. Tesoro Savage asserts further that the Council's own authorities do not allow it to consider rail or vessel impacts as it contends there are no specific Council standards addressing incidental transport to the VEDT, because RCW 80.05.010 focuses only on construction and operation of the terminal, and WAC 463-60-372 focuses only on disclosure of rail or vessel corridors, and access to those corridors.[2007] Similarly, the Port also argues that the Council has no jurisdiction to impose conditions that would in any way purport to regulate or affect rail traffic, and that any mitigation or denial based on rail impacts would be beyond the Council's statutory charge.[2008]

The Proponents contend that there is no need to condition or deny the VEDT proposal based on any impacts associated with rail or vessel transport of crude oil because, in their view, the evidence in this adjudication showed that any such risks are remote and speculative, unrelated to the nature of operations at the terminal.[2009] The Proponents argue these matters cannot be addressed under the authority of state law because it is preempted by comprehensive federal statutes and regulations.[2010] Tesoro Savage argues that there is a very low probability of a significant rail spill, and to the extent there are any such risks, they are adequately addressed

[2005] Council Order No. 843, at 23, *Desert Claim Wind Power Project* (Nov. 16, 2009).

[2006] *The Location of Electricity-Generating Facilities: Introduction – The Evolution of Washington Siting Legislation*, 47 Wash L. Rev. 1, 2-3 (1971).

[2007] Applicant Post-Hr'g Br. 71.

[2008] Final Port of Vancouver USA Post-Hr'g Br. 22-24.

[2009] Applicant Post-Hr'g Br. 2, 71-73.

[2010] Port of Vancouver USA Post-Hr'g Br. 22-24 by federal regulations, emergency response plans, and other mitigation provided under the Interstate Commerce Commission Termination Act (ICCTA) and the Federal Rail Safety Act (FRSA). It also notes that the applicable federal regulations are newly revised and continue to be updated.

The Opponents argue that there is no federal preemption issue in this matter, primarily because Tesoro Savage is not a rail carrier, and that either denial or approval with conditions would not explicitly or implicitly govern or regulate rail transportation, which has nothing to do with siting an energy facility. Nor would a negative result implicate ICCTA or FRSA, which govern rail transport in this country. The Opponents argue that application of ICCTA, FRSA, or the Ports and Waterways Safety Act of 1972 (PWSA)[2011] to avoid considering the impacts of the VEDT would preclude the Council from performing its statutory duty to ensure the proposal would operate safely and not entail unreasonable risks to the public, and from recommending denial of the proposal when those risks are too great. They assert that Congress never intended to supplant state law concerning the siting of an energy facility with federal statutory railroad law, and that there is simply no preemption issue under these facts.[2012]

The Proponents argue that any ultimate decision conditioning or denying the VEDT proposal based in any way on consideration of the impacts of rail or vessel transport is unlawful as it would be preempted under that doctrine as developed under the Congress's exercise of its powers under the United States Constitution.[2013]

1. The Commerce Clause

Congress can only act by using powers that are enumerated in the Constitution.[2014] The Tenth Amendment to the Constitution reserves to states those powers not denied to them or that are specifically granted to Congress. The Commerce Clause vests broad authority to Congress to pursue legislative reforms addressing a wide range of matters of national concern. It states that "Congress shall have the Power. . . to regulate Commerce. . . among the several States. . . ."[2015] The Commerce Clause provides the constitutional foundation for the development of federal law governing interstate commerce. The power of federal preemption is based on a single constitutional provision, the Supremacy Clause of article VI, § 2 of the Constitution. It states that the "Constitution and the Laws of the United States. . . which shall be made. . . under the Authority of the United States, shall be the supreme Law of the Land. . . ."[2016]

Pursuant to that authority, Congress may: (1) "regulate the use of the channels of interstate commerce," (2) "regulate and protect the instrumentalities of," or "person or things

[2011] 33 U.S.C. §§ 1221-1236.
[2012] *See, for example,* Post-Hr'g Br. of the Dep't of Natural Resources 10-11.
[2013] Tesoro Savage's Motion to Dismiss Rail Operations Issues, and its Reply on Rail Operations Issues.
[2014] *Marbury v. Madison,* 5 U.S. (1 Cranch) 137, 2 L. Ed. 60 (1803).
[2015] U.S. Const. art. I, § 8, cl. 3.
[2016] U.S. Const. art. VI, § 2.

in," interstate commerce, and (3) regulate intrastate activities where the activity has a substantial effect on interstate commerce.[2017] As relevant to this adjudication, Congress has exercised this authority in enacting the Federal Rail Safety Act (FRSA)[2018] and the Interstate Commerce Commission Termination Act (ICCTA)[2019] and the associated railroad safety rules are generally found in 49 C.F.R. Parts 200-299.

2. Preemption

Preemption is the displacement of one government's law by the law of another. Under the Supremacy Clause of the U.S. Constitution, federal law preempts conflicting state law. Preemption is the generic power of Congress when it exercises any of its enumerated powers as set forth in the U.S. Constitution, such as its power under the Commerce Clause. Nevertheless, there is a presumption against the supplanting of historic state powers by the federal government unless preemption is the clear and manifest purpose of Congress.[2020] In expressing its preemptive intent, Congress can supersede state law through explicit statutory language or implicitly through the statute's structure and purpose.[2021] If Congress has legislated upon a subject in an exercise of its commerce power, under the Supremacy Clause, any state law to the contrary cannot stand unless Congress consents to a state regulation of interstate commerce for some reason. When federal law is not explicit as to the extent of its preemptive intent, the initial assumption is that state and federal laws can coexist and that preemption is not likely to be found.[2022]

The Supremacy Clause gives Congress the power to preempt state law, in three ways:

> (1) Congress may withdraw specified powers from the states by enacting a statute containing an *express* preemption provision.
>
> (2) States are precluded from regulating conduct in a *field* that congress, acting within its proper authority, has determined must be regulated by its exclusive governance; and
>
> (3) State laws are preempted when they *conflict* with federal law in a way that compliance with both federal and state regulations is a physical impossibility, or the state law is an obstacle to the accomplishment and execution of the full purposes and objectives of congress.[2023]

[2017] *United States v. Lopez*, 514 U.S. 549, 558, 561, 115 S. Ct. 1624, 131 L. Ed. 2d 626 (1995). Congress's power to enact the Federal Rail Safety Act (FRSA), 49 U.S.C. §§ 20101-20168.

[2018] 49 U.S.C. §§ 20101-21311.

[2019] 49 U.S.C. §§ 10101-16101.

[2020] *CSX Transportation, Inc. v. Easterwood*, 507 U.S. 658, 663-64, 113 S. Ct. 1732, 123 L. Ed. 2d 387 (1993); *Cipollone v. Liggett Group, Inc.*, 505 U.S. 504, 516, 112 S. Ct. 2608, 120 L. Ed. 2d 407 (1992).

[2021] *See Cipollone*, 505 U.S. at 516.

[2022] *Jones v. Rath Packing Co.*, 430 U.S. 519, 525, 97 S. Ct. 1305, 51 L. Ed. 2d 604 (1977).

[2023] *Arizona v. United States,* 567 U.S. 387, 132 S. Ct. 2492, 2495, 183 L. Ed. 2d 351 (2012).

The intent of Congress to preempt a field of conduct can be inferred from a framework of regulation "so . . . pervasive that Congress left no room for the States to supplement it" or where a "federal interest is so dominant that the federal system will be assumed to preclude enforcement of state laws on the same subject."[2024]

3. Federal Rail Law

In the case of the VEDT proposal, the Proponents argue that Congress has occupied the field of railroad operations and safety. The United States Congress has exercised its powers of preemption in the field of railroad operations by its enactment of FRSA and ICCTA. The purpose of the FRSA[2025] is to promote the operational safety of railroads and to reduce railroad-related accidents and associated deaths and injury. FRSA § 20106 provides that railroad safety requirements shall be nationally uniform "to the extent practicable." Proponents argue not only that the Council may not directly regulate rail carriers, but further that the Council lacks even the authority "to consider issues exclusively regulated by federal agencies."[2026]

ICCTA. ICCTA vests with the Surface Transportation Board (STB), a federal agency, exclusive jurisdiction over "transportation by rail carriers" and "the construction [of]. . . facilities."[2027] "Transportation" as defined by ICCTA includes a "warehouse. . . yard, property, facility, instrumentality, or equipment of any kind related to the movement of passengers or property, or both, by rail."[2028] "Rail carrier" as defined by ICCTA means "a person providing common carrier railroad transportation for compensation, but does not include street, suburban, or interurban electric railways or operated as part of the general system of rail transportation."[2029] (The VEDT proposal is not governed by ICCTA as it will not be operated by a rail carrier, but rather by Tesoro Savage.)

ICCTA grants authority to the STB over interstate rail transportation, as follows:

> The jurisdiction of the Board over –
>
> (1) transportation by rail carriers, and the remedies provided in this part with respect to rates, classifications, rules (including car service interchange, and other operating rules), practices, routes, services, and facilities of such carries;
>
> and

[2024] *Rice v. Santa Fe Elevator Corp.,* 331 U.S. 218, 230, 67 S. Ct. 1146, 91 L. Ed. 1447 (1947).
[2025] 49 U.S.C. §§ 20101-20168.
[2026] Applicant Motion to Dismiss Issues 15, 20, 49, 50, 51, 52, 53, 66 and Portions of Issues 7, 12, 14, 18, 19, 39, 45, 64, 67, 68 ("Rail Operation Issues") at 1.
[2027] 49 U.S.C. § 10501(b).
[2028] 49 U.S.C. § 10102(9).
[2029] 49 U.S.C. § 10102(5).

> (2) the construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities, even if the tracks are located, or intended to be located, entirely in one State,
>
> is exclusive. Except as otherwise provided in this part, the remedies provided under this part with respect to regulation of rail transportation are exclusive and preempt the remedies provided under Federal or State law.[2030]

Congress and the courts have recognized a need to regulate railroad operations at the federal level. Congress's authority under the Commerce Clause to regulate the railroads is well established.[2031] ICCTA expressly preempts "remedies provided under Federal or State law,"[2032] but "Congress narrowly tailored the ICCTA pre-emption provision to displace only regulation, i.e., those state laws that may reasonably be said to have the effect of manag[ing] or govern[ing] rail transportation while permitting the continued application of laws having a more remote or incidental effect on rail transportation." [2033]

The Proponents cite the *City of Auburn* case as authority for their argument that, since adoption of the Interstate Commerce Act of 1887, the courts have recognized the need to "exclusively" regulate rail safety and transportation at the federal level and avoid a "patchwork of conflicting state and local regulations that interfere with interstate commerce.[2034] Further, Tesoro Savage argues that preemption under ICCTA does not depend on there being an existing federal regulation because, it asserts ICCTA completely occupies the field of rail regulation. Therefore, it argues, ICCTA prevents the Council from taking action that directly or indirectly regulates transportation by a rail carrier.

The Council concludes that federal law does not preempt its consideration of potential impacts arising from the transportation of crude oil to the terminal by rail or from the terminal by marine vessel. The Council's evaluation of the VEDT proposal under RCW 80.50 is entirely distinct from the action at issue in *City of Auburn.* In that case, BNSF was seeking to reopen a rail line that was its own property. The City of Auburn was attempting to directly regulate the construction directly related to rail line improvements by a rail carrier. By contrast,

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[2030] 49 U.S.C. § 10501(b), 49 U.S.C. § 10102(1).

[2031] *City of Auburn v. United States*, 154 F.3d 1025, 1029 (9th Cir. 1998); *Houston, E. & W. Tex. Ry. v. United States,* 234 U.S. 342, 350-52, 34 S. Ct. 833, 58 L. Ed. 1341 (1914). *City of Auburn* was an appeal from the STB, the adjudicatory board formed under the authority of the ICCTA. The case concerned BNSF's plan to reopen its 229-mile long rail line over Stampede Pass in Washington State. The City challenged the decision based on local environmental permitting laws that it contended required BNSF to conduct environmental review. The STB had issued a declaratory order finding federal preemption of state and local environmental review laws in approval of the reopening of the Stampede Pass line.

[2032] 49 U.S.C. § 10501(b).

[2033] *Florida E. Coast Ry. Co. v. City of W. Palm Beach*, 266 F.3d 1324, 1331 (11th Cir. 2001) (alteration in original) (citation omitted).

[2034] Motion to Dismiss Issues 15, 20, 49, 50, 51, 52, 53, 66 and Portions of Issues 7, 12, 14, 18, 19, 39, 45, 64, 67, 68 ("Rail Operation Issues") at 5.

here there is no railroad property at issue, and the action being considered is not regulation of a rail carrier. *Green Mountain Railroad Corp. v. State of Vermont*,[2035] another case on which the Proponents rely, is similarly distinguishable. There, Vermont's effort to apply permitting provisions of its environmental and land use statute mandating preconstruction permits for land development were found to be preempted. The railroad had sought to build facilities on its own 66-acre tract of real property, portions of which were wetlands unsuitable for development. But that effort failed because the court looked to the express preemption clause in ICCTA, which provides that ICCTA remedies are exclusive and preempt remedies provided under state law. Again, the distinction is that the case involved a railroad's proposed actions on its own property. The Proponents have not cited any cases where the regulation is of an entity that is not a rail carrier.

In 2016, the Surface Transportation Board considered and ruled on a challenge to a city planning commission decision denying an oil refining company's conditional use permit for a crude oil off-loading facility. The refinery asserted the planning commission was preempted by federal law to deny the permit for the proposal because the refinery would be served by a railroad. The STB denied Valero's declaratory order petition and went on to provide guidance on preemption in the context of a facility to be served by a railroad.[2036] The proposed off-loading facility would receive 50-car unit trains twice a day. The Board said that, although the facility would serve the needs of the railroad by receiving the crude oil, the operating capacity would be with the refinery not the railroad. Valero argued that the city was engaging in impermissible indirect rail regulation and its action was therefore preempted.

The STB disagreed and pointed to the fact that Valero was an owner operator of an oil refinery, not a rail carrier. There was no preemption issue because the planning commission was not attempting to regulate transportation by a rail carrier as these terms are defined by ICCTA. The control over the railroad operations at the refinery never shifted to Valero, and Valero made no allegation that it was a rail carrier or that it would be performing offloading under the auspices of a rail carrier at the facility. Citing *CSX Transportation*,[2037] the STB stated that, even in a context where a railroad is involved, localities retain their reserved police powers to protect public health and safety so long as their actions do not discriminate against rail carriers or unreasonably burden interstate commerce. As long as they do not unreasonably interfere with, restrict, or foreclose a railroad's operations, the city's actions to protect public health and safety were allowed because they did not discriminate against a rail carrier or burden interstate commerce.[2038] The Council agrees completely with the *Valero* decision and adopts its reasoning in finding no preemption here. In evaluating the proposed project, the Council has no occasion to impose any regulations on rail carriers. Moreover, the fact that the

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[2035] *Green Mountain R.R. Corp. v. State of Vermont*, 404 F.3d 638 (2nd Cir. 2005).

[2036] *Valero Refining Co. Pet. for Declaratory Order*, STB Docket No. FD 36036, 2016 WL 5904757 (Sept. 20, 2016).

[2037] *CSX Transp. Inc. v. Williams*, 406 F.3d 667 (D.C. Cir. 2005).

[2038] *Valero Refining Co. Pet. for Declaratory Order*, STB Docket No. FD 36036, 2016 WL 5904757 (Sept. 20, 2016).

Council is considering vessel as well as rail impacts demonstrates that it is not discriminating against rail carriers by considering only those offsite impacts.

These and other cases addressing efforts to control railroad activities illustrate that the Proponents' reliance on cases where a railroad is engaged in construction, acquisition, operation, abandonment, or discontinuance of spur, industrial, team, switching, or side tracks, or facilities *it owns* is misplaced in this proceeding. The Council is considering the location of a crude oil terminal on property owned by the Port and operated by Tesoro Savage, which is not in any way an attempt to regulate the operations on, or activities of, a rail carrier occurring on the carrier's property, or even the carrier's activities on Port property. BNSF would not be operating the VEDT, holding out its own services with Tesoro Savage as a third-party agent, or exerting control over the VEDT's actions. Moreover, the consideration of rail impacts in making a facility citing decision does not threaten to create a "patchwork" of regulations governing transportation of goods by rail carrier. The Council's finding that Tesoro Savage has not met its burden under RCW 80.50 to show that the proposed project is, on balance, in the public interest creates no disuniformity in the system of regulations with which rail carriers must comply. Because of these considerations, the Council is not preempted in any way from considering impacts of rail transport of crude oil because ICCTA has no application beyond the railroad and its operations.

FRSA. Congress adopted the FRSA to promote the operational safety of railroads, and to reduce railroad-related accidents and the associated deaths and injuries.[2039] FRSA Section 20106 provides that railroad safety requirements shall be nationally uniform "to the extent practicable." FRSA Section 20106(a)(2) "saves" from preemption certain state laws, rules, or orders "related to railroad safety," allowing them to remain in effect in two circumstances. First, a state may impose a requirement until a federal rule or order covers the same subject matter. Second, even if a federal requirement covers the same subject matter, a state may nonetheless adopt an additional or more stringent requirement when the following three conditions are met:

> 1. A state may impose a requirement until a federal rule or order covers the same subject matter; and
>
> 2. If a federal requirement covers the same subject matter, the state may nonetheless adopt or continue in force an additional or more stringent law, regulation, or order related to railroad safety or security when the law, regulation, or order –
>
>> A. Is necessary to eliminate or reduce an essentially local safety or security hazard;

[2039] Frank L. Mastro, *Preemption is Not Dead: The Continued Vitality of Preemption Under the Federal Railroad Safety Act Following the 2007 Amendment to 49 U.S.C. § 20106,* 37 Transp. L.J. 1, 3-4 (2010).

B. Is not incompatible with a law, regulation, or order of the United States Government; and

C. Does not unreasonably burden interstate commerce.[2040]

In order to establish that a federal requirement preempts a state regulation, the Proponents must show that "the federal regulations substantially subsume the subject matter of the relevant state law."[2041] Merely showing that the federal regulations "touch on" or "relate to" the subject regulated by the state is not enough.[2042]

The threshold question that must be considered is whether the consideration of impacts associated with rail transportation of crude oil to the proposed facility amounts to a regulation "related to railroad safety" within the meaning contemplated by the FRSA. The Council concludes that it is not. What the case law interpreting the FRSA makes clear is that a state may not impose regulatory requirements or liability directly on rail carriers within subject areas covered by federal regulations unless specifically "saved" under FRSA Section 20106(a)(2). But, as one United States district court has held, the FRSA only preempts state laws if they aim to "control railroad operations and safety."[2043] This understanding of the scope of the FRSA's preemptive reach is consistent with the purpose of the act, which is to "promote safety in every area of *railroad operations* and reduce railroad-related accidents and incidents."[2044] But, in making its recommendation to the Governor on the ASC, the Council is not in a position to control railroad operations or safety. If the Council ultimately recommends denial of the VEDT, railroad operations and safety would continue unchanged. Rather, under RCW 80.50 the Council must make a decision about the siting of a proposed facility that takes into account all impacts to the public interest, and therefore it must be informed by and consider the realities created by background federal regulations and risks inherent in the transportation of crude oil by rail.

The preemption "savings" clause section in FRSA mirrors the Commerce Clause compliance as a pre-requisite to state action under FRSA.[2045] 49 U.S.C. § 20106's reference to interstate commerce is not restricted to commerce by rail carriers. To determine the pre-emptive intent of Congress in these provisions of the FRSA, the rules of statutory construction require that the first focus be on the plain meaning of these clauses as they relate to state law not in conflict with the federal rail statutes and their respective regulations. They do not occur in a contextual vacuum. It is important to study the surrounding statutory structure and regulatory scheme to determine how Congress intended to effect its preemptive scheme, while at the same time furthering the goal of operational safety of railroads through the combined

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[2040] 49 U.S.C. § 20106(a)(2).

[2041] *CSX Transp., Inc. v. Easterwood*, 507 U.S. 658, 664, 113 S. Ct. 1732, 123 L. Ed. 2d 387 (1993).

[2042] *CSX Transp., Inc. v. Easterwood*, 507 U.S. 658, 664, 113 S. Ct. 1732, 123 L. Ed. 2d 387 (1993).

[2043] *Dakota, Minn. & E. R.R. Corp. v. S.D.*, 236 F. Supp. 2d 989, 1007 (D.S.D. 2002), *aff'd in part, vacated in part, remanded sub nom. Dakota, Minn. & E. R.R. Corp. v. S.D.*, 362 F.3d 512 (8th Cir. 2004).

[2044] 49 U.S.C. § 20101.

[2045] *Pike v. Bruce Church, Inc.*, 397 U.S. 137, 142, 90 S. Ct. 844, 25 L. Ed. 2d 174 (1970).

operation of ICCTA and FRSA. At least one court has determined that these two federal statutory schemes must be understood as complementing each other. "[T]he agencies' complementary exercise of their statutory authority accurately reflects Congress's intent for the ICCTA and FRSA to be construed *in pari materia*."[2046] So, it is reasonable to conclude that both the FRSA and the ICCTA permit state laws and actions where they do not conflict with the two federal statutory schemes for regulating railroads.

If consideration of rail impacts related to the VEDT does implicate FRSA preemption, the first question the Council must contemplate is whether a FRSA rule or order substantially subsumes the subject matter of the Council's mitigation or reason for denial, considering whether the state and federal requirements have different purposes, different safety concerns, *regulate* different actions, *require* different actions, or protect from different harms. The FRSA specifically authorizes a state to enact its own railroad safety laws until the federal Department of Transportation enacts a regulation that covers the subject matter of the state law, or a regulation that addresses the state action in question. The Proponents have not met their burden of establishing that this is the case.

Even a state action that addresses an essentially local safety or security hazard will not stand if it is found to address something already fully covered by FRSA. Then it could be preempted as incompatible, or invalid, under the dormant Commerce Clause as burdensome to interstate commerce.[2047] The purpose of the FRSA is to promote safety in every area of railroad operations and reduce railroad-related accidents and incidents.[2048] The Council's review does not concern any of these things.

The Proponents contend that the following FRSA rules substantially subsume the subject matter of the Council's consideration of horn noise and rail-traffic access and at-grade blocking times:[2049]

FRSA Rule	Allegedly prevents Council action based on:
49 CFR Part 222 on use of locomotive horns at public highway rail crossings	Horn noise
49 CFR § 229.129 on railroad locomotive safety standards for locomotive horns	Horn noise
49 CFR Part 232 on brake system safety standards for freight trains and end-of-service trains	Rail-traffic access and blocking time at rail crossings
49 CFR §§ 213.9 and 213.307 on speed limits by classes of track	Rail-traffic access and blocking time at rail crossings

[2046] *Tyrrell v. Norfolk S. Ry. Co.*, 248 F.3d 517, 522-23 (6th Cir. 2001).
[2047] *See CSX Transp. Inc.,* 406 F.3d 667 (D.C. Cir. 2005).
[2048] 49 U.S.C. § 20101(1).
[2049] Applicant Motion to Dismiss Issues 15, 20, 49, 50, 51, 52, 53, 66 and Portions of Issues 7, 12, 14, 18, 19, 39, 45, 64, 67, and 68 (Rail Operations Issues) at 9-10.

The Council's action in this Order is not based on horn noise so the Proponents' arguments about the first two rules cited above are immaterial.

While the Council's recommendation of denial is based in part on the potential for rail-traffic access and blocking times at rail crossings, the Proponents have not demonstrated that the rules they cited substantially subsume the subject matter of the reason for the Council's recommendation. The Proponents do not explain how 49 C.F.R. Part 232 has any relevance to a denial based on lengthy wait times at public and private at-grade crossings. 49 C.F.R. § 232.1 expressly says that Part 232 prescribes federal safety standards for freight train brake systems and equipment. 49 C.F.R. § 232.9 requires railroads to comply with the requirements in Part 232. The rest of Part 232 establishes the specific requirements for brake systems (Subpart B), inspection and testing requirements (Subpart C), periodic maintenance and testing requirements (Subpart D), end-of-train devices (Subpart E), the introduction of new brake system technology (Subpart F), and electronically controlled pneumatic braking systems (Subpart G). Similarly, 49 C.F.R. §§ 213.9 and 213.307 simply establish the maximum allowable operating speeds on various classes of track. The Proponents have not demonstrated any logical linkage between these requirements and a Council recommendation of denial based in part on at-grade crossing delays, let alone sustained their burden of proving that such denial on that basis is "substantially subsumed" by these rules.

In the Applicant's Pre-Hearing Brief, Tesoro Savage makes a broad and conclusory allegation that "issues associated with" rail speeds, routing, rail equipment standards (including tank cars, emissions, horns, and brakes), rail track and equipment inspection, staffing requirements, bridge safety, reporting and safety plans, classification and packing standards for the crude oil, and oil spill prevention and response planning are preempted and attaches a list of C.F.R. parts that it alleges have preemptive effect.[2050]

However, the Proponents make no attempt to prove that the referenced regulations are FRSA rules that substantially subsume state action or explain what specific rules substantially subsume what state action. They have thus failed to sustain their burden of proving that a Council recommendation of denial is preempted by FRSA.

Moreover, even if they had demonstrated that a FRSA rule substantially subsumes state action, they failed to address the balance of the FRSA's savings provision in 49 U.S.C. § 20106, including whether the Council's action is necessary to eliminate or reduce an essentially local safety hazard.

4. Federal Maritime Vessel Law

The Port argues that the Council lacks jurisdiction to impose conditions on the VEDT that would regulate vessel traffic on the Columbia River.[2051] The Ports and Waterways Safety

[2050] Applicant Pre-Hr'g Br. 26, App. A.
[2051] Final Port of Vancouver USA Post-Hr'g Br. 22-24.

Act (PWSA) gives the United States Coast Guard general authority to regulate the "design, construction, alteration, repair, maintenance, operation, equipping, personnel qualification, and manning of vessels."[2052] The PWSA contains two distinct titles that preempt state laws differently. Title I, codified at 33 U.S.C. §§ 1221-1236 deals primarily with vessel traffic monitoring and control. Title II, found in Title 46 of the United States Code, addresses tanker design and safety specifications. Title I authorizes, but does not require, the Coast Guard to promulgate regulations creating "vessel traffic services, consisting of measures for controlling or supervising vessel traffic."[2053] In *United States v. Locke*,[2054] the Supreme Court recognized that Title I allows state rules directed to local circumstances and problems. The relevant test for whether a local regulation can coexist with Title I of the PWSA is whether the secretary has promulgated regulations or decided that no such requirement should be imposed.[2055] In the case of the Columbia River, the Secretary has apparently not promulgated or does not appear to have designated the Columbia River as an area requiring vessel traffic services.[2056] Therefore, the PWSA does not preclude the Council from imposing conditions on the VEDT that are directed at mitigating impacts from increased vessel traffic occasioned by vessels, such as impacts related to wake stranding.

The PWSA was amended by the Oil Pollution Act of 1990 (OPA), enacted in response to major oil spills such as the Exxon Valdez oil spill. It included savings clauses now found in Title I of the Act. These savings clauses give states some concurrent authority to impose liability and requirements related to the discharge of oil into state waters.[2057] They provide that the OPA is not to be construed as affecting the authority of state laws concerning the payment of costs or damages arising out of oil pollution or the threat of oil pollution. The United States Supreme Court heard a challenge to Washington rules that imposed extensive regulation on the ships and crews that entered Washington State waters.[2058] The Supreme Court reversed an attempt by Washington to enact laws regulating oil tanker design, equipment, reporting, and operating requirements, providing statutory penalties and restriction of vessel operations in state waters, and denial of entry into such waters. The savings clause in 33 U.S.C. § 2718 *was*, however, held to preserve state laws that established liability rules and financial requirements relating to oil spills, and not intended to impose substantive regulation of a vessel's primary conduct.[2059] This savings clause would mean that the OPA does not prevent the Council from imposing requirements on the VEDT to address impacts from anticipated oil spills.

[2052] *United States v. Locke*, 529 U.S. 89, 101, 120 S. Ct. 1135, 146 L. Ed. 2d 69 (2000).
[2053] 33 U.S.C. § 1223.
[2054] *Locke*, 529 U.S. at 101.
[2055] *Ray v. Atlantic Richfield Co.*, 435 U.S. 151, 171-72, 98 S. Ct. 988, 55 L. Ed. 2d 179 (1978).
[2056] *See* 33 C.F.R. ch. I, subch. P., pt. 161.
[2057] 33 U.S.C. § 2718.
[2058] *Locke*, 529 U.S. 89.
[2059] *Locke*, 529 U.S. at 105.

Some of Washington's authority to directly regulate marine vessel transportation has been preempted by federal law.[2060] However, it does not appear at this time that the U.S. Coast Guard has adopted regulations that preempt state regulation of the movement of ships on the Columbia River. The Supreme Court has recognized that states may impose regulations "directed to local circumstances and problems, such as water depth and narrowness, idiosyncratic to a particular port or waterway."[2061]

One more statute that governs vessel traffic to and from the VEDT is the Oil Pollution Act of 1990 (OPA). It amended portions of the PWSA and contained several savings clauses specifying that it did not preempt State law. However, the central holding of *Locke* was that these savings clauses did not alter the preemption analysis of the rest of the PWSA that the Court set forth in *Ray*.[2062] Nevertheless, the Court found that:

> Congress intended to preserve state laws of a scope similar to the matters contained in Title I of OPA, not all state laws similar to the matters covered by the whole of OPA or to the whole subject of maritime oil transport. The evident purpose of the saving clauses is to preserve state laws which, rather than imposing substantive regulation of a vessel's primary conduct, establish liability rules and financial requirements relating to oil spills.

This is an indication that the Council could impose conditions on the VEDT to address the impacts from oil spills caused by the increased vessel traffic into and out of the VEDT. The Port's position that the Council has no authority to address marine impacts that would result from the proposed VEDT is undermined by Proponents' evidence about marine impacts. Several witnesses raised Ecology's regulations requiring vessels to carry a certain amount of insurance for oil spills and requirements that vessels are limited in the amount of oil that any one vessel may carry. To the extent that the Port is correct that the State is entirely preempted from addressing impacts from marine vessel traffic, it undercuts assurances put forth by the Proponents' witnesses that the oil tankers will abide by the maximum oil volume and minimum insurance coverage requirements set by Ecology's regulations. Moreover, the requirement that vessels be piloted through the Columbia Bar and up the river is based in Oregon law.[2063]

The Port's briefing on preemption of the Council's authority to impose mitigation related to vessel traffic is unpersuasive. It relies on several cases discussed above that specifically hold that state authority in this area is *not* completely preempted. Further, even though the *Locke* test for the validity of state regulation turns on whether the Coast Guard has promulgated regulations that displace state law, the only specific regulation cited by the Port in its argument that state authority is preempted, 33 C.F.R. § 162.225, deals with limited

[2060] *See Ray*, 435 U.S. 151 (holding Washington's regulations of tanker design, size and movement in Puget Sound was preempted).

[2061] *Locke*, 529 U.S. at 109 (citing *Ray*, 435 U.S. at 171).

[2062] *Locke*, 529 U.S. at 105.

[2063] *See* Or. Rev. Stat. ch. 776.

emergency conditions and is not a generally applicable regulation of vessel traffic. Nothing cited by the Port, and nothing uncovered in the Council's own research, indicates that the Coast Guard has comprehensively regulated vessel traffic in the Columbia River such that state law in that area would be preempted.

Controlling cases interpret the PWSA and the OPA as recognizing state authority to regulate some aspects of marine vessel impacts. So long as these regulations do not touch on vessel construction, maintenance, or design, and are directed at local circumstances, the State has authority to impose additional liability or additional requirements relating to the discharge or substantial threat of discharge of oil, so long as such requirements do not conflict with other portions of the PWSA.

The emphasis of the Council's governing law is on siting energy facilities safely and without undue detriment to the public, and not on regulating trains, railroads, or vessels. A state is not precluded by any of the principles of constitutional federalism from denying to permit the location of a facility at a place that poses numerous dangers to the public, the environment, and a state's resources because the product posing those dangers would come to the facility by train and leave by vessel.

IV. BALANCING THE NEED FOR THE PROPOSED FACILITY AGAINST ITS IMPACT ON THE BROAD PUBLIC INTEREST

The EFSLA requires the Council to "balance the increasing demands for energy facility location and operation in conjunction with the broad interests of the public."[2064] The Council applies RCW 80.50.010 by weighing and balancing the need for the proposed facility against its impacts on the broad public interest, including human welfare and environmental stewardship. The Council then determines whether a proposed facility at a particular site will produce a net benefit justifying a recommendation of project approval.

The Council is acutely aware of the region's need for energy and the associated need for sources and supply channels to provide that energy. We are also mindful of our duty to protect the broad public interest. The Council must decide whether this energy logistics facility, at this proposed site, will produce a net benefit after balancing the availability and costs of energy to consumers and the impact on human welfare and the environment.

A. NEED

The Council will begin its analysis by considering the need for the VEDT. The parties agree that consumer[2065] demand for refined petroleum products in PADD V is likely to remain roughly stable over the life of the project and that sufficient refinery capacity exists to meet

[2064] RCW 80.50.010.
[2065] In this context, consumer means end users of the product; both individuals and industry end users.

state and PADD V consumer demand for refined petroleum products over that same period. The parties also agree that consumers in PADD V would be unlikely to notice differences in retail prices attributable to the VEDT.

In regard to refiners' need, there is little evidence that the VEDT will directly benefit refiners in Washington, particularly given that many in-state refineries already have CBR capacity. Refiners in California or elsewhere in PADD V could benefit from the ability to source crude from the VEDT due to supply-chain flexibility and reliability, access to a variety of crude oil types and blends, and potentially competitive pricing. Washington refiners could indirectly benefit from the availability of VEDT-sourced crude to California refineries if, for example, the VEDT reduced competition for ANS crude allowing Washington refiners to continue sourcing from ANS despite declining production.

While Tesoro Savage has shown at least potential benefits to refiners from the VEDT, the VEDT is not *necessary* to secure refiners' supplies of crude oil because sources of crude oil will remain available to PADD V refiners whether or not the VEDT is constructed. The benefit to refiners from the project is the marginal value refiners in Washington and across PADD V would derive from sourcing crude from the VEDT rather than some other channel, and any resulting indirect benefits experienced by consumers of energy.

So given the fact that there is sufficient refinery capacity to meet current and future demand, the main beneficiary is Tesoro and possibly other refiners, that end users will not see a price difference attributable to the VEDT and the VEDT is not necessary to secure crude oil for refineries, the Council views the need for the VEDT as low.

B. PUBLIC INTEREST

The Council will next identify the public interest impacts of the VEDT.

1. On-Site Impacts

Seismic risks at the VEDT. The proposed VEDT poses significant risks to public safety and the environment. The VEDT is proposed for a seismic-event-prone site with a 15 percent chance of a great CSZ megathrust earthquake within the design life of the project and a 2 percent chance of an earthquake that exceeds the structural design of buildings and structures. Shallow but dangerous earthquakes may also occur. Soils at the site are highly susceptible to liquefaction, which can cause significant ground settlement and deformation. While Tesoro Savage proposes ground improvements in an attempt to stabilize the soil, Tesoro Savage does not intend to extend the ground improvements through liquefiable soil to the gravel layer (the competent layer) where the storage tanks, secondary containment, pipelines, and docks are located, and has not completed advanced modeling to verify the adequacy of its ground improvement design. Furthermore, the record does not contain examples where comparable engineering, particularly deep soil mixing, has secured comparable facilities in liquefaction areas during a comparable magnitude earthquake.

Although WAC 463-62-020 does not apply to the Council's current evaluation, the Council nonetheless evaluated Tesoro Savage's contention that the Council's ability to consider seismic impacts was limited because Tesoro Savage had demonstrated that the VEDT, as designed, complies with State Building Code provisions, specifically the IBC and ASCE 7-10. However, the Council's ability to consider seismic issues is not limited in this fashion because Tesoro Savage has not met its burden of proving compliance with the code provisions. Tesoro Savage has designed the VEDT to Risk Category II but Risk Category III is more appropriate because a higher seismic importance factor of 1.25 would result in a 25 percent more robust design, thereby reducing risk. The building code standards are clear that "the acceptable risk for a building or structure is an issue of public policy, rather than purely a technical one."[2066] The commentary continues that, "[e]limination of the specific examples of buildings that fall into each category has the benefit that it . . . "provides individual communities and development teams the flexibility to interpret acceptable risk for each project."[2067] As discussed above, given the proposed location for the VEDT, the facility poses a risk to human life in event of structural failure, as well as significant environmental damage and economic disruption. Consequently, designing to a Risk Category III is preferable as a matter of public policy and Tesoro Savage is thus incorrect that designing to Risk Category II complies with the Building Code. Thus, Tesoro Savage has not demonstrated the VEDT is designed in compliance with the standard in WAC 463-62-020, and it is appropriate for the Council to fully consider seismic impacts.

Moreover, even if Tesoro Savage had demonstrated compliance with WAC 463-62-020, that rule has no applicability to the Council's current analysis. The Council finds the testimony of Dr. Wartman persuasive. Tesoro Savage's geotechnical and engineering experts essentially did not disagree with Dr. Wartman as to the danger that the predicted earthquake activity presents to the public given the proposed location of the VEDT. The evidence clearly established that the experts agreed that there is no amount of infrastructure improvement that can guarantee that the public would be fully protected from the consequence of such an earthquake. Even if all designs perform as appropriate, there is a 2 percent chance that an earthquake exceeding the design specifications will occur within the next 50 years, which the Council views as unacceptable for this facility in this location, in light of the potentially significant consequences of such a quake.

Such significant consequences may include a substantial oil spill during the vessel loading process due to an earthquake. Multiple factors could significantly increase the quantity of oil spilled, including: a portion of the pipeline and the marine terminal being located in highly liquefiable soils; the poor performance of pipeline infrastructure during earthquakes; the likelihood of such an earthquake occurring during the vessel loading process; questions

2066 Applicant Post-Hr'g Br. App. B, at 27-28. (For the PDF version, this cite is Appendices A-D on pages 27-28.)

2067 Applicant Post-Hr'g Br. App. B, at 27-28. (For the PDF version, this cite is Appendices A-D on pages 27-28.)

regarding the ability of the emergency shutoff systems to perform during a catastrophe; and failure to achieve an emergency shutdown within the 60-second isolation time period. Oil spill containment measures at the dock may be insufficient in an emergency such as an earthquake. Damages to the river from such a spill could be significant.

In addition, a seismic event at the VEDT poses a substantial risk to visitors and workers at the VEDT and other employers in the Port area, as well as the visitors, workers, and inmates at the JWC. The Council notes that the facility risk estimates provided by both Tesoro Savage and Project Opponents were based on normal operations. In the event of a major seismic event, those estimates would not apply. Threats of injury or death due to fire or explosion to persons near the VEDT in the immediate aftermath of an earthquake remain grave, if unquantified. Compounding this risk are the questions about the availability and efficacy of emergency response activities, including the fact that no provisions appear to be in place to ensure supplies of water needed to fight such fires. To the contrary, the Council finds substantial evidence to suggest that water service to the VEDT site would likely be disrupted in the event of a major earthquake, constraining the ability to fight fires.

Spill Risks During Cargo Loading at the VEDT. Vessel loading risk for dock spills could be significant. Although estimates are that a spill of less than 50 bbl constituted about 60 percent of the release frequency, DNV GL's most robust prediction of vessel loading risk predicted that a spill less than 50 bbl every 1300 years, a spill between 50 and 100 bbl every 42,000 years, a spill between 100 and 500 bbl every 8 years, and a spill between 50 to 1000 bbl every 590 years. DNV GL noted that in the event of a full bore rupture of a 36-inch loading pipe, the result would be a 31,600 bbl spill. If Tesoro Savage loads at 32,000 bbl per hour and the operator is able to respond within one minute to manually stop the transfer and the system takes 30 seconds to stop the transfer, more than 33,000 gallons of oil (i.e., 786 bbl) will spill during that period. It should be noted that this oil spill assessment did not take into account failures due to earthquakes that could occur while a vessel is loading cargo for 16–20 hours at the dock.

Oil spill containment measures may be insufficient for some spills. Tesoro Savage proposed 3 bbl of capacity of spill containment at the dock but then added a sump attached to piping to divert crude in a shutdown situation and increase capacity through the additional pumping capability. Tesoro Savage did not identify or demonstrate the capacity of such a system.

Tesoro Savage will use prebooming at the dock when possible. The failure rate of a conventional boom is around 1.0 knot when the boom is perpendicular to the current, and at least a portion of the downstream boom will be perpendicular with the current, the boom, which the VEDT will use for pre-booming, will begin to fail when current speed exceeds 1.0 knot. At the VEDT, the monthly average current velocity ranged from .7 to 1.8 knots, with a maximum current speed exceeding 1.0-knot part of the time each month. During the spring, flows approach 3.0 to 5.0 knots. Therefore, prebooming will either not occur or be ineffective. Stand-by booming has limited effectiveness. In addition, there are many times you cannot boom due to weather and wind. Fence booms will be deployed, but they are less effective in rough water because wave and wind action can cause the boom to twist.

Taking into account all the possible scenarios and safety measures, the Council concludes that the risk of spill at loading is significant. And the ability to minimize the impact from a large spill is limited, while the cumulative effects of small spills is significant.

Clark County Jail Work Center. The risk to the JWC population, which includes inmates, workers and visitors, and subsequent potential damages unacceptable. This includes the potential harm to the JWC population if an event occurs, the barriers to a successful evacuation of the JWC population, and the lack of resources to respond to an incident at the VEDT at the same time as needing to provide resources for the JWC population. As local government has a higher constitutional standard in relation to the care and custody of the inmate population, the risk with this proposal are not acceptable.

Emergency Response Capabilities at the VEDT. Tesoro Savage intends to use state of the art site design and safety features at the VEDT, along with a comprehensive emergency planning, prevention and training program. These are all important features in decreasing risk, but the parties agree that risk remain. Consequently, the Council must determine whether, in the event of an incident (explosion, fire, oil spill) there are sufficient emergency response capabilities to protect the citizens and the environment from the damages such an incident would bring.

There is substantial evidence about the inadequacies of staff, resources, equipment and training currently present at the VFD. There are also significant gaps in staff, equipment and training with the Clark County Sheriff's Office. Therefore, the emergency response capabilities will not be sufficient to successfully respond to a major incident at the VEDT. Even with the help of other first responders from agencies that have a mutual aid agreement with the City and County, the Council finds that the emergency response capabilities will be taxed as it will take time to request and mobilize those additional resources, if they are available.

There also appears to be major obstacles that emergency responders, either local or those providing mutual aid, would need to overcome to get to the location where services need to be provided. Obstacles include traffic congestion, road blockages, along with the difficulties for emergency responders to get into a congested area at the same time those at the area were attempting to evacuate.

In addition, CRESA may not be able to provide prompt and reliable messaging to the public. Lack of integrated mapping will hamper CRESA's ability to provide incident command with accurate information to support a rapid emergency response and successful evacuation. And finally, the parties agree that there are areas of weakness in the water supply system to the Port. These weaknesses could impact the firefighting capabilities in the event of an incident.

Taken as a whole, the emergency response capabilities are not sufficient to ensure the protection of the public in the case of an event at the VEDT.

Air Quality. After reviewing the total calculations for VOCs from the stationary sources the testimony, and exhibits, the Council has determined that the tpy appears to fall below the major source limit, making the VEDT subject to a minor permit (NOC) to address emissions from the VEDT rather than a PSD permit.

The Council also has determined the emissions from the VEDT comply with ambient air quality standards when looking at the results for both the criteria pollutants and the TAPS from stationary sources. Tesoro Savage has demonstrated that many of the criteria pollutants were within the ASILs established by EPA. For those criteria pollutants that exceeded the ASILs, background concentrations were added. The total concentrations for all of the criteria pollutants are less than the NAAQS. The modeling predicts that the concentrations of all criteria pollutants comply with primary and secondary standards at all off-site locations.

With respect to toxic air pollutants, most of the TAPs were within the SQERs established by Ecology. Tesoro Savage developed maximum predicted TAP concentrations attributable to the facility for the eight TAPs that exceeded their SQERs, and they are all less than the ASILs established by Ecology. It is unnecessary for Tesoro Savage to conduct ozone modeling. Permitting agencies must conduct ambient air quality analyses (including air dispersion modeling) only for facilities with the potential to emit significant amounts of a pollutant, and emissions of both VOCs and NOx are estimated to be below the 40 tons per year significance threshold (VOCs 33 tons per year; NOx 12 tons per year). Similarly, the Council finds that Tesoro Savage is not required to do a secondary aerosol formation analysis.

The Council also finds, however, that the project is likely to cause health impacts to the Fruit Valley Neighborhood, and the workers and inmates of the Clark County Jail facility located at the Port. This is primarily due to the amount of diesel exhaust particulate matter ($DPM_{2.5}$) and the nitrogen dioxide emitted at the site, along with the health risks associated with these pollutants. The Council also takes into account the health impacts from ozone events and secondary aerosol formation, impacts from other pollutants, including GHGs, in accordance with its authority under RCW 80.50.010 to balance the need of the project versus the impacts.

Environmental Justice Issues on Fruit Valley Neighborhood from VEDT Operations. Dr. Elinor Fanning, a toxicologist, testified as to the negative effect of toxic pollutants on human health in general and respiratory health in particular, especially as it affects vulnerable populations. Because of the proximity of the neighborhood to the terminal, Dr. Fanning opined that the degradation in air quality put the residents, and especially the "sensitive" residents, at a greater risk for "acute and chronic health effects."

Land Use Planning—Vancouver's Long Term Vision. The VEDT site is unquestionably intended and appropriately sized for heavy industry, has been used for those purposes in the past, and is used for those purposes today. Current site activities included trans-shipment of petroleum products, albeit on smaller scale than now proposed. As detailed in Order 872, the Council has issued a limited finding that the VEDT is on its face consistent with land use plans and zoning ordinances in that it is a permitted use. However, the Council reserved making a determination on broader issues related to the Vancouver comprehensive plans and ordinances.

Viewed from a broader perspective than the limited inquiry conducted in Order 872, the evidence indicates areas of inconsistency between the VEDT and Vancouver's comprehensive plans and long-term vision for the city. Key policy objectives in the Vancouver comprehensive plans are to facilitate development that minimizes adverse impact on neighborhoods and adjacent areas, to locate complimentary uses adjacent to one another, and to increase the ratio of jobs to housing so that the city's economy is more self-sustaining. The proposal at the terminal site and rail corridor are inconsistent with the balance of Vancouver plans and ordinances, and interests, as follows: Strategic Plan Goals 1 and 7 provisions for safe infrastructure and utilities, and strengthened connections to the Columbia River and waterfront; Comprehensive Plan goals CD-6 (Neighborhood livability), CD-9 (Compatible uses), CD 10 (Complementary uses), CD-15 (Public Health and the built environment), EN-3 (Energy conservation), EN-6 (Habitat), and EN-7 (Endangered species).

In addition, the VEDT is not adequately designed given the seismic risks present at the site, which is in a liquefaction area. The probability of a major seismic event is not miniscule or remote, as expert testimony in the record indicates a 15 percent chance of a Cascadia level subduction earthquake striking the region in the next 50 years. Potential consequences include large-scale oil release, fire, or explosion, with negative implications for public safety, public service provision, and the environment, particularly the Columbia River. This conflicts with Plan Policy EN-11, Hazard Areas, which states "[m]anage development in geographically hazardous area and floodplains to protect public health and safety."

Financial Assurances for Losses Resulting from VEDT's Operations. Tesoro Savage will have limited assets and, absent indemnification provisions in its contract with its two parent companies, the joint venture partners will not be liable for losses resulting from VEDT's operations. Therefore, outside of insurance coverage, there will be little to no other funds available to compensate third parties for potential losses.

Tesoro Savage has not yet committed to any particular type or level of insurance beyond what is required by the Port lease. It is undisputed that, based on the potential incidents that could occur at the site that these limits are too low. Tesoro Savage intends to evaluate potential losses through a Black Swan study after project approval. The Black Swan analysis seems to be a very conservative model that looks at only a limited number of factors, based on Tesoro Savage's view that the level of coverage should be based on a reasonable worst-case analysis, rather than based on the MFL. The MFL is more comprehensive but may take too broad a look and therefore produce a larger number than is reasonable. Neither analysis is perfect, but the MFL seem to be more reasonable in determining the potential scope of damages in the event of an incident related to the VEDT. The object of each is the same, determining the potential loss that must be considered in determining insurance coverage.

State statutes relate to financial responsibility regarding oil spills but these statutes do not restrict the Council's ability to look at the financial responsibility requirements for damages resulting from an incident at the VEDT, or from an incident on the vessel or rail routes.

Ms. Hollingsed testified that coverage of up to $1 billion to $1.5 billion is available on the market. Considering only the risks posed by operations at the VEDT, Tesoro Savage has not demonstrated that the market has capacity to insure a reasonable worst-case damage amount because Tesoro Savage has deferred calculation of that amount to the future. It also appears that the market lacks capacity to insure a maximum foreseeable loss that could be as high as $6 billion.

This leaves a substantial hole in the protection of the state, local governments, and the public if an incident occurred at the VEDT leading to an oil spill, explosion, or fire. The loss of life and property, the damage to the environment, and impact on tribal concerns may not be covered. This would be an unacceptable risk to the public.

Risk to Other Port Workers. Approximately 200 full-time, and about 100 part-time and at-will International Longshore and Warehouse Union (ILWU) Local 4 members would be working inside the rail loop in close proximity to the tracks that would contain oil train cars. In the event of an incident at the VEDT, their entry and exit into this facility or this loop track is over railroad tracks that have a high potential for being blocked. In addition, the mainline through the port goes through the middle of a malting plant and a grain elevator. The ILWU Local 4 workers are concerned about their safety when working in a grain elevator so close to unit trains carrying Bakken oil. Despite the risk to these workers, Tesoro Savage does not believe that these workers are at risk and at this time, would not commit to providing these workers with any protective safety gear. The record supports a finding that the VEDT would expose these workers to increased risk beyond what was present when the worker accepted his or her job at the Port.

2. Off-Site Impacts

Rail Corridor Risks. The VEDT will result in an additional 4.7 unit trains per day on average. This additional train traffic represents an estimated increase of 280 percent to 430 percent in the number of inbound unit trains carrying Bakken crude oil on the rail route compared to the current 10 to 18 per week estimated by BNSF.

FRA data for Class I railroads (excluding AMTRAK) identifies 2522 train derailments on main tracks for the period 2008 through 2015, of which 780 of those derailments occurred on BNSF rail lines. Track conditions are the most frequent source of derailments, such as broken rails attributed to detail fractures, irregular track alignment and wide gage, and defective or missing cross ties, spikes or other fasteners. So although the proposal includes good inspection plans, there are too many ways a defect can occur and not be discovered, resulting in a derailment.

One derailment every 2.0 to 2.4 years and spill every 6.4 years in Washington is estimated. When calculated for the entire route, there is estimated a derailment approximately every 10 months and a spill every 2.1 years. Each derailment is projected to involve an average of 12.7 tank cars. With that risk level, the Council must look at the potential resulting damages.

Evaluation of the amount of crude oil that could spill in a derailment should consider the amount of crude that has actually spilled in recent crude oil and ethanol accidents in North America. One method is to apply the average of 51 percent of derailed tank car contents being released to Dr. Barkan's estimated average derailment of 12.7 tank cars, which yields an average spill of 165,013 gallons. A further reduction of 50 percent to account for safety improvements attributable to use of DOT-117 tank cars, as estimated by PHMSA, results in a projected average spill of 82,500 gallons, which is similar to PHMSA's projected average spill size of 83,602 gallons per mainline derailment. Other data on tank car releases in North America since 2006 suggests that actual releases could reach as high as an average 270,000 gallons per derailment.

The tank car improvements have not been fully implemented and there is insufficient data on how much it will mitigate potential damages. PHMSA projected that, absent further safety improvements, there will be 15 mainline derailments for 2015, falling to a prediction of about 5 mainline derailments by 2034 for a total of 207 derailments nationwide over 20 years. In addition, based on population densities along mainline track nationwide, PHMSA projects the United States would experience between 0 and 10 additional high consequence events, each with over $1.15 billion in total environmental damages and monetized injury and fatality costs exceeding $5.75 billion and 49 fatalities, over 20 years. PHMSA also projects one event exceeding $5.75 billion with 245 fatalities.

The VEDT is projected to generate the equivalent of 21 percent of the United States crude oil and ethanol tank car shipments on which PHMSA's projections are based. Adjusting for the shorter length of the Washington route relative to the average national crude oil trip, PHMSA's methodology would project that without additional safety improvements the Vancouver proposal would generate one higher consequence event with at least $1.15 billion in costs and at least 49 fatalities somewhere along the Washington route every 49 years.[2068] Extrapolating from Washington to the full rail route, there would most likely be one high consequence event associated with VEDT trains on average every 16 years.

[2068] Vancouver share of national carload 0.210 x .385 (to account for 385 mile Washington inbound route vs. 1,000 mile national CBR average) = .081. .081 x 10 national high consequence incidents projected by PHMSA = 0.81 high consequence events projected along Washington corridor.

Consideration of rail-related risks in Washington also requires consideration of the fact that the main CBR route travels through historically landslide-prone areas such as the Columbia River Gorge.

Based on the record, most future oil spills stemming from derailments, other than the smallest, will involve fire. Larger fires can heat other spilled product or cause intact cars to experience a heat-induced tear with product release in the form of a fireball. A fire from a rail incident could become a wildfire as the route serving the VEDT is among the most fire-prone areas in the state where even normal railroad traffic and maintenance activities regularly ignite wildfires. Wildfires are expensive. In the summer of 2007, trains travelling west along the BNSF line caused multiple fires along the tracks, including several blazes that grew into a 365-acre complex southwest of Spokane that caused significant property damage and cost state taxpayers $460,000 in suppression costs.

Emergency response capabilities along the rail route are limited and may not be capable of a successful response. Many of the jurisdictions along the route are small ones with limited or volunteer responders. Along with a small staff, there is limited equipment and staff is not trained for this type of incident. Mutual aid may or may not be available or, if available, not be equipped to respond to a derailment and fire. Water may be unavailable to fight fires. Although there are ways to minimize impacts, they are not sufficient to adequately protect the population and the environment for which the impact of a fatality is not quantifiable.

Trains associated with the VEDT may also impact the public interest by blocking at-grade crossings in Washington and the rest of the rail route. Gate down times in Vancouver will average 5 minutes and 8 seconds, which creates 20-21 minute delays each direction, for a total of 42 minutes in comparison to the current 15 minutes at the Vancouver intersections. Such delays could interfere with emergency responders and have grave consequences for human life, health, and safety.

Tribal Cultural Impacts. Along the Columbia River rail lines, there are thousands of archaeological and historical sites, with most underground and undisturbed. In the event of a spill, a removal action has a strong potential to impact these sites, which are important to tribal members' ability to reference their history and connection to place.

These sites and potential sites are unique resources that are "priceless and irreplaceable. They cannot be restored in the event that [a] site is excavated." We agree that these cultural resources' complete value cannot ever be restored in the event a site is excavated because the excavation moves artifacts and takes away their connection to a particular spot. The value of the rich historical and archaeological resources along the Columbia River is beyond monetary. These resources are indeed priceless, not only to Washington tribal peoples, but to all the people of the State of Washington and to the State of Oregon as well.

Based on the history of incidents along the rail route that have threatened these cultural resources, the construction of the VEDT and the transport of very large quantities of crude oil creates the potential for further serious compromise and even the loss of the state's irreplaceable cultural resources.

Tribal Fishing Impacts. Tribal members have been fishing the Columbia River from time immemorial, going back numerous generations. In addition, treaty and non-treaty fisheries in the main-stem Columbia River are managed according to a court-ordered agreement under the *United States v. Oregon* federal court case.[2069] Although all of the locations where the tribes currently fish commercially are upriver of the proposed VEDT, tribal people claim fishing rights that go down to the mouth of the Columbia River and they have never abandoned their claim. So tribal members cannot just go to a different location in the event of an oil spill.

Tribal fishers have three main reasons why fishing is a crucial part of their lives. Ceremonial fishing is done primarily in the spring and is typically managed through a system of permits. None of these fish may be sold. Tribal subsistence fishing includes fishing for personal and family use. This could also include barter among federally recognized tribes. Tribal fishers are allowed to take fish through subsistence fishing the entire year. Tribal commercial fishing is done for the purpose of trade with non-Indians.

Many tribal fishers depend on fishing for a significant portion of their income. For many fishers, it is their sole source of income. If commercial fishing is not available to these fishers, it is a significant economic loss, particularly for tribal communities with high unemployment rates. Monetary compensation, even if available, may not make affected tribal members whole. Tribal parties would be particularly impacted by the VEDT both in terms of access limitations to their fishing sites and the potential for habitat and fish resource damages.

Increased rail traffic also raises safety concerns due to fishers having to cross the tracks to access their fishing sites. Tribal family members have been killed crossing the tracks. These fishing sites are often in remote areas without developed, safe railroad crossings.

Vessel Operations Risks. The 1984 Mobil Oil tanker grounding spilled the equivalent of about 3 or 4 train cars and reached the mouth of the Columbia in less than 3 days, mixed into the water column and sediments, and ended up in the mouths and tissues of sturgeon. Since then, there have been changes in navigation technology, vessel operations, and vessel design that increase safety. Nevertheless, DNV GL predicts that the VEDT will increase the risk of marine incidents for current traffic on the Columbia River by approximately 2 percent. An incident of any type (including those that do not result in a spill) for a 47,000 DWT tanker is estimated to occur approximately once every 0.8 years. The estimated incident rate for 105,000 DWT tankers is once every 3 years. The estimated incident rate for 165,000 DWT tankers is once every 57 years.

[2069] 2008-2017 *United States v. Oregon* (Civil No. 68-513-KI (D. Or.) Management Agreement, https://www.fws.gov/pacific/Fisheries/Hatcheryreview/Reports/snakeriver/SR--079.revised.2008-17USvOR_Mngmt_Agrmt.pdf.

Although many of the predicted incidents would not result in an oil release, estimates of spill volumes for a vessel incident can be significant. The DNV GL vessel traffic risk assessment model concluded that a tanker collision has a high probability of releasing 102,500 bbl from the largest 165,000 DWT tankers, 100,000 bbl from the 105,000 DWT tankers, and 58,700 bbl from the 47,000 DWT tankers. This same model concludes that in case of grounding, there is a probability of releasing 31,900 bbl for 165,000 DWT tankers, 30,600 bbl from 105,500 DWT tankers, and 20,200 bbl from 47,000 DWT tankers.

Tesoro Savage has committed to implement a tug escort for all loaded vessels leaving the VEDT. DNV GL concluded that using the escort tug will result in a 91.45 percent average percentage reduction in grounding, along with a predicted reduction in oil spill risk from groundings from a recurrence interval of once every 31 years to once every 370 years. The use of a tug escort reduces the spill risk from transit, which includes both grounding and collision, by 48 percent. Although use of escort tugs can reduce the risk of collision and grounding, the risk is not eliminated.

Because of the limited ability of stand-by booming to recover oil spilled in the river, booming may be ineffective in recovering oil that is spilled.

Ballast Water Issues. Notwithstanding VEDT compliance with ballast water management requirements, there is some increased risk for the introduction of invasive species into the Columbia River ecosystem.

Fish Wake Stranding. Barlow Point is very susceptible to wake stranding from vessels associated with the VEDT, as (to a lesser degree) are Sauvie Island and County Line Park. Tesoro Savage has not, however, proposed to require the vessel owners or operators with whom it contracts to slow speeds at Barlow Point to protect fish, or worked with affected stakeholders such as the Washington Department of Fish and Wildlife, the Columbia River Pilots, the Coast Guard, and others to develop protocols for slowing speeds.

Cumulative Vessel Traffic. DNV GL did not add up the various types of incidents and oil spill amounts to produce an overall estimate of risk and accompanying oil spill amount. The Council therefore is convinced that the overall risk of an incident resulting in the release of oil is underestimated.

Land Use and Community Interests Along the Rail Corridor. The VEDT will increase rail traffic in excess of 200 percent over 2015 levels. Houses are within 60 feet of the track in much of the Vancouver corridor, raising the possibility that even derailments without release of oil, fire, or explosion can have significant safety consequences. In fact, the record suggests that when crude oil by rail derailments have occurred, oil release, fire and in some cases explosions have often resulted. Frequencies of this nature are not considered remote under local regulatory standards. In the case of floods, for example, even though advance warning is typically provided, land use ordinances in Vancouver and other communities in

Washington and the nation identify a frequency of once every 100 years to be a sufficient risk to impose significant development limitations.

In addition to public safety issues, the waterfront development and nearby portions of downtown Vancouver within the Vancouver Central City Vision subarea would likely on balance develop less intensely than would occur without the proposal and its real and perceived risks. Values of residential as well as commercial properties throughout the corridor will likely be diminished, with implications for local revenue to fund public services. Connectivity to residential and recreational areas fully or partially dependent on access via the 27 at-grade crossings in the Vancouver corridor will be diminished. While local land use planning has occurred with an understanding of existing rail traffic and potential increases, and in some cases has made specific improvements in response, there is no indication that those plans considered the extent of rail volume increases posed by the VEDT proposal, or more importantly, advent of CBR transport or its impacts. This rail traffic on the rail corridor is inconsistent with multiple provisions of Vancouver's comprehensive plans, ordinances, and interests.

In Washougal, an oil spill near the Washougal wellhead could result in contamination of Washougal's water supply. This is Washougal's primary water source, with no ready backup water source, so this risk of contamination and its consequences are clearly inconsistent with local community interests.

In Spokane, increased rail traffic increases the risk of derailments on an elevated rail corridor in the City's urban core, raising the possibility that, in addition to the possibility of a derailment, spill, fire, and explosion, that a derailed train that remains intact could nonetheless cause significant damage. The trains also pose a risk of contamination to Spokane's water supply.

Water Quality. Based on evidence in the record, the Council expects that, in the absence of response efforts, oil spilled at the VEDT is likely to reach the Pacific Ocean within 2 days.

After a spill of dilbit, the rapid evaporative losses of lighter components increases the viscosity and density of the remaining oil and the denser remaining oil can become submerged or sink to the bottom. Dilbit may combine with particles in the water column to submerge, and then remain in suspension or sink. Both dilbit and weathered dilbit are more likely to have increased persistence in the environment over commonly transported crude oils. Dilbit residue is much more strongly adhesive than light or medium crude oils. Weathered dilbit adheres strongly to shorelines, vegetation, and debris and will be difficult to remove from these surfaces. The adhered oil will also pose a threat of fouling habitat and wildlife because it more quickly weathers into a viscous sticky residue. Closure of affected water bodies as a result of oil spills are likely to be longer when the spilled oil sinks in the water column.

Current fate and effects predictive modeling does not adequately address dilbit and effective response to a dilbit spill requires updates to oil spill response procedures in the Northwest. Limitations on the ability to model, track, locate, and recover submerged oil exist and GRPs have not been developed for most of the rail corridors through which the crude oil railcars will transit, and there are also gaps in GRPs for marine areas.

Most of the techniques and tools for tracking subsurface oil have not been used in response to actual oil spills. Visual observations by divers are widely used, but they are labor intensive and slow. There are technologies available for containing and recovering subsurface oil, but few are effective and most can only work in very limited environmental conditions. Response operations on rivers are challenging because of factors including limited access points for equipment and worker deployment, variable flow rates and water depths, vessel wakes that can cause equipment to fail in addition to posing safety hazards, seasonal constraints associated with cold water and icy conditions, and bottom debris in rivers which can interfere with sunken oil detection and snag equipment. The National Academy Study states: "There are no known, effective strategies for recovery of crude oil that is suspended in the water column, particularly where it occurs as droplets or oil-particle aggregates."

First responders may lack relevant information about oil characteristics to effectively respond to a spill.

Management of waste is also a major challenge during a spill response because very large volumes of water, oil, sediments, debris, and sorbents will be generated.

Tesoro Savage contends that dilbit will float in the event of a spill, citing to laboratory tests. However, evidence from actual oil spills demonstrates the potential for oil to sink, and illustrates the difficulties in recovery efforts and the significant and long-lasting impacts to the environment. Examples include the Mobil Oil spill, the Barge E2MS 303 spill, the Barge Florida spill, and the Enbridge spill. The Enbridge dilbit spill into the Kalamazoo River resulted in about 15 percent to 18 percent of the oil ending up on the bottom of the river. After dredging, about 160,000 gallons remained, which will have ongoing effects to the habitat for decades.

In summary, the Council seriously questions the ability of dilbit to float. The efficacy of the response equipment is directly tied to recovering the oil before it sinks. The weight of evidence shows the shortcomings in existing planning. In addition, there are no known, effective strategies for recovery of crude oil that is suspended in the water column, particularly where it occurs as droplets or oil-particle aggregates. And the average recovery of oil spilled on water at a rate of 15 percent to 20 percent, with Tesoro Savage's expecting a 10 percent recovery. This will leave a substantial amount of oil in the water.

Wetlands. Oil spilled in the Columbia River has the potential to damage wetlands that support habitats and plants that support many species of birds, mammals, reptiles, amphibians, fish, and invertebrates. Crude oil affects wetlands by physical smothering of leaves and soils.

Because of deficiencies in Tesoro Savage's trajectory analysis and tabletop exercise, it is difficult to determine the potential geographic scope of wetland impacts or the capability of responders to address a spill that might affect wetlands. This is particularly true with regard to dilbit. Oil recovery rates in wetlands greater than 20 percent are rare. Manual removal can cause long-lasting damage.

Oil spills have left unsafe chemical concentrations in wetlands. For example, 3 years after the Deepwater Horizon spill, PAH levels were 374 times baseline levels, a level that affects fish reproduction and growth. Shoreline erosion was accelerated and insect communities were depressed. It may take many decades for PAHs to reach baseline levels. Another example is the Exxon Valdez spill, where embryo mortalities remained high even after year four and oil remains in the streambanks where it can move to salmon redds (individual salmon spawning places) and significantly impact mortality.

Wetlands impacted by oiling or response operations may also be more susceptible to habitat loss due to enhanced erosion during the time it takes for the vegetation to naturally recover. The record lacks evidence of successful restoration of wetlands after a large spill.

Salmon. Upper Columbia Spring Chinook are an endangered species because of their very small numbers and their narrow timing window for traveling in the river. An oil spill at the time this group of fish is migrating could impact the whole population.

The geographic impacts of spilled oil can be widespread and oil in the environment can persist in shorelands and wetlands, sometimes for decades. Cleanup operations do little or nothing to protect exposed aquatic organisms.

The effects of oil can last for decades, particularly in long-lived species such as sturgeon. Oil traveling downstream can also harm embryos and other tiny organisms. Oil exposure to early-life stages of salmon has life-threatening impacts. Both toxic and sub-lethal effects can lead to death. Sub-lethal effects can also lead to increased predation and poorer chances of survival. Dilbit can cause cardio toxic effects in embryonic fish, such as pericardial edema, heart malformations, and reduced heart rate, which can reduce future aerobic performance and swimming ability, which can impact the ability to migrate and capture prey.

Oil can cause elevated mortality for years after exposure. Mortality is increased in not only the fish that were directly exposed but also in their offspring. For example, elevated salmon mortality rates after the Exxon Valdez oil spill resulted in two pods of killer whales losing 40 percent of their population in about a year, leaving one pod with no reproductive females.

VOCs and PAHs Risks to First Responders and the Public. After a spill, about 50 percent of Bakken crude and about 20 percent of dilbit will evaporate. Evaporation of VOCs poses a safety concern for first responders and the public. Bakken crude poses an additional risk because it contains high levels of PAHs in the naphthalene to phenanthrene range, which can dissolve in the water column. Dissolved PAH in the water column can cause toxic effects.

Financial Assurances. As described above, Tesoro Savage will have limited assets and, absent indemnification provisions in its contract with its two parent companies, the joint venture partners will not be liable for losses resulting from VEDT's operations so, outside of insurance coverage, there will be little to no funds available to compensate third parties for potential losses.

Tesoro Savage has not yet committed to any particular type or level of insurance. It intends to evaluate potential losses through a Black Swan study after project approval. The Black Swan analysis seems to be a very conservative model that looks at only a limited number of factors, giving the smallest value for potential loss, based on Tesoro Savage's view that the level of coverage should be based on a reasonable worst-case analysis, rather than based on the MFL. The MFL is more comprehensive but may take too broad a look and therefore produce a larger number than is reasonable. Neither analysis is perfect, but the MFL seem to be more reasonable in determining the potential scope of damages in the event of an incident related to the VEDT. The object of each is the same, determining the potential loss that must be considered in determining insurance coverage.

State statutes that relate to financial responsibility regarding oil spills exist, but these statutes do not restrict the Council's ability to look at the financial responsibility requirements for damages resulting from an incident at the VEDT, or from an incident on the vessel or rail routes.

Ms. Hollingsed testified that coverage of up to $1 billion to $1.5 billion is available on the market. Considering the risks posed by rail and vessel traffic, Tesoro Savage has not demonstrated that the market has capacity to insure a reasonable worst-case damage amount because Tesoro Savage has deferred calculation of that amount to the future. It also appears that the market lacks capacity to insure a maximum foreseeable loss that could be as high as $6 billion.

The Council must necessarily look at potential incidents and resulting damages that can occur on the rail corridor and from marine vessels that are carrying crude oil to and from the VEDT. But for the VEDT, the transportation of crude oil to the facility and the associated risks would not occur. As a result, financial assurances need to include assurances that the risk of damage is covered for all three segments of the facility operations. This is not the same as saying that Tesoro Savage is the entity that must obtain insurance for events along the rail line or in the Columbia River. The Council must consider the possibility of uncovered losses and the lack of financial assurances.

If the Council accepts that the Council may only require financial assurances from Tesoro Savage for VEDT operations, Tesoro Savage has not demonstrated that funds from other sources will actually fund either a reasonable worst-case loss or a MFL. This leaves a substantial hole in the protection of the state, local government and the public if an incident occurred due to rail or marine operations leading to an oil spill, explosion or fire.

Environmental Justice Issues with Fruit Valley Neighborhood. The Fruit Valley neighborhood is unique in Vancouver in that it is separated by a series of railroad tracks, and the only way into and out of the neighborhood is to cross over those tracks. If an accident on the tracks were to occur, accessibility into and out of the neighborhood would be limited, if not impossible. And if the incident included an explosion, there is a potential to destroy the neighborhood.

Financial Assurances for Incidents along the Rail and Vessel Corridors. As described above, Tesoro Savage will have limited assets and, absent indemnification provisions in its contract with its two parent companies, the joint venture partners will not be liable for losses resulting from VEDT's operations so, outside of insurance coverage, there will be little to no funds available to compensate third parties for potential losses.

Tesoro Savage has not yet committed to any particular type or level of insurance beyond what is required in its lease with the Port. It intends to evaluate additional potential losses through a Black Swan study after project approval. The Black Swan analysis seems to be a very conservative model that looks at only a limited number of factors, based on Tesoro Savage's view that the level of coverage should be based on a reasonable worst-case analysis, rather than based on the MFL. The MFL is more comprehensive but may take too broad a look and therefore produce a larger number than is reasonable. Neither analysis is perfect, but the MFL seem to be more reasonable in determining the potential scope of damages in the event of an incident related to the VEDT. The object of each is the same, determining the potential loss that must be considered in determining insurance coverage.

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As noted previously in this Order, PHMSA considers damages in excess of $5.75 billion a conceivable result of a CBR accident. With the VEDT's storage capacity equivalent to six unit trains, the Council notes the possibility of losses an order of magnitude larger than the incidents described as comparable by Ms. Hollingsed.

If the Council accepts that the Council may only require financial assurances from Tesoro Savage for VEDT operations, Tesoro Savage has not demonstrated that funds from other sources will actually fund either a reasonable worst-case loss or a MFL. This leaves a substantial hole in the protection of the state, local government and the public if an incident occurred due to rail or marine operations leading to an oil spill, explosion or fire.

3. Anticipated Economic Benefits

Jobs. The direct employment impacts in Clark County in Phase I construction are expected to be 239 jobs for the one-year construction period. These impacts are expected to be 81 jobs for the six-month Phase II construction period. Phase I construction will lead to $23 million in both labor income and economic value added, while Phase II will lead to $8 million in labor income and economic value.[2070]

During the Project's operations, direct labor specific to on-site Project operations is expected to be 91 jobs annually for the start-up period, and 176 jobs annually for each year of the remaining years over the 15 year operational period studied, with total economic activity (salaries, purchased goods and services, and governmental taxes and fees) totaling $99 million annually.

Revenue. In total, the construction of the VEDT is expected to have a one-time tax impact of over $22 million to state and local governments, and a recurring annual impact of approximately $7.8 million once the VEDT is operating at full capacity. Sales tax increases represent the largest portion of both construction and operations phases, 80 percent of the construction phase and 40 percent of the operations phase. Property taxes are the second largest tax component, representing 12 percent of construction phase tax increases and 39 percent of operations phase tax increases.

[2070] *Value Added* is the total change in the value added to the economy from the new economic activity. In practice, value added reflects new "value" created by the economic activity which goes to labor (in the form of labor income), government (in the form of tax revenues) and shareholders (in the form of "profits" or residual value). Consequently, both labor income and tax revenue, which are reported separately, are components of value added. Ex. 0156-000012-TSS.

The Port would receive revenues directly from the VEDT, including market value rent from the land lease, dockage for every vessel that loads at the dock, wharfage and service facility fee for every barrel of oil that goes across the dock, rail access fees at $25 per rail car, and rail maintenance fees for total revenues paid of approximately $60 million per year, which will be reinvested into the Port infrastructure and into the community.

These economic benefits would need to be offset by any increase in expenditures that would need to be made by the local jurisdictions to serve the new facility.

C. BALANCE NEED AGAINST PUBLIC INTEREST

The Council next carries out its balancing test in three ways. The Council first balances the need for the VEDT at this location against all of the public interest impacts it has identified and concludes that the VEDT at this location will not produce a net benefit that would support a recommendation of approval. The Council then balances need against the identified public interest impacts but excluding those impacts that Tesoro Savage suggests may implicate federal preemption principles and again concludes that the VEDT at this location will not produce a net benefit that would support a recommendation of approval. Finally, the Council balances need against the public interests but excluding both those impacts that may implicate federal preemption principles and those impacts that would be outside of the Council's ability to consider if WAC 463-62 applies to the Council's current analysis and again concludes that the VEDT at this location will not produce a net benefit that would support a recommendation of approval.

1. Balancing Need against All Public Interest Impacts

The VEDT will produce several benefits:

Crude oil supply. The VEDT will facilitate access to mid-continent crude for refiners in California and elsewhere in PADD V that have not constructed their own CBR facilities.

Jobs. The VEDT is expected to directly create 239 jobs during the one year Phase I construction period and 81 jobs during the six month Phase II construction period. Phase I will produce $23 million in labor income and economic value. Phase II will produce $8 million in labor income and economic value. During operations, direct labor specific to on-site operations is expected to be 91 jobs annually for the start-up period, and 176 jobs annually for each year of the remaining 15 year operational period studied, with total economic activity totaling $99 million annually.

Taxes. Construction is expected to have a one-time sales and property tax impact of over $22 million and a recurring annual impact of approximately $7.8 million once the VEDT is operating at full capacity.

Port Revenues. The Port would receive revenues from the VEDT, including rent, dockage, wharfage, service facility fees, rail access fees, and rail maintenance fees for total revenues to the Port of approximately $60 million per year for reinvestment into Port infrastructure and the community.

As summarized in Section IV and as explained in detail in the balance of this Order, the VEDT creates or induces the creation of significant and varied impacts on the public interest, including:

- **Seismic Risks at the VEDT.** Seismic risks at the VEDT include a 15 percent chance of a great CSZ megathrust earthquake within the design life of the project, along with risk of dangerous shallow earthquakes. Even if all structural designs perform as planned, there is a 2 percent chance that an earthquake exceeding the design specifications will occur within the life of the project. No amount of infrastructure improvement can fully protect the public and the environment from the potentially significant consequences of such structural failures, including oil spills, fires, and explosions and the related risks to human life and safety, property, and the environment. The VEDT has been designed to a low Risk Category, increasing the potential consequences of a large seismic event.

- **Spills during Cargo Loading at the VEDT.** Spills during cargo loading at the VEDT could range from small to large spills with varying odds of occurring. A full-bore rupture of a 36-inch loading pipe would result in a 31,600 bbl spill. The full odds of a large spill are not known because Tesoro Savage's oil spill assessment did not take into account the possibility of an earthquake-induced failure during cargo loading. Oil spill containment measures at the dock may be insufficient for some spills. Prebooming to capture spilled oil may sometimes not occur and, when prebooming occurs, it may be ineffective. Stand-by booming has limited effectiveness and is sometimes unavailable due to weather and wind.

- **JWC Risks Adjacent to the VEDT.** VEDT site operations expose the JWC population, including inmates, workers, and visitors, to the risk of spills, fires, and explosions. There are barriers to a successful evacuation and a lack of resources to respond to an incident at the JWC. Risks to JWC inmates implicate Clark County's constitutional obligation regarding the care and custody of inmates.

- **Emergency Response Difficulties at the VEDT.** In the event of a spill, fire, or explosion at the VEDT, there is substantial evidence about the inadequacies of staff, resources, equipment and training currently available from the VFD and other first responders. Emergency responders are unlikely to be able to successfully respond to a major incident at the VEDT.

- **Air Quality at the VEDT.** Mobile air pollution sources are not regulated under the permit provisions referenced in WAC 463-62-070 and the evidence showed that emissions from mobile sources may result in health impacts to workers and prisoners at the JWC and the Fruit Valley Neighborhood. The impacts from GHG emissions also are not regulated by the applicable state and federal air quality laws referenced in WAC 463-62-070 and it is undisputed that GHG emissions have a negative impact on human health.

- **Environmental Justice Issues Posed by the VEDT.** Environmental justice issues are raised by the fact that the Fruit Valley Neighborhood would be disproportionately impacted by the VEDT, including impacts from toxic air pollutants.

- **Land Use and Community Interests at the VEDT.** Although the VEDT site is proposed for a historically industrial area, there are areas of inconsistency between the VEDT and a variety of Vancouver's Comprehensive Plans provisions and the long term vision for the city, including the risk posed by a major seismic event, which conflicts with Comprehensive Plan Policy EN-11 that says: "Manage development in geographically hazardous area and floodplains to protect public health and safety."

- **Financial Assurances for Risks at the VEDT.** Tesoro Savage will have limited assets and its parent companies are unlikely to be liable for losses resulting from VEDT's operations at the site. Insurance coverage of up to $1 billion to $1.5 billion may be available on the market but Tesoro Savage has not demonstrated market capacity to insure either a reasonable worst-case damage amount (which Tesoro Savage has not estimated) or a maximum foreseeable loss that could be as high as $6 billion. This exposes the public to the possibility of having to bear the burden of remediating life, health, safety, property, or environmental harms caused or induced by the VEDT.

- **Risks to Port Workers.** In the event of a spill, fire or explosion at the VEDT site, the safety of approximately 300 full-time, part-time, and at-will ILWU Local 4 members could be at risk.

- **Rail Corridor Risks.** The VEDT will result in an additional 4.7 unit trains per day on average, for an estimated 280 to 430 percent increase in the number of inbound CBR unit trains. One derailment in Washington is predicted to occur every 2 to 2.4 years and one spill every 6.4 years, with each derailment projected to involve an average of 12.7 tank cars. The Council believes there are more defensible alternative estimates, as supported by the record. For example, one method is to apply the average of 51 percent of derailed tank car contents being released to Dr. Barkan's estimated average derailment of 12.7 tank cars. This yields an average spill of 165,013 gallons. A further reduction of 50 percent to account for safety improvements attributable to use of DOT-117 tank cars, as estimated by PHMSA, results in a projected average spill of 82,500 gallons, which is similar to PHMSA's projected average spill size of 83,602 gallons per mainline derailment. Other data on tank car releases in North America since 2006 suggests that actual releases could reach as high as an average of 270,000 gallons per derailment. Based on national risk assessments developed by PHMSA, the VEDT could generate a "higher consequence event" with damages exceeding a $1 billion, and potential fatalities. The VEDT is projected to generate 21 percent of the United States' crude oil and ethanol tank car shipments so adjusting for the length of the Washington route, the PHMSA's methodology would project that without additional safety improvements the VEDT would generate one higher consequence event with at least $1.15 billion in costs and at least 49 fatalities somewhere along the Washington route every 25 years and one high consequence event every 8-9 years somewhere along the full rail corridor to North Dakota. The main route in Washington is prone to landslides. Most future oil spills stemming from derailments are likely to result in fire, which is problematic on a route that is prone to wildfires. Emergency response capability along the rail route is limited and successful emergency response may in some situations not be possible. Trains may increase delays at at-grade crossings, which can interfere with emergency responders.

- **Tribal Cultural Impacts along the Rail Lines.** Along the Columbia River rail lines thousands of unique archaeological and historical sites could be damaged by an oil spill and subsequent attempts at clean-up. The value of these sites is beyond monetary and are priceless, not only to Washington Tribal peoples, but to all the people of the State of Washington and the State of Oregon as well. Once destroyed, their value cannot be restored.

- **Tribal Fishing Impacts.** Tribal people claim fishing rights down to the mouth of the Columbia River and have never abandoned their claim. If an oil spill destroys a fishing area, they cannot just move to a different location. They fish for ceremonial purposes, for subsistence purposes, and for commercial trade and for many fishers fishing comprises some or all of their income. Monetary compensation, even if available, may not make affected tribal members whole. Tribal parties would be particularly impacted by the VEDT both in terms of access limitations to their fishing sites and the potential for habitat and fish resource damages. Increased rail traffic also raises safety concerns due to fishers having to cross the tracks to access their fishing sites.

- **Air Quality along the Rail Corridor.** Mobile air pollution sources may result in health impacts to populations along the rail corridor. GHG emissions generated by the project would be equivalent to 0.1 percent of statewide emissions, and also contributed to climate change, and consequently have a negative impact on human health.

- **Vessel Operations Risks.** The VEDT will increase the risk of marine incidents for Columbia River traffic by approximately 2 percent. Depending on the size of the vessel incidents are estimated to occur approximately once every 0.8 to once every 3 years to once every 57 years. Although many of the predicted incidents would not result in an oil release, when spills occur, the volumes can be significant with tanker collisions spilling between 58.700 to 102,500 bbl of oil, depending on the size of the vessel. Tanker groundings are predicted to release between 20,200 and 31,900 bbl of oil. The average spill size for all VEDT vessels, weighted by frequency of accidents by type, and with tug escorts reducing the frequency of groundings by 91 percent is 63,463 bbl, or 2.7 million gallons. This is the equivalent of 95 percent of the contents of a 100-car oil train.

- **Ballast water and Invasive Species.** Despite compliance with ballast water management requirements some increased risk remains for introduction of invasive species into the Columbia River ecosystem.

- **Fish Wake Strandings.** The VEDT is likely to increase wake strandings at Barlow Point and, possibly at Sauvie Island and County Line Park. Tesoro Savage has not demonstrated that it has implemented available and reasonable methods to slow vessel speeds at these locations such as, for example, by working with affected stakeholders such as the Washington Department of Fish and Wildlife, the Columbia River Pilots, the Coast Guard, and others.

- **Cumulative Vessel Traffic Risks.** The cumulative risk of an oil spill associated with increased vessel traffic on the river remains uncertain.

- **Land Use Issues along the Rail Corridor.** The VEDT will increase CBR traffic along the rail route in excess of 200 percent over 2015 levels. Houses within 60 feet of the track in much of the Vancouver corridor are at risk from derailments even absent a spill, fire, or explosion. Waterfront development and downtown areas within the Vancouver Central City Vision subarea would likely develop less intensely than without the VEDT. Residential and commercial property values throughout the corridor will likely be diminished, with implications for local revenue to fund public services. Connectivity to residential and recreational areas fully or partially dependent on access via the 27 at-grade crossings in the Vancouver corridor will be diminished.

  In the event of a spill in Washougal, the city’s primary water supply could be contaminated, with no ready backup water source. Increased rail traffic through Spokane’s urban core runs on an elevated track, raising the possibility that, in addition to the risks of spills, fires, and explosions posed by a breached rail car, an entirely intact derailed rail car could cause significant damage. The trains also pose a risk of contamination to Spokane’s water supply, a sole source aquifer.

- **Water Quality Risks at the VEDT or along the Rail and Vessel Corridors.** In light of limited response capabilities, oil spilled at the VEDT is likely to reach the Pacific Ocean within 2 days. Dilbit may combine with particles in the water column to submerge, and then remain in suspension or sink. Both dilbit and weathered dilbit are more likely to have increased persistence in the environment and weathered dilbit adheres to shorelines, vegetation, and debris and is difficult to remove. Modeling does not adequately addresses dilbit, and oil spill response procedures in the Northwest must be updated to adequately address dilbit spills.

Most techniques and tools for tracking subsurface oil have not been used in response to actual oil spills. Few technologies for containing and recovering subsurface oil are effective and most can only work in very limited environmental conditions. Response operations on rivers are particularly challenging; first responders may lack relevant information; and management of recovered wastewater, oil, sediments, and debris can be difficult. The average recovery rate for oil spilled on water is 15 to 20 percent.

- **Impacts to Wetlands.** Spilled oil can damage wetlands that support habitats and plants, which in turn support many species of birds, mammals, reptiles, amphibians, fish, and invertebrates. Because of deficiencies in Tesoro Savage's trajectory analysis and tabletop exercise it is difficult to determine the potential geographic scope of wetland impacts or the capability of responders to address spills affecting wetlands. Oil recovery rates in wetlands greater than 20 percent are rare and manual removal can cause long-lasting damage. Oil spills have left unsafe and long-lasting chemical concentrations in wetlands that have impacted fish reproduction and growth; increased shoreline erosion; depressed insect communities; and oil left in streambanks can move to salmon spawning places and impact mortality.

- **Impacts to Fish.** Upper Columbia Spring Chinook are an endangered species due to very small numbers. An oil spill at the time this group of fish is migrating could impact the whole population. Oil can be widespread and persist in the environment for decades. Cleanup operations do little or nothing to protect exposed aquatic organisms. Oil can harm embryos and other tiny organisms. Exposure during salmon's early-life stages has life threatening impacts. Toxic and sub-lethal effects can lead to death. Sub-lethal effects can cause increased predation and reduced chances of survival. Dilbit can have cardio toxic effects in embryonic fish, which can reduce future aerobic performance, swimming ability, and the ability to migrate and capture prey. Mortality can occur not only in directly exposed fish but also in their offspring.

- **Risks to First Responders.** About 50 percent of Bakken crude and about 20 percent of dilbit will evaporate chemicals that pose safety concerns for first responders and the public. Polycyclic aromatic hydrocarbons from Bakken can dissolve in the water column and cause toxic effects.

- **Access Delays along the Rail Corridor.** The only way into and out of the Fruit Valley Neighborhood is to cross the tracks. If an accident on the tracks were to occur, accessibility into and out of the neighborhood would be limited, if not impossible. And if the incident included an explosion, there is a potential to destroy the neighborhood.

- **Financial Assurances for Impacts along the Rail and Vessel Corridors.** As noted above with regard to financial assurances at the VEDT site, Tesoro Savage will have limited assets and its parent companies are unlikely to be liable for losses resulting from VEDT's operations. Insurance coverage of up to $1 billion to $1.5 billion may be available but Tesoro Savage has not demonstrated market capacity to insure either a

> reasonable worst-case damage amount (which Tesoro Savage has not estimated) or a MFL that could be as high as $6 billion.

If the Council accepts that the Council may only require financial assurances from Tesoro Savage for VEDT operations, Tesoro Savage has not demonstrated that funds from other sources are available to fund either a reasonable worst-case loss or a MFL along the rail and vessel corridors. This exposes the public to the risk to bear those costs.

In evaluating the need for the VEDT, along with its risks and benefits, the Council is mindful of the following statement in Council Order No. 754 at 13-14, *In re Sumas Energy 2 Generating Facility*:

> Each application is unique and falls somewhere on a continuum that may be defined by end points that, at the one extreme, might involve a facility that produces no harmful emissions, is designed and proposed to be located in a fashion to affect the environment minimally; and that provides demonstrable economic benefits both immediately and over the long term. Persuasive evidence of such benefits would militate strongly in favor of site certification even if the facility promised to produce only a moderate amount of energy or was proposed at a time when available energy supply is adequate to meet demand.
>
> At the other extreme, a proposed facility might produce significant harmful emissions, be designed and proposed to be located with little regard to impacts on the land, surface, and groundwater; and promise few economic benefits. Persuasive evidence of such facts would militate strongly against site certification even if the facility promised to satisfy a pressing energy need somewhere on the Western states' and Canadian power grid.
>
> Most proposed facilities, of course, fall somewhere in the middle range between these hypothetical extremes. Thus, EFSEC's need and consistency analysis is a delicate and difficult task in practice, made more difficult yet by the need to consider both objective and subjective criteria in evaluating "the broad interests of the public."

Choosing the appropriate level of risk to life, safety, property, and the environment is the task of public policy makers carrying out their duty to protect the broad interests of the public. As discussed throughout this Order and as summarized above, the VEDT will create a variety of risks to the public interest, including the possibility of oil spills that cause fires, explosions, and pollution. The probability of some events may be low but the consequences of low probability events can still be high or even catastrophic. Emergency response resources may be unavailable or ineffective and Tesoro Savage has not demonstrated that sufficient financial resources are available to fully compensate those who have suffered loss or damage. The VEDT will produce jobs, tax revenues, and payments to the Port, but the need for the

VEDT's crude is limited, with some potential benefits to refiners but no material benefits to consumers. Based on the record before it, the Council concludes that the risk posed to life, safety, property, and the environment by the VEDT is just too high. The Council therefore concludes that, on balance, the VEDT's impacts on the broad public interest outweigh the need for the VEDT at this location.

2. Balancing Need Against the Impacts to the Public Interest but Excluding Impacts that May Implicate Federal Preemption Provisions

In balancing the need for the VEDT at this location against the risks it poses to the public interest, the Council concludes that the VEDT's impacts still outweigh need even after removing impacts that Tesoro Savage allege are subject to federal preemption. These remaining impacts are more than sufficient to justify a recommendation of denial: seismic risks at the VEDT; spills during cargo loading at the VEDT including the associated impacts to water quality, wetlands, and fish; fire risks to the Jail Work Center; emergency response deficiencies for an incident at the VEDT or the Jail Work Center; air quality problems at the VEDT and associated environmental justice issues; inconsistencies with local land use planning documents and community interests; lack of demonstrated financial assurances for incidents at the VEDT; risk to Port workers; impacts to tribal fishing and culture associated with spills from the VEDT; and risks to first responders.

3. Balancing Need Against the Impacts to the Public Interest but Excluding Impacts that May Implicate Federal Preemption and Impacts that Tesoro Savage Contends are Off-Limits for Council Consideration Under WAC 463-62

As discussed above, Tesoro Savage takes the general position that the Council's ability to include certain topics in its balancing analysis is limited by WAC 463-62. Tesoro Savage contends that if it has demonstrated compliance with the standards in WAC 463-62, the Council cannot act without exercising substantive SEPA authority. The topics covered by WAC 463-62 are seismicity, noise, fish and wildlife, wetlands, water quality, and air quality.

The Council found that Tesoro Savage had met its burden with regard to noise and, since it found no additional impacts justifying further consideration, did not move the noise issue into its current balancing analysis. Tesoro Savage has conceded that the rule did not limit the Council's ability to consider subsets of three other topics discussed in the rule: non-routine oil spills from the VEDT, non-routine wetland impacts from oil spills, and non-routine fish and wildlife impacts from oil spills. Thus, the Council may consider non-routine oil spills from the VEDT, wetland impacts from oil spills, and fish and wildlife impacts from oil spills. The Council found that Tesoro Savage had complied with the air permit requirements but that impacts outside the scope of that rule can be considered (impacts from mobile sources and GHG). The Council also found that Tesoro Savage did not meet its burden of demonstrating compliance with the seismicity portion of this State Building Code. Thus, the Council will exclude from its balancing air impacts and GHG and seismic impacts at the VEDT.

The Council therefore applies the balancing test after eliminating consideration of these two matters disputed by Tesoro Savage: air impacts and seismicity impacts. The Council concludes that remaining impacts are still sufficient to justify denial of the project: spills during cargo loading at the VEDT including the associated impacts to water quality, wetlands, and fish; fire risks to the Jail Work Center; emergency response deficiencies for an incident at the VEDT or the Jail Work Center; environmental justice issues; inconsistencies with local land use planning documents and community interests; lack of demonstrated financial assurances for incidents at the VEDT; risk to Port workers; impacts to tribal fishing and culture associated with spills from the VEDT; and risks to first responders.

4. Application of State Energy Policies and the Policies Adopted in WAC 463-47-110

Impacts exceed need when considered only under RCW 80.50 but even more so when considered in light of the SEPA policies adopted in WAC 463-47-110 and Washington's energy policies.

As discussed above, RCW 43.21C.030 requires that state laws, policies, and regulations be interpreted and administered in accordance with SEPA's policies to the fullest extent possible. Those policies are in RCW 43.21C.020, which state:

- Agencies are to use all practicable means to foster the general welfare, create conditions under which human beings and nature can coexist, and fulfill the requirements of present and future generations.

- Consistent with other considerations of state policy, agencies are to take actions including fulfilling the responsibilities of each generation as trustee of the environment for future generations; assuring that Washington citizens have safe and healthful surroundings; using the environment without degradation or risk to health or safety; maintaining an environment which supports diversity and variety of individual choice; achieving a balance between population and resource use to permit high standards of living; and enhancing the quality of renewable resources.

- "[E]ach person has a fundamental and inalienable right to a healthful environment."

The Council implemented these policies in WAC 463-47-110 in which Section (1)(a) says that "[t]he overriding policy of the council is to avoid or mitigate adverse environmental impacts which may result from the council's decisions." In light of all of these considerations, EFSLA does not require the Council to recommend project approval notwithstanding significant impacts on the public interest that protective measures cannot adequately mitigate.

In addition, while the Council's responsibility is focused on the appropriate siting of energy facilities, it does not operate in a policy vacuum. Previous Council decisions have analyzed projects' consistency with the state's energy strategy, utilities' integrated resource plans, regional power plans, and state policy directives favoring deployment of renewable technology, as part of determining each project's need and benefits. The Council applies the state statutes referenced above that establish state energy policies in developing a state position with respect to the proposed location of the VEDT.

Accordingly, these statutes inform the Council that Washington State energy policies include the objectives of reducing dependence on fossil fuels and transitioning to a clean energy economy, with these goals balanced against the need to maintain the availability of energy at competitive prices for consumers and businesses. By its very nature, the VEDT does not promote nor is it consistent with state policy to reduce greenhouse gas emissions.

V. FINDINGS OF FACT AND CONCLUSIONS OF LAW

From the foregoing discussion of the evidence, the arguments presented, and the applicable law, the Council makes the following:

A. FINDINGS OF FACT

Tesoro Savage and ASC

1. Tesoro Savage is a Delaware limited liability company formed as a joint venture of Tesoro Refining & Marketing Company LLC (a wholly-owned subsidiary of Tesoro Corporation) and Savage Companies, established for the sole purpose of building, owning, and operating the VEDT at the Port Vancouver.

2. Tesoro (now Andeavor) is a Fortune 100 company, and an independent refiner, marketer of petroleum products, through its subsidiaries, operator of six refineries in the western United States with a combined capacity of approximately 875,000 bbl per day.

3. Savage is a privately held operator that provides supply chain management solutions and industrial solutions tailored to meet the needs of customers across a variety of industries including oil refining and railroads, operating in over 200 locations with more than 3000 employees in North America and internationally.

4. Tesoro Savage filed an ASC for the VEDT with the Council on August 29, 2013. Prior to the adjudication, Tesoro Savage's ASC was amended on February 25, 2014, August 29, 2013, and May 27, 2016.

5. Tesoro Savage seeks a recommendation of approval for the VEDT, a crude oil distribution terminal. The VEDT would receive crude oil unit trains and unload them into storage tanks for later transfer onto tanker vessels. These vessels would transport the crude oil down the Columbia River to refineries on the West Coast of the United States or elsewhere.

Description of the VEDT Proposal

6. The VEDT would be built on a 47.4 acres site in the Port. It would include a rail

unloading area, six 48-foot diameter crude oil storage tanks to hold the oil, pipelines, a marine terminal, and other structures ancillary to the tasks relating to management of the crude oil as it is held by, and passes through, the VEDT.

7. At full operation, the VEDT would receive an average of more than four loaded crude oil unit trains per day, multiplied by 750 bbl per car for an average of at least 360,000 bbl of oil a day, at 120 cars per unit train, and 1713 trains per year. Based on these figures, the VEDT will receive 4.7 trains per day.

8. The VEDT has been designed to accept crude oil in the range of 15 to 45 API destined for PADD V refineries. The immediate plan is to transport the crude oil to California refineries although Tesoro Savage did not originally intend the project to transfer crude oil for shipment to foreign refineries and the Port lease currently prohibits export, a federal export ban has been lifted and export from the VEDT could occur if the lease prohibition was changed.

9. The VEDT will be constructed on property leased from the Port and will consist of the following: Area 200, the rail unloading area and where the office facilities will be located; Area 300, the oil storage area where the crude oil will be delivered via pipeline from the train unloading areas; and Area 400, the marine terminal (or dock area) that will receive crude oil via pipelines from the storage tanks and occasionally directly from the rail unloading area; a new rail track on the outside of existing loop tracks and shift existing tracks added as part of the WVFA Project; Area 500, the pipeline to move crude oil between Areas 200, 300 and 400; and Area 600, the boiler buildings

10. The Port and Tesoro Savage have executed a 10-year lease with two 5-year extensions for an expected total VEDT project life of at least 20 years. However, a 50–year design life is assumed.

The Port

11. The Port, with a 100-year history, has focused on the growth and development of its facility and operations, and has carried out a 20-year long-term program of investment in the regional and local economy.

12. The Port has signed long-term agreements for over-sized, over-weight cargo. In addition to the proposed VEDT, there are three new projects planned at Port Terminal 1: a Marriott Hotel, a mixed-use facility with office space and residential units, and a new Port headquarters on the waterfront of the Columbia River. Because of this planning and program of improvements, the Port’s financial health does not solely depend upon development of the VEDT.

13. The Port is on the bank of the Columbia River, and is in a heavily urbanized area of Vancouver within a network of roads and streets and railroad tracks, the Jail Work Center (JWC), and a residential neighborhood known as the Fruit Valley Neighborhood.

14. The Port is not a container handling facility. The Port currently receives crude oil trains. To facilitate an increased number of such trains, the Port has constructed the West Vancouver Freight Access project (WVFA Project) on its property, which is a loop track and rail infrastructure. The new infrastructure will increase the efficiency of rail movement into and through the Port. The Port also constructed bridges and underpasses for rail tracks.

The Crude Oil Industry in Washington and Western United States

15. The U.S. is divided into regional Petroleum Administration for Defense Districts or PADDs. PADD V is comprised of: Alaska, Washington, California, Oregon, Nevada, Arizona, and Hawaii.

16. Tesoro owns four refineries in PADD V. Its two largest are in California, one is in Anacortes, Washington, and one is in Kenai, Alaska.

17. Washington has four other refineries owned by three different companies, British Petroleum, Phillips 66, and U.S. Oil. Four of the five Washington refineries have on-site CBR receiving facilities.

18. The modes of transportation into PADD V are: the existing pipeline infrastructure, including the Trans Mountain pipeline which brings crude oil into Washington from Canada; ships transporting crude oil from the southern coast of Alaska and from foreign sources; CBR from the mid-continent.

19. A portion of the crude oil supply currently coming into Washington is needed in-state, but a portion moves on to other states and international markets. The Western Washington refined oil products market is supplied from refineries in Washington; however refined product that exceeds consumption in Washington is also exported.

20. The majority of the oil product for Eastern Washington comes through pipelines from Utah and Montana refiners in PADD IV through Spokane. These pipelines carry only refined product.

21. The VEDT would, at most, only incidentally serve the needs of Western Washington, and would not serve the energy needs of Eastern Washington at all.

Seismic Issues

22. The proposed VEDT would be the largest CBR facility in the United States.

23. The VEDT is located in a seismic-event-prone location, subject to large magnitude subduction earthquakes and other types of powerful earthquakes. There are active faults within 25 miles of the VEDT site, and active shallow sources of ground movement nearby. These different types of ground movement sources have different seismologic effects,

including longer-duration shaking, which results in soil liquefaction. Many earthquakes of different types have occurred in the region of the Port of Vancouver in the past and they will occur in the future.

24. There is a 15 percent chance that a great CSZ megathrust earthquake will occur in the VEDT region within the next 50 years and that, for design purposes, the proper assumption is that facilities will remain functional for a 50-year life. Thus, there is a 15 percent chance of a CSZ megathrust earthquake during the expected lifetime of the VEDT. In addition, there is a two percent change of an earthquake in excess of the VEDT's design occurring within the next 50 years.

25. Shallow source earthquakes would cause high amplitude horizontal ground shaking with stronger effects on soils, structures and facilities at the VEDT. This level of peak ground acceleration could exceed the threshold to trigger soil liquefaction. Earthquakes with longer periods of shaking also causes soil to remain in a liquefied state for a longer period of time, which magnifies damage.

26. Aftershocks, which are especially pronounced after large earthquakes such as CSZ events, impede rescue, recovery and cleanup efforts.

27. Soil liquefaction causes loss of soil strength and stiffness. When liquefaction occurs, the solid layer temporarily behaves as if it were a viscous liquid instead of a solid. The first effect of soil liquefaction is vertical settlement of the ground surface, which is rarely uniform and almost always differential. The second effect is horizontal movement or lateral spreading of the ground surface, which can extend many feet. A third effect is landslide development resulting from significant strength loss. These effects are more pronounced at ports located along bodies of water because of the nature of the geological processes that deposited soils at those locations.

28. The soils at the VEDT are highly susceptible to soil liquefaction. They are primarily 15 to 20 feet of compacted fill underlain by silt and sand of varying strength down approximately 60 to 100 feet below the ground surface. This soil configuration is indicative of the effects of seismic activity at the site.

29. The likely results of soil liquefaction include significant dynamic settlement and lateral spreading deformations in some areas, especially near the riverbank. In the absence of adequate ground improvements, ground settlement is predicted to be approximately 10 to 16 inches in the unloading and office areas and the boiler building; 6 to 10 inches in the storage tank area; 3 to 15 inches in the transfer pipelines area; and 12 to 24 inches at the marine terminal. Estimates of lateral spreading at the shoreline for the marine dock is up to approximately 12 feet at the site, which could impact slope stability along the banks of the Columbia River.

30. The ground improvements planned for Area 300, where the storage tanks are located, do not extend all the way through the liquefiable soil layers, which is not adequate to protect the structure from failure.

31. There are no ground improvements underneath the berm area around the storage tanks. Since uniform settlement of soil is rare, this design poses risk of significant damage to these containment protection structures.

32. The seismicity standard for construction of energy facilities is the Washington State Building Code in Title 51 RCW, which incorporates by reference ASCE/SEI 7-10, in which Chapter 11, Seismic Design Criteria, is the seismicity standard for buildings and other structures subject to earthquake caused ground movements. It classifies building use risk according to risk presented by a failure of the structure in an earthquake. The ASCE 7-10 places engineering choices such as risk categorization within the sound judgment of such professionals as qualified engineering professionals and building officials.

33. The commentary to ASCE 7-10 says that the acceptable risk for a building or structure is an issue of public policy, rather than a purely technical one and that ASCE 7-10 risk categories provide individual communities and development teams the flexibility to interpret acceptable risk for each individual project.

34. Tesoro Savage has classified the planned VEDT structures subject to the ASCE risk categorization for occupied buildings and other structures as falling into Risk Category II.

35. Because of his broad qualifications and engineering expertise, the Council finds that Joseph Wartman, Ph.D. is a qualified engineering professional, and the more convincing witness as to the appropriate building standards in an earthquake hazard zone.

36. The risk categories express the approximate relationship between the number of lives that might be placed at risk and the type of load condition being evaluated for the structures that will house the occupants. Dr. Wartman said that, for classification of the maximum environmental loads in certain structures with potential occupants at the VEDT, based on the proposed use of the structures, the plan based on Risk Category II is incorrect and creates an added level of risk that is not acceptable. In addition, the location of the facility means that failure of its structures in the event of a large earthquake could result in significant environmental and economic consequences. As the building official, the Council finds that Risk Category III is the correct risk category for the VEDT.

37. Tesoro Savage suggests that portions of Area 400 are subject to ASCE 61-14 but does not demonstrate that the State Building Code has adopted ASCE 61-14 and, if it has, how the VEDT meets those requirements. Tesoro Savage similarly suggests that the pipelines in Areas 200, 300, 400, and 500 are subject to ASME B31.4 but has not linked that standard to the State Building Code or demonstrated the VEDT's compliance.

38. There is a high level of danger in placing an oil distribution terminal at a site with such a high probability of destructive seismic activity. The construction design is inadequate to protect the public, public resources, life, safety, property, and the environment.

39. In case of failure due to an earthquake, there is a reasonable probability that an oil spill into the Columbia River would occur, impacting water quality, wetlands, aquatic life, and disrupting commercial, recreational, and Tribal fishing. Fire and or explosion, with release of toxic vapors may also occur, impacting the workers at the Port, the JWC and the Fruit Valley Neighborhood.

40. There is no amount of infrastructure improvement that can guarantee that the VEDT site would be safe in a catastrophic earthquake. There is no design that can assure avoidance of a catastrophic failure in some or all respects if the severe earthquake that is predicted to occur within the life of the VEDT.

41. The public cannot be fully protected from the consequences of a VEDT infrastructure failure from any of the several types of earthquake that are predicted to have a significant chance of occurrence at this site within the relatively near future. Compliance with minimum seismic building code standards is not sufficient to protect the public from the substantial risk to people, property, the community, and to the environment in the event of a significant earthquake event at the proposed VEDT site.

Operational and Security Risks Associated with Normal Operations

42. Routine operational and site security at the VEDT does not pose an inordinate risk to the public interest.

Rail Operations at the VEDT

43. VEDT staff would take control of the unit trains from BSNF at the time the trains enter the facility, and exclusively operate the trains when at the facility. Rail carrier staff would not operate trains after delivering them to the Port. Based on the effectiveness of the guardrails in the approach track and the general safety provisions related to rail construction and maintenance at the Port, the potential occurrence of an incident stemming from rail based activities at the facility itself is remote.

Rail Route Operations – Rail Traffic Increases

44. The VEDT will result in an additional 4.7 incoming train trips per day on average. Regardless of fluctuations in other rail traffic, this is a significant impact because it represents an estimated increase of 283 percent to 430 percent in the number of inbound unit trains carrying Bakken crude oil. This represents a 29 percent increase in the number of all current inbound trains, and a 25 percent increase in the average length of trains.

Rail Route Operations – Causes of Derailments

45. Track conditions are the most frequent source of derailments. From 2012 to 2015, BNSF track has been involved in 491 mainline rail accidents nationally, which is second to Union Pacific Railroad's 599 accidents for the same time period.

46. Most of the inbound route serving the proposed VEDT is FRA Class 4 track, the type of track that was involved in most United States and Canadian crude oil and ethanol spills since 2006, and slightly less than half of general freight accidents nationally from 2012 to 2015.

47. Despite a robust track monitoring program, many track defects cannot be found through inspection activities.

48. While tank car shells, valves, and brakes are improving over time, those improved tank cars still derail and cause spill incidents. (The Council takes note that the improved safety brakes rule has been rolled back, per U.S. Department of Transportation news release of December 4, 2017.) According to the PHMSA, the DOT-117 model only provides a 21% total risk reduction over the unjacketed CPC-1232, and only a 10% risk reduction over the jacketed CPC-1232. DOT-117s have a puncture velocity of only 12.3 miles per hour and are designed to withstand pool fires for only up to 100 minutes and torch fires for up to 30 minutes. Tank cars with ¾ inch shells similar to the DOT-117 model have punctured in accidents. Tesoro Savage has committed to only accepting DOT-117 at the VEDT, however that commitment can change.

Rail Route Operations – Rail Route Accidents and Consequences

49. On the proposed rail route to the VEDT there is a significant risk of crude oil train accidents and the associated dangers from accidental release of oil, and subsequent fire and explosion, and the resulting damage to the surrounding area. These events can reasonably be expected to cause impacts to public health and safety, property, and the potential for significant harm to the environment from derailments and accidents along the rail route. There are additional dangers from increasing rail activities. Temporary or long-term blockage of at-grade crossings, collisions with vehicles, and sparking from trains travelling through areas susceptible to fire are also dangers from additional rail traffic.

50. The VEDT would receive an average of 360,000 bbl of crude oil every day delivered by 4.7 incoming trains per day, each carrying up to 120 fully loaded tank cars to Washington; through cities and over land from the border of Washington, through Spokane, the Tri Cities, and on to Vancouver, passing through many cities and communities on the way. The trains will also pass through some of the most fire-prone areas in Washington.

51. There is projected one inbound train derailment will occur in Washington every 2.4 years on average, which when interpolated to the train-miles for the VEDT, would project

that without further safety improvements one inbound derailment would occur in Washington every 1.2 years.

52. One derailment on the Washington route every 2.4 years and spill every 6.4 years equate to an inbound derailment approximately every 10 months and spill every 2.1 years over the full project route.

53. Derailments will involve an average of 12.7 tank cars is reasonable as it is approximately half way between the historical average of 18 derailed cars in the recent North American crude and ethanol accidents listed by opponents, and the future U.S. projection of five by PHMSA.

54. There is more than one method to estimate average spill per derailment. It is reasonable to find that an average spill per derailment will be between 82,500 gallons per mainline derailment and 270,775 gallons per derailment (the opponents estimate).

55. In a derailment, there is a significant probability of a crude oil spill into the environment. Depending on location, the oil spill can reach a body of water, including the Columbia River.

56. Most future oil spills stemming from derailments, other than the smallest, will involve fire. Consequences will likely vary depending on the location as well as the nature of the accident, response, and other factors. Damages could reach as high as $6 billion if a large population or particularly vulnerable environmental area is harmed.

57. The VEDT is projected to generate 21% of the United States' crude oil and ethanol tank car shipments so adjusting for the length of the Washington route, without additional safety improvements, the VEDT would generate one higher consequence event with at least $1.15 billion in costs and at least 49 fatalities somewhere along the Washington route every 49 years and one high consequence event every 8-9 years somewhere along the full rail corridor to North Dakota.

58. In the event of a derailment and spill, response capabilities are limited, and at times unavailable. Public health and safety impacts include not only impacts from smoke, vapors, fire, or explosion, but also potential drinking water contamination from spills. Areas at risk include water intakes along the Columbia River for Kennewick, Pasco, and Richland, as well as numerous wells and intakes at aquifers in inland areas. Washougal and the Spokane region are each served by a sole-source aquifer. Tribal reservations and treaty ceded areas, and culturally important fishing, hunting, and other activities are at risk from rail accidents and prolonged clean-up. The Washington route includes long stretches along the Columbia River and Sprague Lake, as well as crossings of smaller bodies of water, in which an oil spill could have significant environmental consequences. Derailed trains can also directly damaging adjacent buildings even without a spill or fire. Homes are close to the tracks in much of the Vancouver corridor, and buildings are below the elevated track in Spokane, and derailed trains

can directly damage adjacent buildings without a spill or fire.

Rail Route Operations – Rail Route Fire Risk and Consequences

59. Derailment of crude oil trains is more dangerous and harmful to the public than are derailments of other types of freight trains. Bakken and diluted bitumen crude oils have relatively low flash points and relatively high vapor densities. At ambient temperatures, crude oils vaporize readily and are highly flammable.

60. Unless crude oil releases are very small, oil spills stemming from derailments will pose a strong risk of fire, particularly in the dry conditions along the rail route in Eastern Washington.

61. In a derailment that involves a crude oil release and fire, the thermal stress from continuing fire can lead to additional tank care failure. A tank failure includes the likelihood of a sudden energetic rupture called a “boiling liquid expanding vapor explosion” followed by a fireball.

62. Flammable vapors are heavier than air, and they tend to spread along the ground, collecting in confined areas such as storm sewers. Wind conditions along the Columbia River are typically high. In high winds, there is a tendency of wildfire to move up slopes such as those in the Columbia River Gorge. This creates the potential for unpredictable eruption of secondary fires when the released vapors come into contact with ignition sources.

63. Most oil train fires cannot be suppressed within the first one to two hours. Techniques such as foaming are ineffective or impossible to timely employ after a fire ignites, and adequate foam supply is sometimes unavailable or difficult to acquire quickly.

64. The consequences of a rail-caused fire vary depending on incident location, the nature of the accident, the robustness and timeliness of the response, and other unpredictable factors such as the general increase in train traffic. Natural conditions in large portions of the rail corridor increase the potential for crude oil train accident caused wildfires that are expensive to manage.

65. Because of the demands on firefighting and response resources, there is a significant chance that public resources to deal with a crude oil rail derailment fire will either not be available or will be inadequate, particularly in Washington’s wildfire season. While BNSF and other rail carriers also have firefighting resources, there is no evidence to suggest these resources are sufficient to eliminate the risk of serious consequences from a crude oil fire.

66. Experience in past derailment fires has shown that oil train fires can and do cause secondary fires that can result in death and extreme danger to people, structures, and natural resources. The long term damage that crude oil train fires cause to the environment and

to the public is extremely costly.

Rail Route Operations – Railroad Landslide Risk and Consequences

67. Washington has a heightened vulnerability to landslides, particularly along the VEDT rail route. Areas typically susceptible to landslides are steep hillsides with convergent topography such as that found within the Columbia River Gorge. There has been insufficient analysis of landslide hazards along the rail corridor to fully understand and evaluate the potential danger. The risk of landslides along the rail route is underestimated.

68. The BNSF tracks are built on top of landslide deposits in a significant part of the Columbia River Gorge and a number of the landslide deposits are still moving. This makes the area even more susceptible to future sudden landslides.

69. A sudden landslide hitting a train would likely cause a derailment by forcing the train to stop abruptly or by damaging the railroad tracks. Creeping movement of land can affect the ground under the railroad tracks and cause distortions that gradually build and cause train derailments. These effects from land movement along the VEDT rail route present a more extensive landslide hazard than exists in most other rail corridors.

70. Because the railroad tracks in the VEDT rail corridor are so close to the Columbia River, a derailment caused by a landslide would have a significant potential to cause a serious impact on the river, resulting in negative consequences for fish and other Columbia River resources.

Rail Route Operations – Emergency Response Capabilities Along the Rail Route

71. Emergency response capacity may be insufficient along the rail route to ensure timely and effective response to rail emergency sufficient to protect lives, safety, property, and the environment.

72. BNSF and its contractors have various personnel and equipment for responding to rail accidents, as do government agencies and Tribes, including providing hazardous response teams, but these resources may not be sufficient or be able to address the emergency or the broader community needs.

73. Mutual aid clearly allows for pooling of resources, but it has limits. Arrival of conventional mutual aid may be unavailable, limited or delayed by other emergencies, distances involved, or transportation access.

74. Although Spokane has emergency response capabilities, it has gaps including the lack of sufficient sheltering capacity that is needed for an oil train derailment and fire in the urban center, insufficient firefighting capability and limitations to the HAZMAT personnel.

75. DNR firefighters are not prepared to address additional wildfires associated with the proposal at a time when resources have been demonstrated inadequate to address the existing wildfire threat, and water supplies may not be adequate at the location of the incident.

76. Even if emergency response personnel and assets are fully available, rapidly deployed to the incident, and seamlessly managed, it would not necessarily be sufficient to fully mitigate impacts from the projected accidents over the life of the VEDT to satisfy that statutory standardly managed, it would not necessarily be sufficient to fully mitigate impacts from the projected accidents over the life of the VEDT to satisfy that statutory standard.

At-Grade Crossing Impacts

77. At the ten busiest at-grade rail crossings in the Washington corridor, there would be sufficient queue space for vehicles to wait during gate downtimes and alternative crossing routes existed and that projected rail traffic would create no additional crossing delays.

78. The 5 to 13 minutes of added emergency response time projected by Mr. Dunn at the ten crossings he examined likely underestimates impacts for the balance of crossings along the corridor because those ten crossings were the busiest so alternative routes are more likely to be available. Mr. Dunn did not examine intersections in Vancouver or Spokane, or any intersection anywhere that would serve as a sole access point. Intersections that were included were primarily analyzed for queueing capacity as opposed to other impacts.

79. These ten at-grade crossings represent only a small fraction of at-grade crossings on the route. There are approximately 306 at-grade crossings on the inbound Washington route. There are 111 at-grade crossings in Vancouver and Spokane alone, although some may be on other tracks not serving the VEDT. There is no information about the number of crossings, vehicle numbers, or potential delays on the full Washington route.

80. There are 25 at-grade rail crossings along the corridor of the Evergreen Line in Vancouver, of which 21 are private crossings with little or no protective measures and 20 provide the only access to areas they serve. Five crossings are sufficiently close to others that a stalled train would likely block at least two.

81. Mr. Lopossa's testimony is more credible in that he is the Senior Civil Engineer for Vancouver. He has both the technical expertise, along with the local knowledge, which makes his testimony more credible.

82. Mr. Lopossa provided the more reasonable estimates. Gate down times will average 5 minutes and 8 seconds, based on a 7800 foot long train travelling at 20 miles per hour, and gates coming down 30 seconds before arrival of the train, and going up 12 seconds after. This added delay is significant because each individual train will create a five minutes and 8 second delay at each Vancouver at-grade crossing, and because there will be four trains

delay at each at-grade crossing, the total delay from inbound trains at each crossing is 20-21 minutes each direction. If trains go outbound through the Vancouver corridor, the total delay of 42 minutes would occur at each Vancouver crossing, in comparison to the current 15 minutes at the Vancouver intersections.

83. The additional train traffic from the VEDT could add 10-15 minutes to emergency vehicle response times along the route. These delays could have "especially grave consequences" for emergency responders such as police, fire, ambulance, health care providers, and those in need of medical care.

84. The increased traffic delays of 15 percent to 26 percent at 200 Washington intersections is a moderate to major impact, with potential moderate to major impacts on minority and/or low income populations, and potentially major impacts on emergency responders and human health.

85. Whatever the appropriate estimated delay along the route, Tesoro Savage has provided insufficient information about the resulting safety implications. If hypothetically one in one million of the proposed oil trains that passes through Washington at-grade crossings delays an emergency response to the point where an otherwise avoidable death occurs, approximately 21 added fatalities could occur over the 20-year project lifespan in Washington. That is potentially three times that in the full project corridor through to North Dakota.

Vessel Operations

86. Vessels traveling upriver to the VEDT. Tesoro Savage will use local licensed Columbia River Bar Pilots and Columbia River Pilots to increase navigational safety. Pilots are experienced mariners who have extensive navigational expertise.

87. Vessels loading procedures. At the start of the loading operation, oil will start flowing toward the vessel at a slow rate, and will gradually increase up to the maximum rate. It will take approximately 16-20 hours to fully load each vessel.

88. There is a 30-second shutoff valve in case there is a problem during loading. In addition, there are valves at the dock, at the header, and one on the land side, and there are the valves on the tank that can shut down the flow of oil.

Vessel Operations – Risk of Collision at the Dock

89. The risk of vessels colliding at the dock is remote.

Vessel Operations – Risk of Spills During Cargo Loading at the Dock

90. Spills of varying sizes could occur during cargo loading at the dock. Susan Harvey, whose estimates are close to those of Tesoro Savage expert David Corpron, if

Tesoro Savage is loading at 32,000 bbl per hour and the operator is able to respond within one minute to manually stop the transfer by pushing the emergency shutdown system button, and the system takes at least 30 seconds to stop a transfer, 33,000 gallons of oil (786 bbl) will spill in that one and half minute period. If an isolation device fails, the spill volume will increase.

91. Oil spill containment measures may be sufficient for some spills but insufficient for others. Tesoro Savage's original proposal provided approximately three bbl of capacity of spill containment. Three bbl of capacity for spill containment is at the low end of possible spill volumes discussed by the witnesses. Tesoro Savage later committed to add containment capacity by diverting crude in a shut-down situation and increasing pumping capacity but did not identify the ultimate capacity of such a system.

92. These analyses do not appear to take into account the oil spill risk associated with earthquakes that reasonably could occur while a vessel loading cargo for 16–20 hours at the dock. It is uncertain whether the 60-second assumed isolation time to seal off potential releases is realistic in a major earthquake. The second control room may not remain standing or if the shutoff infrastructure will remain functional. There is a significant risk of a substantial oil spill during the vessel loading process due to an earthquake.

Vessel Operations – the Efficacy of Booming

93. When a vessel is tied up to the VEDT dock, a boom to control oil spills will be deployed around the vessel. However, there will be times when the boom cannot be deployed due to inclement weather or wind conditions. In those instances, the vessel loading operation will continue without the boom. Since it takes approximately 16-20 hours to fully load the ship, the danger of an oil spill into the environment will be increased.

94. Pre-booming will either not occur or be ineffective for much of the year, primarily due to current speed. Because of this, the safety measures planned around loading do not achieve full protection against oil spills into the Columbia River during vessel loading, particularly during high wind conditions, which are common in the vicinity of the Columbia River.

95. The proposed stand-by booming is a helpful mitigation measure, but with only limited effectiveness. The boom will not be pre-deployed and deployment takes about 20 minutes. Some oil will be able to travel for miles downstream before the boom is placed into service. If fire is involved as part of a spill, the boom would not be used at all.

96. Assuming pre booming would not take place when a small craft advisory has been issued, it implausible that booming employed as a mitigation measure would be effective if a spill occurred when there is a small craft advisory for wave conditions.

97. The ability to boom downriver if a spill occurs during a small craft advisory issued for wave conditions is also questionable. It may be many miles before conditions would

allow a boom downriver to be deployed, resulting in oil spill into the water.

Vessel Operations – Transit Risks on the Columbia River

98. From the VEDT, oil tanker vessels will transport the crude oil down the Columbia River to the Pacific Ocean to serve refineries on the west coast of the United States or elsewhere. Oil tankers are one of the highest sources of risks of catastrophic oil spill into Washington waters.

99. Tanker vessel traffic on the Columbia River is limited to 300,000 bbl per day. Tesoro Savage intends to work to increase this limitation to 600,000 bbl. Doubling the potential amount of oil transported by vessel down the Columbia River is not an acceptable risk.

100. Following catastrophic oil tanker spills, there have been changes in navigation technology, vessel operations, and vessel design. These improvements in oil tanker operations and design have reduced the likelihood of an oil spill due to tanker vessel structural failures.

101. Current vessel safety measures are appropriate safety procedures and improvements that reduce the risk of vessel accidents and associated spills and damage, but they cannot eliminate that risk or reduce it an acceptable level given the catastrophic damages that could result. Should a spill occur from a vessel incident, spill volumes would likely be significant enough to cause damage to the environment.

102. There are projections that the VEDT will increase the risk of marine incidents for current traffic on the Columbia River by approximately 2 percent. An incident of any type (including those that do not result in a spill) for a 47,000 DWT tanker is estimated to occur approximately once every 0.8 years. The estimated incident rate for 105,000 DWT tankers is once every three years. The estimated incident rate for 165,000 DWT tankers is once every 57 years.

103. The VEDT will increase the risk of total marine incidents for Columbia River traffic by approximately 2 percent. Depending on the size of the vessel, incidents are estimated to occur approximately once every 0.8 to once every 3 years to once every 57 years. Although many of the predicted incidents would not result in an oil release, when spills occur, the volumes can be significant with tanker collisions spilling between 58,700 to 102,500 bbl of oil, depending on the size of the vessel. Tanker groundings are predicted to release between 20,200 and 31,900 bbl of oil. The average spill size for all VEDT vessels, weighted by frequency of accidents by type, and with tug escorts reducing the frequency of groundings by 91 percent, is 63,463 bbl, or 2.7 million gallons of oil. This is the equivalent of 95 percent of the contents of a 100-tank car oil train.

Vessel Operations – Cumulative Vessel Traffic

104. The risk figures for the combination of current traffic, vessels going to and from the VEDT, and traffic for future projects, are significant. For example, 40 year return period for the 20,000 bbl spill means there is about a 40 percent chance at least one such spill would occur over 20 years (1/40 = 2.5 percent). Since DNV GL did not add up the various types of incidents and oil spill amounts to produce an overall estimate of risk and accompanying oil spill amount, its overall risk of an incident resulting in the release of oil was underestimated.

Ballast Water Management Issues

105. Even with following the requirements for ballast water management, there is a risk of introducing invasive species into the environment. And ballast water will change the salinity and other chemical factors of the water, which could impact aquatic species.

Wake Stranding of Fish

106. Oil tankers produce wakes than can strand juvenile salmon. Unless another wave carries the stranded fish back into the water, it will die. Wakes from the tankers calling at the facility will be similar to the wakes produced by current vessel traffic.

107. Particular areas in the Columbia River, like Barlow Point, are susceptible to wake stranding, where fish are stranded by a single vessel passing event. Therefore, increased tanker traffic will cause increased wake stranding of fish, particularly small juvenile fish.

108. Juvenile Lower Columbia Chinook salmon, which is listed as an endangered species under the Endangered Species Act, would be affected by wake stranding.

109. Upper Columbia spring Chinook are listed as an endangered species. The spawning populations of these fish cluster in numbers in the hundreds. A substantial portion of these aggregates of juvenile fish can occupy a narrow geographic area for a short time period as they are migrating down river. At these times, they are particularly vulnerable to the lethal effects of wake stranding.

110. Vessel wakes along the Columbia River likely will not have an impact on shoreline vegetation, or species other than fish, other than a minor impact to the benthic community.

111. Tesoro Savage is not a vessel owner or operator. Rejection of the Tesoro Savage ASC would not impact vessel operations in the State of Washington, or elsewhere.

Protecting Water Quality

112. Many federal and state laws were enacted following the Exxon Valdez oil spill in 1989 that expanded protect of water quality by adding new requirements for oil handling. These planning requirements provide a general framework for coordination among federal, state, and local authorities but do not prevent a spill or provide a successful recovery in all circumstances.

113. Tesoro Savage performed a trajectory analysis to identify where spilled oil will end up during a 48-hour time period. However, analysis was flawed in that it assumed a lower current speed and did not include wind speed in determining spill trajectory. These omissions make Tesoro Savage's predictions unreliable.

114. Tesoro Savage's tabletop exercise understates the distance oil would travel from a spill by understating Columbia River current for the two spill scenarios and it failed to consider the unique properties of dilbit, which minimizes the expected spread of oil. It fails to address the likely impacts on habitats and species, and also understates the required responses. Therefore this exercise has limited persuasive or planning value.

115. There are limitations on the ability to model, track, locate, and recover submerged oil because of limited data and observations, and also the unsuitability of available techniques for oil spill response. Few technologies are available or effective for containing and recovering subsurface oil, and most can only work in very limited environmental conditions.

116. Lack of relevant information to responders is another problem. Critical information such as the specific oil involved in a spill is often not provided to first responders in a timely manner and material safety data sheets are usually generically written and do not provide information about a spilled oil's chemical composition, density after weathering, or adhesion properties.

117. The consequences of an oil spill into the Columbia River are greater when the characteristics of different types of crude oil prevent it from being completely recovered. Diluted bitumen is particularly difficult to recover because it is subject to faster dissolution than other types of crude oil.

118. Both dilbit and weathered dilbit are more likely to have increased persistence in the environment than current commonly transported crude oils and it is much more strongly adhesive than light or medium crude oils. Adhered oil will pose a special threat of fouling habitat and wildlife because it more quickly weathers into a viscous sticky residue.

119. The failure to consider factors such as the inadequate information provided to responders there are serious flaws in Tesoro Savage's spill planning.

120. Actual experiences with oil spills are more instructive about what would happen with an oil spill into the Columbia River or other waters than Tesoro Savage's flawed

modeling.

121. The recovery of spilled oil from water is very difficult and will always be incomplete in varying degrees. Often all of dispersed oil will become dissolved.

122. Recovery requires that the oil not become dissolved in the water. Once crude oil is submerged into the water column, many containment efforts are largely ineffective.

123. River currents, wind, temperatures, and other factors can and do inhibit or prevent effective booming, which greatly diminishes the effectiveness of spill recovery efforts in the Columbia River. Once spilled crude oil enters ocean waters, the recovery percentage is reduced to, at most, 15 percent to 20 percent.

124. The impacts of an oil spill include potential coating of shorelines, oil in the water column, oil that is broken into unrecoverable particles, and oil that cannot be recovered because it has sunk to the bottom of the river, where it causes additional risk to species that dwell there, such as sturgeon.

Protection of Wetlands

125. The impact on wetlands from an oil spill can be significant. Wetlands support a wide diversity of habitats and plant communities that support many species of birds, mammals, reptiles, amphibians, fish, and invertebrates.

126. Oil spilled in the Columbia River has the potential to damage wetlands through physical smothering of leaves and soils. Wetlands are likely to become oiled after a spill.

127. Because of the deficiencies in Tesoro Savage's trajectory analysis and tabletop exercise, it is difficult to determine the potential geographic scope of wetland impacts or the capability of responders to address a spill.

128. Oil spills have left unsafe chemical concentrations in wetlands, with a legacy of continued stress on emergent plants, which affects the ecosystem's structure and function. It may take many decades for PAHs to reach baseline levels if no additional oiling occurs. Oil can move from the bank down into salmon redds (individual salmon spawning places) and significantly impact mortality.

129. Wetlands impacted by oiling or response operations may also be more susceptible to habitat loss due to enhanced erosion during the time it takes for the vegetation to naturally recover.

130. Restoration actions may be necessary as part of a response. The restoration of wetlands is not feasible in the event of a large spill.

Biological and Ecological Impacts of Oil Spills

131. While oil travels downstream is has sufficient time to impact embryos and other tiny organisms. Oil in the environment can persist in shorelands and wetlands, sometimes for decades. Cleanup operations do little or nothing to protect exposed aquatic organisms.

132. Upper Columbia Spring Chinook are an endangered species. It is possible that an oil spill at the time this group of fish is migrating would impact the whole population. Oil exposure to early-life stages of salmon has life threatening impacts and cause elevated mortality to the exposed fish and their offspring for years after exposure.

133. The effects of oil can last for decades, particularly in long lived species such as sturgeon. Both toxic and sub-lethal effects can lead to death of the organism and eventually will lead to increased predation and poorer chances of survival and can be lethal to a population.

VOC and PAH Risks to First Responders and the Public

134. After a spill, about 50 percent of Bakken crude and about 20 percent of dilbit will evaporate, which may present health and explosion hazards. Evaporating volatile organic compounds (VOCs) create a safety concern for first responders and the public. Bakken oil poses an additional risk because it contains high levels of PAHs in the naphthalene to phenanthrene range, which can dissolve in the water column and cause toxic effects.

135. VOCs and PAHs evaporating from spilled oil pose a risk to first responders and the public.

Recovery and the Fishing Industry

136. The potential economic impacts to commercial and recreational fishing from an oil spill on the lower Columbia River are:

- $4.7 million in lost revenues from commercial landings, with losses possibly continuing after the fishery is reopened due to negative public perception.
- $14.4 million decline in expenditures by recreational anglers. This measured potential impacts to local businesses such as bait shops and marinas.
- $17.8 million decline in the value of recreational fishing. This is the monetary quantification of lost enjoyment by recreational anglers whose experience is degraded or reduced in quality because of the spill.

137. These estimates included only impacts on the lower Columbia River and did not include impacts from oil leaving the mouth of the River.

138. The overall damage value on a worst case discharge scenario is in the range of $171.3 million.

139. There would be impacts to tribal fishing in the event of an oil spill, the extent of which depends on the location of the spill and the amount of oil spilled. Not all such impacts could be mitigated by financial compensation.

Land Use Consistency - Vancouver

140. Brian Carrico and David Wechner are experienced experts in the field of land use planning. Consistent with their backgrounds, the Council finds that Mr. Carrico may underestimate the impact of the VEDT and its consistency with Vancouver's Comprehensive Plan and zoning ordinances, and that Mr. Wechner may overestimate the impact of the VEDT.

141. Eric Holmes, as the Vancouver City Manager, a former land use planner himself, is in the best position to know the intent, purpose and application of Vancouver's plans, especially in relationship to Vancouver's vision of its city as related to future development.

The VEDT Site

142. The site is in an area that has historically been used for heavy industrial purposes and is used for such purposes today. However, the VEDT is not adequately designed given the seismic risks present in an area of liquefiable soils. The VEDT is not consistent with Vancouver Comprehensive Plan Policy EN-11, Hazard Areas.

The Rail Corridor

143. The land use analysis may include consideration of the rail corridor, and consideration of on- and off-site use impacts is not restricted by the contents of local land use planning documents or the way they may have traditionally been applied by some land use planners.

144. The VEDT is inconsistent with local plans and ordinances, and not protective of local interests. The increases rail traffic, an increase in CBR traffic in excess of 200% over 2015 levels.

145. An approximate doubling in the number of loaded crude oil trains is likely, as well as significant increases in overall train traffic, particularly the number of longer trains with more than 100 cars. In the 11 mile Vancouver corridor located on mainline track not containing guardrails, there is projected a derailment of a loaded oil train associated with the proposal roughly once every 84 years. Houses are within 60 feet of the track in much of the Vancouver corridor, raising the possibility that even derailments without release of oil, fire, or explosion can have significant safety consequences. Frequencies of this nature are not considered remote under local regulatory standards.

146. Crude oil trains serving the VEDT will travel through residential and mixed-use

neighborhoods, critical public city and county facilities such as schools, wastewater treatment plants, groundwater and drinking water facilities, the Clark County Jail Work Release Center, government buildings and facilities, and other public places.

147. The planned increase in the intensity of crude oil rail traffic would have a negative impact on the community's connections to the Columbia River waterfront, and regional recreational assets such as wildlife refuges, parks, trails and bikeways. It would also impact implementation of shoreline use plans, and restoration efforts at critical habitat protection areas.

148. The VEDT at the terminal site and rail corridor is inconsistent with the balance of Vancouver plans and ordinances, and interests, as follows:

- Strategic Plan Goals 1 and 7 provisions for safe infrastructure and utilities, and strengthened connections to the Columbia River and waterfront are not met by the VEDT.
- Comprehensive Plan goals CD-6 (Neighborhood livability).
- CD-9 (Compatible uses).
- CD-10 (Complementary uses).
- CD-15 (Public Health and the built environment) and CD-16 (Sustainability).
- EN-3 (Energy conservation).
- EN-6 (Habitat).
- EN-7 (Endangered species).
- EN-11 (Hazard Areas).

Other Communities' Interests – Washougal

149. There is a risk that an oil spill resulting from a train derailment near the Washougal primary wellhead could result in contamination of Washougal's main water source, with no ready backup water source; this risk of contamination and its consequences are clearly inconsistent with local community interests.

Other Communities' Interests – Spokane

150. The VEDT will increase risk of derailments in Spokane because portions of the rail corridor are on elevated track through its urban core, where even an intact derailed train could cause significant impacts to life, health, and property.

151. There is a risk to Spokane's water supply, although the risk is likely lower than the risk in Washougal because the Spokane wellheads are deeper.

Tribal Cultural and Economic Impacts

152. Tribal people have been living and subsisting in the same places along the Columbia River since pre-history and their ties to the Pacific Northwest and the Columbia River are deep.

153. Treaties that cannot be abrogated have guaranteed tribal people access to their usual and accustomed places in order to acquire important resources needed to practice their culture, continue their way of life, and plan for the future.

154. The Tribes have not abandoned their claims to fish in other locations over a much larger geographic area. In the Columbia River region, this includes tribal claims of rights to harvest smelt in the Cowlitz River and lamprey at Willamette Falls.

155. Tribal people give special meaning to resources they call "first foods." Preeminent among these is the salmon, an endangered resource existing in the Columbia River. First foods have important ceremonial significance in tribal cultural events. Other first foods are game, roots, and berries that are hunted and gathered in the vicinity of the VEDT rail route.

156. Tribal resource concerns are focused on long-term values as predominant over short-term economic gain. The importance of fishing and fish resources and other cultural assets to Tribal people cannot be expressed in terms of money.

157. Rail operations serving the VEDT could result in the loss of irreplaceable cultural resources and sacred sites. Many of these sites are unmapped for secrecy and other reasons, but numbers recorded include at least 500 sites in Klickitat County alone. Railroad operations have threatened loss and damage to irreplaceable archaeological resources that continue to be at risk of destruction from fires, oil spills and railroad activities. Important cultural resources and sites have already been damaged by railroad grading operations.

158. Impacts from crude oil spills and tanker vessel wakes threaten the reversal of decades of restoration work and long-term effort invested by tribal people. The Tribes have expended large sums of money and scientific work to mitigate habitat losses and help to restore populations of threatened and endangered fish species, including salmonids, sturgeon, Pacific lamprey, and smelt.

159. The Tribes have described habitat restoration as their sacred duty. In furtherance of that, the Tribes of the Columbia River region have taken a resource co-management role with state and local agencies in rebuilding salmon runs, improving habitat and hydrology, and in running hatcheries. They have made significant investments to enable the long-term viability of fishing and to preserve and enhance stocks of salmon and other endangered fish species.

These restoration efforts are expensive and the goal of a fully functioning ecosystem on the Columbia River is a long-term endeavor, which cannot easily withstand setbacks from contamination in the water.

160. Historic losses of fishing areas have already been significant and have nearly devastated Tribal economic interests in fishing. The construction of dams, water quality declines, spills of toxic substances, and contamination have all accelerated fish resource losses over the years to the point of near extinction of important species that were previously abundant.

161. Large reductions in tribal fishing access were caused by dam building on the Columbia River. Some tribal fishing rights referred to as "in lieu fishing rights" were granted as compensation for the construction of the Bonneville Dam. These location-specific, non-transferrable in–lieu fishing rights were given to individual Tribal fishers. They are location specific and not transferrable to other locations.

162. Fishing is a fundamental part of tribal economies, and is a critical source of annual income for many Tribal members, their families, and wider tribal interests.

163. Tribal fishers are a particularly vulnerable population because, as is the case with in lieu fishing rights, fishers can only obtain tribally sanctioned rights to fish at specific locations. If those locations become unproductive due to destruction by contamination or some other cause, fishers are unable to establish tribally sanctioned rights to new locations. Should there be an oil spill affecting such places, these fishers' ability to support their families through fishing is severely diminished or lost completely because they do not have the option of moving to another fishing site.

164. Many tribal fishers engage in informal fish sales businesses, keeping no receipts or records that would be necessary to claim compensation from any entity that causes losses in fish sales revenue.

165. If there were an accident along the crude oil rail route, a responsible party would be unable to fully compensate tribal people for cultural impacts and economic losses because the value of these things cannot be monetized.

166. Washington's tribal populations will be particularly impacted by increased crude oil rail traffic, and by any associated oil spills or fires and that occur because fishers and their families travel to and use the river's edge in their daily life activities. Train traffic will cause potentially lethal physical danger to fishers attempting to access their traditional fishing sites due to the necessity of crossing railroad tracks running through narrow gorge areas with no crossings or signaling infrastructure. Tribal members have already been killed crossing railroad tracks to conduct their daily activities.

167. The operations of crude oil trains have already impacted important tribal

cultural sacred sites and items and places of cultural importance. Increasing the amount of train traffic along the proposed rail route will place these sites in further danger of destruction or damage.

168. Tribal hazardous materials response capabilities have been established, but available resources and personnel are not adequate to protect tribal lands and people.

Jail Work Center

169. The Clark County Jail Work Center is located in proximity to the Port of Vancouver, to the proposed VEDT, and to pipes that are planned for transferring crude oil, which all pose risks to the safety of the residents of the Work Center. The Work Center is also in proximity to a planned electrical substation, which poses a flash fire risk to the residents and staff.

170. The risk analysis modeling presented by Dr. Thomas and Dr. Peterson are valid ways of determining risk. However, because Dr. Thomas relied on incorrect assumption, Dr. Peterson's model is more credible, and the risks to the JWC and its inmate population, workers and visitors are significant.

171. In the event of an incident, shelter-in-place may not be feasible, and it would be unreasonable to not consider what would happen in the event an evacuation was needed, especially in light of the constitutional requirements for the care and custody of inmate populations. There would be difficulty in evacuating this population, which evacuation would take a significantly longer period of time and considerably more resources than are available.

172. The testimony of both Mr. Johnson and Sheriff Atkins is more credible as both are based on personal experience in the Vancouver and Clark County area, while the Tesoro Savage witnesses, although experts, do not have direct and personal knowledge of the area about which they are providing testimony.

Risk to Workers at the Port

173. ILWU Local 4 has approximately 200 full-time and approximately 100 part-time workers who are worried about working next to the VEDT site. An accidents and spill, in addition to other impacts, would lead to a shutdown of operations and lost work for the union members.

174. Union members work within the loop track that will receive the crude oil trains, risking that workers would be blocked from escaping should there be a dangerous incident, an creating an unsafe condition.

Emergency Response Capabilities

175. Tesoro Savage has developed emergency response plans to protect employees and respond to emergency situations that develop at the VEDT site, but would not be responsible for neighboring persons and property.

176. For a serious emergency at the VEDT, the appropriate evacuation radius would be one mile. It would not be possible to evacuate everyone within this area in time to avoid harmful effects to persons being exposed to the emergency event conditions.

177. Should there be an incendiary event at the VEDT, evacuation routes will be unreliable due to increased rail and other VEDT related traffic that would likely not be moving. Vancouver and Clark County would have substantial challenges responding to incidents and evacuating the public within the hazard zone due to resource shortfalls, including those of the Clark County Regional Emergency Services Agency.

178. The availability of trained personnel and preparedness funding is inadequate in Vancouver, and Clark County.

179. Community resource shortcomings to address VEDT-related emergencies are compounded by the geographic location of the crude oil train rail route because significant resources, businesses, retail and industrial facilities are located between the Columbia River and the rail route. Evacuation efforts in these areas would be made difficult by traffic volumes and grade crossings that become blocked. Evacuees, including injured persons, could be trapped by railroad cars that get stopped on the tracks.

180. Emergency communication notification systems are outdated in the communities surrounding the VEDT and along the rail route, which, in a serious emergency, would cause delays resulting in lost lives.

181. An emergency at the VEDT would require a large portion of Vancouver and Clark County police resources, causing ordinary police staffing needs and functions to be neglected. The effects of this shortfall could be compounded by increases in situational crime such as the looting of the homes of evacuees.

182. Fire response capabilities of the Vancouver and Clark County would not be sufficient to meet the additional challenges placed upon the jurisdictions by the VEDT. Mutual aid agreements cannot make up for inadequate emergency response preparedness in the local jurisdictions and insufficient emergency vehicles and mobilization challenges.

183. Emergency management planning to date has not yet taken into account the impacts of the planned VEDT. This includes the Clark Regional Comprehensive Emergency Management Plan, the Clark County Hazard Identification Vulnerability Assessment, and the Clark County Hazardous Material Emergency Response Plan, none of which have analyzed the

specific risks and appropriate responses to crude oil unit train-related disasters.

Socioeconomic Impacts

184. Positive economic impacts from the VEDT includes an increase in jobs of about 170 per year at full operations, $60 million in revenue to the Port, taxes collected from the construction and operation activities, and expenditures for other goods and services from this increased economic activity.

185. Negative economic impacts of regular operations include reductions in property values throughout the rail corridor, and increased vehicle delays at at-grade train crossings, annual delay costs to businesses from between $24 to $7052 per intersection at 19 intersections which account for only a small fraction of the total intersections along the corridor and associated business impacts, and do not account for the economic value of delays to non-commercial vehicles.

186. The costs from derailments resulting in oil spills are unknown, but likely to be significant. Other anticipated or potential accidents associated with the proposal may also be costly. In light of the range of accidents projected to occur during the project's lifetime, including during the 16-year period used by the applicant to estimate economic benefits, the record is unclear regarding net economic impacts.

Environmental Justice Impacts

187. The Fruit Valley Neighborhood is a subarea with a higher population of Hispanic, Asian, and Native American person than the rest of Vancouver. The neighborhood also has a high poverty level.

188. The Fruit Valley Neighborhood is in such close proximity to the VEDT that the VEDT will have a greater impact on its residence than other areas of Vancouver. Although the neighborhood is zoned for industrial uses, this does not mean that the incoming industry should be such that it has a disproportionate adverse impact on its residents. The increase emissions of pollutants, even within acceptable regulatory standards, could have an adverse impact on the health of these residents. To date, Tesoro Savage has not agreed to make any changes that would reduce this impact

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189. Due to its proposed location in a heavily populated urban area there is an increased risk of accidents that cause injury or death from the necessity of vehicles crossing railroad tracks, particularly at uncontrolled crossings.

190. In rural areas, there are more uncontrolled crossings where emergency response tends to be slower and more difficult. Increased train traffic compounds the difficulty of providing public services in these regions.

191. Public safety at road crossings will be compromised by the risk to pedestrian users such as adjacent property owners and tribal fishers who cross tracks for economic and residential purposes. These risks are greater at locations where the road and driveway crossings are uncontrolled or where railroad tracks are adjacent to curves and slopes.

192. In many places, railroad tracks used by crude oil trains are located adjacent to particularly vulnerable populations such as those at the Clark County Jail Work Center, schools, assisted living facilities, and childcare centers. The VEDT poses particular risks to these vulnerable populations because they pose special and difficult challenges for evacuation and other protective measures such as fire suppression.

193. Oil trains currently move through major real estate investments and established residential and commercial areas. The Vancouver Waterfront Access Project involves $44.6 million in infrastructure improvements. Its goal is to establish direct connections between the downtown and a redeveloped waterfront. This is expected to spur an estimated $1.3 billion in additional new private investment. VEDT operations in these areas are incompatible with Vancouver's vision of the future of its densely populated urban environment.

Air Quality

194. Although the VEDT is appropriately categorized as a minor source under the Federal Clean Air Act, it would be a new source of emissions of air pollutants, which could negatively affect human health in the immediate area. Air emissions will be produced both at the facility via the transfer and storage of crude oil at the Vancouver terminal, and within the state of Washington via the transportation of the crude oil to the Vancouver terminal in diesel powered trains.

195. The emissions from the VEDT comply with ambient air quality standards when looking at the results for both the criteria pollutants and the TAPs from stationary sources.

196. Many of the criteria pollutants would be within the SILs established by the EPA. The total concentrations for all of the criteria pollutants are less than the NAAQS. The concentrations of all criteria pollutants comply with primary and secondary standards at all off-site locations.

197. With respect to toxic air pollutants, most of the TAPs would be within the SQERs established by the Department of Ecology. Maximum predicted TAP concentrations attributable to the VEDT for the eight TAPs that exceeded their SQERs are all less than the ASILs established by Ecology.

198. However, for the Fruit Valley Neighborhood, workers at the VEDT and the Port of Vancouver USA, and the workers and residents of the Clark County Jail Work Center, the VEDT is likely to cause health impacts related to air quality impacts. This would be due primarily to the amount of diesel exhaust particulate matter $DPM_{2.5}$ and the nitrogen dioxide

emitted at the site, along with the health risks associated with these pollutants.

199. Emissions of both VOCs and NOx, which form ozone, a pollutant relevant to human health concerns, are estimated to be below the 40 tons per year significance threshold. Therefore, they would not be a significant problem as a result of the VEDT, and it is not necessary for Tesoro Savage to do further analysis.

Analysis of storage tank fugitive VOC emissions

200. Tesoro Savage's calculations of the potential to emit VOCs from the unheated storage tanks use an accepted methodology. But because there is limited information on vapor emissions from heated tanks, and that the TANKS program does not work well with heated tanks, and that by heating the oil there are more vapors created, the Council is not sufficiently confident that the calculations for VOC emissions from heated tanks is correct. There is currently no plan to monitor for actual emissions.

Marine vessel loading

201. The Council weighs the expertise of Dr. Sahu and Mr. Bayer in helping it to decide the question of whether a vessel can truly be vapor tight, and the effectiveness of the sniffers in detecting leaks under all conditions. Dr. Sahu is an expert in air quality. Mr. Bayer has a considerable amount of experience, but he is not an air quality expert. The Council therefore gives more weight to Dr. Sahu’s testimony with respect to emissions from marine vessel loading.

202. Tesoro Savage over-estimated the efficiency rate of capture of VOCs emissions during vessel loading. The slight positive pressure in the vessel will result in at least some fugitive emissions of VOCs. The sniffers will not always detect small VOC leaks under windy conditions, which are frequently present in the Gorge area. The Council is unconvinced that annual certifications of vessels as "vessel tight" warrant a finding that 100 percent of the VOC emissions will be captured. In addition, Tesoro Savage should have used a vapor molecular weight of at least 50 lb/lb-molein its emission calculations for the vessel loading.

203. The Council does not totally agree with Dr. Sahu's calculations. Some percentage of VOC emissions should be assigned to vessel loading, but is unable to state at what level that percentage should be set.

204. VOC emissions from Area 600 boilers, the fire water pumps, and the components of stationary sources were properly calculated.

205. Under this regulatory framework, emissions from mobile sources are not considered as part of the emissions evaluated for air permitting, however should be addressed outside the permitting context.

GHG Issues

206. The Council takes into account the impacts from GHG emissions in accordance with its authority under RCW 80.50.010. The Council may analyze the VEDT's consistency with the state's energy strategy, utilities' integrated resource plans, regional power plans, and state policy directives favoring deployment of renewable technology. The Council may also take into account the statute governing GHG emissions in Washington and the statute governing State Energy Strategy, providing that the state's energy strategy is to be based, in part, on reducing dependence on fossil fuel energy sources and improving the efficiency of transportation energy use.

207. Tesoro Savage's current mitigation efforts are insufficient because GHG emissions that need to be mitigated include emissions caused by transport of crude oil (and possibly the emissions due to refining and end use). The VEDT, which is estimated to emit 86,000 metric tons of GHGs per year, will eventually be required to reduce its emissions in accordance with the Clean Air Rule.

208. Even with Tesoro Savage's proposed mitigation, the added GHG emissions that this project will cause in the state of Washington are inconsistent with requirements in RCW 70.235.020, because that provision requires reductions in GHG emissions from all sources in Washington, not just stationary industrial sources.

Noise

209. VEDT noise impacts would not rise to a significant level. Tesoro Savage has committed to limit construction activity to within the hours of 7:00 a.m. and 8:00 p.m. The increased noise from the construction, if construction is limited to daytime hours, and operation of the VEDT would comply with the noise standards set forth in the Council's regulations. Health impacts would not occur from noise that is within these limits.

Need for the VEDT

210. Consumer demand for refined petroleum products in PADD V is likely to remain roughly stable over the life of the project. There is sufficient refinery capacity exists to meet state and PADD V consumer demand for refined petroleum products during this time period. Refiners in PADD V could benefit from the ability to source crude through the VEDT, but would continue to have access to supplies of crude oil from multiple sources with or without the VEDT. Consumer energy prices would not be directly affected by the VEDT. The need for the VEDT is low.

Financial Assurances

211. During the life of the VEDT, Tesoro Savage would maintain severely limited liquid assets as the fees paid to the company will be immediately expended on operational

obligations. There is no plan in place that would provide for either parent company to make its assets available to pay for damages to public resources in a catastrophic event at the VEDT. This structure does not allow Tesoro Savage to possess sufficient funds in reserve to pay any obligations the company may be found responsible for to cover damages caused by, or attributable to its VEDT operations.

212. The majority of Tesoro Savage's assets will be the form of facilities at the terminal, except for the right to use land that will be leased from the Port. Based on its corporate structure, without specific indemnification provisions in its contract with its two parent companies, the joint venture partners will likely not be liable for any loss that results from the operations of the VEDT. Tesoro Savage plans to obtain an unspecified of insurance coverage for itself once the VEDT would be up and running. This insurance may not be available to third parties. Outside of any insurance that would be available, there would be little to no financial assistance available to compensate third parties for potential losses caused by VEDT operations.

233. There is no evidence that either Tesoro Savage, BNSF, or any vessel owner or operator has an adequate and specific plan for financial assurance that would be either timely available or adequate to pay for losses to public resources or injuries to persons caused by VEDT operations or related activities such as rail and vessel operations.

214. Based on Pipeline and Hazardous Materials Safety Administration (PHMSA) national projections and the anticipated shipment volume and length of railroad track on the crude oil rail route in the state of Washington, the VEDT would generate one high consequence accident with at least $1.15 billion every 25 years in Washington. Over the full three-times-longer rail corridor from the crude oil production point of origin, there would be one high-consequence loss event every eight to nine years.

215. PHMSA has estimated that the cost of an average crude oil or ethanol derailment and spill would be $25 million, but that damages could be as high as $6 billion in an extreme event. Other likely losses such as private party losses, closures to recreational uses and associated related expenditures would be more difficult to accurately quantify, but it would be substantial.

216. Other damages from a catastrophic incident associated with the VEDT could include the cost of closure of commercial and recreational fishing, losses to tribal cultural and economic resources, losses from local species population impacts, natural resource damages of unknown extent, and crude oil recovery expenses.

217. The public's unrecovered damages in an oil spill incident would likely include the costs of response, recovery, and cleanup after a catastrophic incident, and the costs associated with the damage to natural resources.

218. There is no evidence that any financial assurance instrument such as

commercial insurance would cover third parties or be adequate, or even available, in the event of an incident that causes public and private damages.

219. The bulk of the various aspects of risk associated with the operation of the VEDT would likely be borne by local communities, private parties, and the general public of the State of Washington.

220. Tesoro Savage will have care and custody responsibility of the crude oil after it enters the VEDT facility, but not of the crude oil unit trains. Its responsibility for the crude oil would last only until it is loaded onto vessels for transport down the Columbia River. Because Tesoro Savage is neither an owner nor operator of the unit trains serving the VEDT, nor of the railroad, nor of the vessels transporting crude oil away from the VEDT to refineries, Tesoro Savage will not have control over most of the high-risk activities involved in handling the crude oil in conducting the VEDT endeavor.

221. There was no competent evidence that BNSF or any other rail carrier or vessel owner or operator would accept or have the capacity to pay the costs associated with a catastrophic event associated with a crude oil derailment.

222. Tesoro Savage is neither a railroad owner or operator nor a vessel owner or operator.

223. Rejection of the Tesoro Savage ASC will not impact the state freight rail system operations in any way, nor would it unduly impact interstate commerce.

224. Rejection of the Tesoro Savage ASC will not impact vessel operations in any way, nor would it unduly impact interstate commerce.

225. There are particular risks to important community infrastructure and unique public assets. Crude oil unit trains serving the VEDT would travel through North Dakota, Montana, and Idaho before entering Washington at Newman Lake near Spokane. In Washington, they will travel 385 miles, southwest from Spokane to Pasco and through the Tri-Cities, and then west to the City of Vancouver. This route passes near and through important, irreplaceable national and local places including Glacier National Park and the Columbia River Gorge National Scenic Area, alongside the Columbia River.

226. Vessels loaded with crude oil or diluted bitumen will leave the Port of Vancouver and travel down the Columbia River, traversing the system of bars and shoals at the Columbia Bar, to the Pacific Ocean. For the entire unit train rail and vessel route, there are irreplaceable important public places, economic assets, and amenities of life for the people of Washington and other states that would be placed at risk of potentially permanent damage from derailments, oil spills, fire or other associated catastrophic events. This is an unacceptable degree of risk to the public's important economic and cultural assets and places.

227. The benefits of the VEDT over its approximately 50-year lifespan are out-weighted by its intrinsic unavoidable risks.

Any conclusion of law deemed to be a finding of fact is adopted as such.

B. CONCLUSIONS OF LAW

Jurisdiction

1. The proposed VEDT is an energy facility as defined by RCW 80.50.020(11), and is proposed for a site in the State of Washington, as defined by RCW 80.50.020(19), and is a new energy facility required to be constructed in accordance with the provisions of RCW 80.50.060.

2. The Council concludes that it has jurisdiction over the subject matter and the parties in this adjudication concerning Application No. 2013-01 pursuant to RCW 80.50 and RCW 34.05, WAC 463-30, and WAC 463-14-050.

Statutory and Rule Requirements

3. Tesoro Savage filed its ASC in accordance with WAC 463-60. As amended, the ASC complies with the guidelines in WAC 463-60. Tesoro Savage has also complied with the provisions of RCW 80.50.071 as to its responsibility to pay the costs of the Council's review.

4. The Council conducted adjudicative proceeding No. 2015-01 for the review of Application No. 2013-01 pursuant to RCW 34.05 as required by RCW 80.50.090(3), WAC 463-18-090, WAC 463-10-010(3), and WAC 463-30. In the course of the adjudication, the Council visited the proposed site of the VEDT.

5. In accordance with RCW 80.50.080, the Attorney General of the State of Washington participated in the adjudication through his Counsel for the Environment.

6. The Council published and, when required by law or rule, served notices of events in the adjudication process including commencement of the adjudicative proceeding, opportunities to file petitions for intervention, prehearing conferences, and the adjudication hearing sessions.

7. The Council afforded the parties to the adjudication the opportunity to present oral and written evidence, object to evidence, and fully brief issues. Prior to the adjudication hearing, the Council held a prehearing conference with the parties, as required by WAC 463-30-270. The Council resolved issues prior to the adjudication hearing through orders.

8. In compliance with RCW 80.50.090(3), the Council heard from all persons wishing to be heard in support of, or in opposition to, the VEDT based on the evidence

admitted into the record. These public comments were not evidence in this adjudication, but they were made part of the wider recommendation decision record and will be considered in that context.

Statutory Framework

9. RCW 80.50.010 requires the Council to balance the increasing demands for energy facility location and operation in conjunction with the broad interests of the public to determine whether a proposed energy facility at a particular site will produce a net benefit.

10. In applying 80.50.010, the Council may consider the requirements of RCW 43.21C.030, RCW43.21C.020, and WAC 463-47-110.

11. In applying RCW 80.50.010, the Council may consider relevant state energy policies such as RCW 43.21F.010, RCW 43.21F.088, RCW 70.235, and RCW 43.325.005

12. The Council's balancing analysis includes consideration of all relevant topics. The Council is not required to apply a three-tier decisional hierarchy. WAC 463-62 does not establish standards for the Council's current consideration of Tesoro Savage's ASC. WAC 463-60 does not establish standards for project approval.

13. Tesoro Savage bears the burden of proof in this adjudication to establish by a preponderance of the evidence that its proposed project at its proposed site will produce a net benefit justifying a recommendation of project approval. RCW 80.50.010. In making this showing, Tesoro Savage must demonstrate that the VEDT's impacts on the public interest are outweighed by the need for this facility at this location.

14. Energy logistics facilities such as the VEDT are not categorically excluded from consideration by the Council.

15. In addressing the need for the VEDT, Tesoro Savage may demonstrate that the VEDT will benefit refiners and is not restricted to demonstrating that the VEDT will benefit end users.

16. In addressing the need for the VEDT, Tesoro Savage is not required to restrict its evidence to locations in Washington.

17. Mitigation measures imposed by the Council pursuant to RCW 80.50.010 must be "available and reasonable" but are not subject to the constitutional principles of nexus and rough proportionality set forth in *Nollan v. California Coastal Commission*, 483 U.S. 825 (1987) and *Dolan v. City of Tigard*, 512 U.S. 374 (1994).

WAC 463-62 Issues

18. As noted above, WAC 463-62 does not establish standards for the Council's current consideration of Tesoro Savage's ASC. The Council nonetheless evaluated whether Tesoro Savage had demonstrated compliance with the referenced standards for seismicity, noise, fish and wildlife, wetlands, water quality, and air quality.

WAC 463-62 Issues – Seismic

19. WAC 463-62-020 references the state building code as setting the seismicity standard for site certification agreements absent the Council's exercise of substantive SEPA authority. The State Building Code adopts by reference the International Building Code and ASCE 7-10, which establish risk categories for buildings and structures based on their uses and the consequences of structural failure.

20. Based on the seismic risk the VEDT poses to human life and the possibility that a structural failure will create substantial economic impact or mass disruption to day-to-day civilian life, Risk Category III is the correct seismic risk classification for the VEDT.

21. Tesoro Savage has failed to sustain its burden of demonstrating that its Risk Category II design complies with the State Building Code and WAC 462-62-020.

22. Tesoro Savage failed to sustain its burden of demonstrating that it has complied with the State Building Code with regard to the portion of the Area 400 marine terminal that is not subject to ASCE 7 10.

WAC 463-62 Issues – Noise

23. WAC 463-62-030 references the standards in RCW 70.107 and regulations adopted pursuant to it, as setting the noise standard for site certification agreements unless the Council exercises its substantive SEPA authority.

24. Tesoro Savage has demonstrated that noise from construction and operation of the VEDT will comply with the noise standards referenced in WAC 463-62-030.

WAC 463-62 Issues – Fish and Wildlife

25. WAC 463-62-040 references certain requirements for the fish and wildlife habitat provisions in site certification agreements. The rule states the Council's goal to achieve no net loss of habitat functions and values in areas impacted by the VEDT. This requires the Council to look beyond the VEDT site at all impacts resulting from VEDT operations. The rule does not default to existing oil spill planning and prevention regulatory regimes. Based on the dangers presented to fish and wildlife habitat from the likelihood of crude oil spills from the VEDT, from vessels, and trains, along with physical impacts of vessel traffic, the Council

concludes that Tesoro Savage has not satisfied its burden of establishing compliance with WAC 463-62-040.

WAC 463-62 Issues – Wetlands

26. WAC 463-62-050 references requirements for wetlands protection in site certification agreements that apply unless the Council exercises its substantive SEPA authority. The rule describes the Council's intent to achieve no net loss of wetland areas and requires that wetland impacts be avoided wherever possible. Where impacts cannot be avoided, actions must occur such as wetland restoration or creation of new wetlands, enhancement of degraded wetlands, and preservation of high-quality wetlands under imminent threat. There can be no net loss of wetlands unless they provide minimal functions and a mitigation action will clearly result in a significant net gain in wetland functions.

27. Tesoro Savage failed to prove that the VEDT meets this standard.

WAC 463-62 Issues – Water Quality

28. WAC 463-62-060 provides that site certification agreements must require that wastewater discharges from approved facilities comply with applicable state and federal water quality, groundwater quality, and sediment quality requirements unless the Council exercises its substantive SEPA authority.

29. For the purposes of this Order, the Council concludes that Tesoro Savage has complied with such requirements insofar as they pertain to Tesoro Savage's permitted discharges from the VEDT.

30. With regard to non-permitted oil spills, Tesoro Savage invites the Council to consider non-permitted oil spills outside of the ambit of WAC 463-62-060.

31. Tesoro Savage is correct that the permit requirements in WAC 463-62-060 are not the mechanism by which non-routine oil spills are addressed. WAC 463-62-060 does not limit the Council's current consideration of unpermitted oil spills associated with the VEDT.

32. Tesoro Savage is incorrect that existing oil spill planning and prevention regimes are the sole mechanism for addressing non-permitted oil spills.

WAC 463-62 Issues – Air Quality

33. WAC 463-62-070 mandates that site certification agreements must require that air emissions from energy facilities comply with applicable state air quality laws and regulations promulgated pursuant to the Washington State Clean Air Act, RCW 70.94.

34. For the purpose of this Order, the Council concludes that Tesoro Savage has

demonstrated compliance with air permitting requirements.

35. Tesoro Savage has not, however, demonstrated that those requirements pertain to emissions from mobile sources or to GHG emissions associated with the VEDT.

Contested Legal Issues – Seismic issues

36. Tesoro Savage has failed to prove that the VEDT at this location is designed to adequately protect the public interest (including life, health, property, and the environment) from a significant risk of a seismic event causing structural failure.

Contested Legal Issues – Operational Safeguards

37. Tesoro Savage has met its burden of proving that routine operational and site security procedures at the VEDT adequately protect the public interest.

Contested Legal Issues – Rail route operations

38. Tesoro Savage has failed to prove that operations along the rail corridor will adequately protect the public interest (including life, health, property, and the environment) from a significant risk that a train accident or derailment will cause an oil spill, fire, or other harm.

Contested Legal Issues – At-grade crossings

39. Tesoro Savage has failed to prove that the operation of trains travelling to and from the VEDT will adequately protect the public interest from at-grade crossing blockages in Washington and along the rest of the rail route.

Contested Legal Issues – Vessel Collision at the dock

40. Tesoro Savage has met its burden of proving that the odds of a vessel collision at the dock are so low that such a collision poses no significant risk to the public interest.

Contested Legal Issues – Risk of spills during loading

41. Tesoro Savage has failed to prove that cargo loading operations at the VEDT adequately protect the public interest from oil spills (including spills of significant size) entering the Columbia River.

Contested Legal Issues – Risk of spills during vessel transit

42. Tesoro Savage has failed to prove that vessel transit operations adequately protect the public interest from oil spills (including spills of significant size) entering the Columbia River.

Contested Legal Issues – Ballast water management

43. Tesoro Savage has failed to prove that ballast water management practices adequately protect the public interest (including protecting water quality and aquatic life in the Columbia River from the introduction of invasive species and changes in water salinity and other chemical factors).

Contested Legal Issues – Wake effects – wake stranding of fish

44. Tesoro Savage has failed to prove that increased vessel traffic resulting from the VEDT will adequately protect the public interest by protecting fish from wake stranding.

Contested Legal Issues – Other wake effects

45. Tesoro Savage has met its burden of proving that vessel wakes will not impact shoreline vegetation or contribute to additional shoreline erosion. Minor impacts to the benthic community may occur but it does not appear that such impacts will be long term.

Contested Legal Issues – Protection of Water Quality

46. Tesoro Savage has failed to prove that existing oil spill planning and response efforts adequately protect the public interest by protecting water quality from the impacts of an oil spill into the Columbia River.

Contested Legal Issues – Protection of Wetlands

47. Tesoro Savage has failed to prove that the public interest will be protected from oil spills that significantly impact wetlands.

Contested Legal Issues – Biological and Ecological Impacts of an Oil Spill

48. Tesoro Savage has failed to prove that the public interest will be protected from the biological and ecological impacts of an oil spill.

Contested Legal Issues – VOC and PAH Risks to First Responders and the Public

49. Tesoro Savage has failed to prove that the public interest will be protected from the risk to first responders and the public arising from VOCs and PAHs evaporating from

spilled oil.

Contested Legal Issues – Recovery and the Fishing Economy

50. Tesoro Savage has failed to prove that the public interest will be protected from impacts to the fishing economy, commercial, recreational, and Tribal commercial and cultural fishing activities.

Contested Legal Issues – Land Use

51. Pursuant to RCW 80.50.100 and RCW 80.50.120, the Council is not bound by Vancouver's Comprehensive Plan, subarea plans, and zoning ordinances although the Council may elect to consider the provisions of such documents.

52. The Council's prior determination in Order 872 (Order Determining Land Use Consistency) that the VEDT site is consistent and in compliance with certain narrowly circumscribed portions of Vancouver's Comprehensive Plan and zoning ordinances is not dispositive of whether the VEDT complies with the portions of Vancouver's Comprehensive Plan, subarea plans, or zoning ordinances that are not within the scope of Order 872 or whether it would have negative effects on local public resources, and human populations and resources in the vicinity of the facility.

53. Tesoro Savage has failed to prove that the VEDT is designed to adequately protect the public interest (including human life, safety, and the environment) from a significant risk of a seismic event causing structural failure and, as a corollary, has therefore failed to prove that the VEDT is consistent with the public interest articulated in Vancouver Comprehensive Plan Policy EN-11, Hazard Areas.

54. The Council's land use analysis may include consideration of impacts to the public interest along the rail corridor. The Council's consideration of on- and off-site use impacts is not restricted by the contents of local land use planning documents or the way they may have traditionally been applied by some land use planners.

55. Tesoro Savage has failed to prove that the VEDT and operations along the rail line will adequately protect the public interest articulated in Vancouver land use plans and zoning ordinances, and local interests, as follows:

- Strategic Plan Goals 1 and 7 provisions for safe infrastructure and utilities, and strengthened connections to the Columbia River and waterfront are not met by the VEDT.

- Comprehensive Plan goals CD-6 (Neighborhood livability).

- CD-9 (Compatible uses).

- CD 10 (Complementary uses).

- CD-15 (Public Health and the built environment) and CD-16 (Sustainability).

- EN-3 (Energy conservation).
- EN-6 (Habitat).

- EN-7 (Endangered species).

- EN-11 (Hazard Areas).

Contested Legal Issues – Other Communities' Interests

56. Tesoro Savage has failed to prove that operations along the rail line will adequately protect the public interest from the risk that an oil spill in Washougal will contaminate Washougal primary wellhead and main water source.

57. Tesoro Savage has failed to prove that operations along the rail line will adequately protect the public interest from the risk that a derailment on the elevated track through Spokane's urban core will cause significant impacts to life, health, property, and the environment.

58. Tesoro Savage has failed to prove that operations along the rail line will adequately protect the public interest from harm to Spokane's water supply.

59. Tesoro Savage has failed to prove that operations at the VEDT, along the vessel route, and along the rail line will adequately protect the public interest from the risk to Tribal cultural and economic interests.

Contested Legal Issues – Jail Work Center

60. Tesoro Savage has failed to prove that operations at the VEDT will adequately protect the public interest from risks to the Clark County Jail Work Center.

Contested Legal Issues – Risk to Workers at the Port

61. Tesoro Savage has failed to prove that operations at the VEDT will adequately protect the public interest from risks to workers at the Port, including ILWU Local 4 members.

Contested Legal Issues – Emergency Response Capabilities

62. Tesoro Savage has failed to prove that operations at the VEDT and along the rail line will adequately protect the public interest in adequate emergency response capability environment.

Contested Legal Issues – Socioeconomic Impacts

63. Tesoro Savage has met its burden of demonstrating that the VEDT will benefit the public interest by having positive economic impacts including increased jobs, Port revenues, tax revenues during construction and operation, and expenditures for other goods and services resulting from this increased economic activity.

64. Tesoro Savage has failed to prove that the VEDT will adequately protect the public interest from the negative economic impacts of property value reductions along the rail corridor; the business impacts of increased vehicle delays at at-grade train crossings; and the significant costs resulting from oil spills.

Contested Legal Issues – Environmental Justice Impacts

65. Tesoro Savage has failed to prove that operations at the VEDT and along the rail line will adequately protect the public interest in protecting the Fruit Valley Neighborhood, Tribal fishers, and vulnerable populations such as those at the Jail Work Center, schools, assisted living facilities, and childcare centers from disproportionate adverse impacts.

Contested Legal Issues – Air Quality

66. Tesoro Savage has met its burden of proving that the VEDT is subject to a minor permit (NOC) to address stationary emissions from the VEDT.

67. Tesoro Savage has met its burden of proving that emissions from the VEDT are consistent with the public interest insofar as they comply with ambient air quality standards when looking at the results for both the criteria pollutants and the TAPs from stationary sources.

68. Tesoro Savage has failed to prove that emissions from mobile sources will protect the public interest from health impacts to the Fruit Valley Neighborhood, workers and inmates at the Jail Work Center, and populations along the rail line.

Contested Legal Issues – Greenhouse Gas Emissions

69. Tesoro Savage has failed to prove that its current GHG mitigation efforts are consistent with the public interest because RCW 70.235.020 requires reductions in GHG emissions from all sources in Washington, not just stationary industrial sources.

Contested Legal Issues – Noise

70. Tesoro Savage met its burden of proving that noise from the VEDT will not negatively impact the public interest so long as Tesoro Savage limits construction activity to between the hours of 7:00 a.m. and 8:00 p.m.

Contested Legal Issues – Need for the VEDT

71. Tesoro Savage has failed to prove that the need for the VEDT is anything other than low.

Contested Legal Issues – Financial Assurances

72. Tesoro Savage has met its burden of proving that it will have care and custody of the crude oil only after it enters the VEDT.

73. Tesoro Savage has failed to prove that adequate financial assurances from the VEDT, BNSF, vessels owner, or any other source are available to protect the public interest by timely and fully paying for losses to public resources or injuries to life, safety, property, or environment caused by VEDT operations or related activities such as rail and vessel operations.

74. The benefits of the VEDT over its approximately 50-year lifespan are out-weighted by its intrinsic unavoidable risks.

Constitutional Federalism Issues

75. The emphasis of the Council's governing law is on siting energy facilities safely and without undue detriment to the public, and not on regulating railroads or vessels. A state is not precluded by the principles of constitutional federalism from denying to permit the location of a facility at a place that poses numerous dangers to the public, the environment, and a state's resources because the product posing those dangers would come to the facility by train and leave by vessel.

76. Pursuant to the Commerce Clause, Congress enacted the Federal Rail Safety Act and the Interstate Commerce Commission Termination Act.

77. Tesoro Savage has met its burden of proving that it is not a rail carrier, a railroad, or a rail operator and that the VEDT is not a rail facility.

78. Tesoro Savage has failed to prove that the Interstate Commerce Commission Termination Act or the Federal Rail Safety Act preempt the Council from considering potential impacts arising from rail transport to and from the VEDT.

79. Tesoro Savage has failed to prove that the Interstate Commerce Commission Termination Act or the Federal Rail Safety Act preempt the Council from recommending that the Governor reject Tesoro Savage's ASC.

80. Tesoro Savage has failed to prove that the Interstate Commerce Commission Termination Act or the Federal Rail Safety Act preempt the Governor from rejecting Tesoro

Savage's ASC.

81. Tesoro Savage has failed to prove that rejection of Tesoro Savage's ASC will impact nationwide freight rail system operations in any way.

82. Tesoro Savage has failed to prove that Council's action or a gubernatorial denial of Tesoro Savage's ASC has the effect of managing or governing rail transportation.

83. Tesoro Savage has failed to prove that Council's action or a gubernatorial denial of Tesoro Savage's ASC has anything more than a remote or incidental effect on rail transportation.

84. Tesoro Savage has failed to prove that a Federal Rail Safety Act rule or order substantially subsumes the subject matter of the Council's action or a gubernatorial denial of Tesoro Savage's ASC.

85. Tesoro Savage has failed to prove that Council's action or a gubernatorial denial of Tesoro Savage's ASC is not necessary to eliminate or reduce an essentially local safety or security hazard.

86. Tesoro Savage has failed to prove that Council's action or a gubernatorial denial of Tesoro Savage's ASC is incompatible with a federal law, regulation or order.

87. Tesoro Savage has failed to prove that the Council's action or a gubernatorial denial of Tesoro Savage's ASC unreasonably burdens interstate commerce.

88. Tesoro Savage has failed to prove that the Ports and Waterways Safety Act or the Oil Pollution Act preclude the Council's action or a gubernatorial denial of Tesoro Savage's ASC.

89. Tesoro Savage has failed to prove that the Ports and Waterways Safety Act or the Oil Pollution Act preclude the Council from considering the impacts from increased vessel traffic associated with the VEDT, including impacts such as wake stranding.

90. Tesoro Savage has met its burden of proving that it is neither a vessel owner nor a vessel operator.

91. Tesoro Savage has failed to prove that the Council's action or a gubernatorial rejection of Tesoro Savage's ASC will impact vessel operations in any way.

Balancing

92. In accordance with RCW 80.50.010, in balancing the pressing need for increased energy facilities against the requirement to ensure, through available and reasonable

methods, that the location and operation of energy facilities will produce minimal adverse effects on the environment, the ecology of the land and its wildlife, and the ecology of state waters and their aquatic life, the Council concludes that the VEDT's contribution to the demand for energy facility location and operation does not outweigh the negative impacts on the broad interests of the public.

93. The VEDT would contribute to the provision of energy resources for the public by supplying crude oil to refineries in the West Coast region, along with providing jobs, tax revenues, and payments to the Port, but these benefits are outweighed by potentially catastrophic and uncompensated impacts to life, safety, property, and the environment.

94. The outcome of the Council's balancing analysis remains unchanged regardless of whether the Council balances need against all identified impacts to the public interest, or whether the Council excludes from its analysis impacts to the public interest that Tesoro Savage contends implicate constitutional federalism principles and impacts to the public interest that Tesoro Savage contends cannot be considered absent the Council's exercise of substantive SEPA authority.

95. In accordance with RCW 80.50.010, the Council concludes that, based on the evidence in the adjudication record, Tesoro Savage has failed to meet its burden of establishing by a preponderance of the evidence that the Port of Vancouver is an appropriate location for siting its proposed Vancouver Energy Distributional Terminal.

Any finding of fact that is deemed to be a conclusion of law is adopted as such.

Based on the analysis in this Order, the record, the foregoing Findings of Fact and Conclusions of Law, the Council issues the following:

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VI. ORDER

Based on the analysis contained in this Order, its findings of fact and conclusions of law, and the record in this matter, the Council issues the following Order:

A. The Council hereby recommends that the Governor reject Application No. 2013-01.

B. The Council orders that this Order be forwarded to the Council for consideration as part of the Council's overall review of Application No. 2013-01 that will result in a recommendation to the Governor.

DATED and effective at Olympia, Washington, the 19th day of December, 2017.

Roselyn Marcus

Roselyn Marcus, Interim Chair

Dennis Moss, Utilities and Transportation Commission

Roselyn Marcus for Joe Stohr

Joe Stohr, Department of Fish & Wildlife

Roselyn Marcus for Dan Siemann

Dan Siemann, Department of Natural Resources

Cullen Stephenson, Department of Ecology

Jaime Rossman

Jaime Rossman, Department of Commerce

Ken Stone, Department of Transportation

Bryan Snodgrass, City of Vancouver

Greg Shafer, Clark County

APPENDIX A

PUBLIC COMMENT

RCW 80.50.090(3) requires the Council's Administrative Procedure Act's adjudicative proceeding to include a session at which "any person shall be entitled to be heard in support of or opposition to the application for certification." The Council held this session on the afternoon of the last day of the adjudicative hearing and the public comments it received became a part of the adjudicative proceeding record. The session was held in on July 29, 2016, at 1:00 p.m. at Clark College at Columbia Tech Center in Vancouver, WA. At this session, 68 people provided comment, either as the representative of a group or on his or her own behalf. Of those providing comment, 33 people supported the application while 35 people expressed opposition to the application. Regardless of the position expressed, in accordance with the instructions given by the administrative law judge, all comments were related to the evidence that had been presented during the adjudicative process.

The comments in support of the application can be summarized into distinct categories. Comments focused on the:

- Rebuttal of testimony by Susan Harvey. Comments expressed concern about the accuracy of Ms. Harvey's testimony regarding maritime safety on the Columbia River. They raised doubt about the risks raised from previous incidents elsewhere and whether they are true comparators to that which will occur if the application is approved. They dispute the safety risks raised and provided information on current practices, vessel response plan, and maritime fire safety plan.
- Number and types of jobs that would be created to build and operate the facility and the need for these jobs in this community. There were also comments on the additional jobs that would be created in the community to support the facility once it was operational.
- Economic benefits to the community. These benefits come from additional jobs for skilled craft labor, and additional economic activity from those newly employed by Tesoro Savage for the building and operation of the facility. There will also be increased tax collection from this activity.
- Continued need for oil, despite the direction to reduce oil consumption. This project will decrease dependency on foreign oil, on the transportation of foreign oil across the Pacific Ocean. Because Bakken crude is a lighter oil with less carbon intensity, the project will also reduce the carbon impact.

The comments in opposition to the application can also be summarized into distinct categories. Comments focused on the:

- Risks associated with a fire, whether at the terminal, along the rail route, or on the water. The damage to the environment, wildlife and fish, and property damage is a concern both as it relates to the damage and in a regards to the costs associated with a fire event. There is also a concern regarding the ability to respond to such an emergency.

- Significant concern about safety on the water, risk of an oil spill, and resultant damages to the water quality and the sea life. There is no ability to reduce the risk to an acceptable level.
- Concern regarding rail safety (derailment) and resultant damages from a rail incident—from an oil spill to a wildfire.
- There is significant concern about the health hazards due to air pollutants from the facility and along the rail route. There were comments regarding the environmental injustice regarding these health risks, and the disproportionate impact on low income and minority neighborhoods.
- There were many comments regarding incompatibility of the project with the City of Vancouver's vision and long term planning for the downtown and waterfront.

The comments generally mirrored the testimony of both the Proponents and Opponents to the project. It was evident that the public took considerable time and effort to prepare their comments and that the comments reflected firmly held beliefs from both sides.

Appendix B – Witness List
Case No. 15-001
Tesoro Savage LLC – Vancouver Energy Distribution Terminal

	Proponents' Witnesses	Sponsoring Party	Date of Appearance
1	Ames, Ken	TSS	July 6, 2016 & PFT
2	Barkan, Christopher	TSS	July 27, 2016 & PFT
3	Bayer, Marc	TSS	June 29, 2016 & July 26, 2016 & PFT
4	Carrico, Brian	TSS	June 28, 2016 & PFT
5	Casey, Keith	TSS	July 11, 2016
6	Challenger, Gregory	TSS	July 7, 2016 & July 26, 2016 & PFT
7	Corpron, Dave	TSS	June 28-29, 2016 & July 28, 2016
8	Dunn, Brian	TSS	July 11, 2016 & PFT
9	Gibbs, Russ	TSS	July 21, 2016 (telephone) & PFT
10	Guthrie, Larry	POR	July 6, 2016 & PFT
11	Hack, John	TSS	July 6, 2016 & PFT
12	Hansen, Eric	TSS	June 29, 2016 & PFT
13	Haugstad, Eric	TSS	July 5, 2016 & PFT
14	Hollingsed, Michelle	TSS	July 7, 2016 & July 28, 2016
15	Kaitala, Dava	TSS	July 6, 2016 & PFT
16	Larrabee, Jared	TSS	June 27-28, 2016 & July 28, 2016
17	McDougal Jr. Randall	TSS	June 29, 2016
18	O'Mara, Dennis	TSS	July 5, 2016 & PFT
19	Reese, Jo	TSS	July 26, 2016 & PFT
20	Rhoads, Greg	TSS	July 11, 2016 & July 28, 2016 & PFT
21	Roach, Brad	TSS	June 27, 2016 & July 28, 2016 & PFT
22	Rohrbach, Mark	TSS	June 30, 2016 & PFT
23	Sawicki, David	POR	July 5, 2016 & PFT
24	Schatzki, Todd	TSS	June 30, 2016 & PFT
25	Shafar, Daniel	TSS	June 29, 2016 & PFT
26	Shanahan, Matthew	TSS	June 30, 2016 & PFT
27	Smith, Alastair	POR	June 27, 2016
28	Taylor, Elliott	TSS	July 7, 2016 & July 26, 2016 & PFT
29	Thomas, J Kelly	TSS	July 5, 2016 & July 26, 2016 & PFT

	Opponents' Witnesses	Sponsoring Party	Date of Appearance
30	Appleton, Jim	VAN	July 12, 2016
31	Blackburn, Robert	VAN	July 13, 2016 & PFT
32	Brigham, Kathryn	TRB	July 21, 2016 & PFT
33	Broncheau, Michael	TRB	July 25, 2016 & PFT
34	Chipkevich, Robert	VAN	July 12, 2016 & PFT
35	Clary, Tyler	VAN	July 14, 2016 & PFT
36	Dick, Roger	TRB	July 22, 2017 & PFT
37	Ellis, Stuart	TRB	July 21, 2016 & PFT
38	English, Eric	ENV	July 25, 2016 & PFT
39	Fanning, Elinor	CRK	July 18, 2016 & PFT
40	Garcia, Linda	CRK	July 21, 2016
41	Goodman, Ian	CRK	July 19, 2016 & PFT
42	Grady, Matthew	CWF	July 14, 2016
43	Harvey, Susan	CRK	July 12, 2016 (Video) & July 20, 2016 (Telephone) & PFT
44	Hicks, Mitchell	TRB	July 25, 2016 & PFT
45	Hildebrand, Michael	SPO/VAN	July 13, 2016 & SPO- PFT & VAN- PFT

	Opponents' Witnesses	Sponsoring Party	Date of Appearance
46	Holmes, Eric	VAN	July 14, 2016 & PFT
47	Holmes, James	CLK	July 25, 2016 & PFT
48	Huber, Audie	TRB	July 21, 2016 & PFT
49	Johnson, Jerry	CWF	July 20, 2016 & PFT
50	Johnson, Robert W	DNR	July 19, 2016 & PFT
51	Johnson, Scott	VAN/CLK	July 19, 2016 & PFT
52	Lester, Michael S	VAN	July 18, 2016 & PFT
53	Lopossa, Ryan	VAN	July 12, 2016 & PFT
54	Lumley, Babtist Paul	TRB	July 25, 2016 & PFT
55	Molina, Joseph	VAN	July 14, 2016 & PFT
56	Niemi, Ernie	CRK	July 20, 2016
57	Parker, Blaine	TRB	July 21, 2016 & PFT
58	Penney, Zachary	TRB	July 22, 2016 & PFT
59	Rice, Stanley	TBR	July 22, 2016 & PFT
60	Sahu, Ranajit	CRK	July 20, 2016 & PFT
61	Sanchey, Elizabeth	TRB	July 22, 2016
62	Schaeffer, Brian	SPO	July 14, 2016 & PFT
63	Settler, Randy	TRB	July 22, 2016
64	Slockish, Jr. Wilbur	TRB	July 22, 2016
65	Smith, Jared	CRK	July 20, 2016
66	VandenHeuvel, Brett	CRK	July 18, 2016
67	Walsh, Timothy	DNR	July 19, 2016 & PFT
68	Wartman, Joseph	CRK	July 18, 2016 & PFT
69	Wechner, David	CRK	July 25, 2016 & PFT

	Witnesses	Sponsoring Party	Prefiled Testimony Only
70	Bennion, Norman	TSS	PFT
71	Butler, Stephanie	TSS	PFT
72	Earle, Christopher	POR	PFT
73	Grette, Glenn	TSS	PFT
74	Gunderson, Daniel	TSS	PFT
75	Hale, Jeffrey	TSS	PFT
76	McMahon, Scott	TSS	PFT
77	Nash, Nicholas	TSS	PFT
78	Olavson, Lars	TSS	PFT
79	Roscoe, Daniel	TSS	PFT
80	Shepsis, Vladimir	TSS	PFT
81	Wallace, Kristen	TSS	PFT
82	Atkins, Chuck	CLK	PFT
83	Bishop, Richard	CLK	PFT
84	Brigham, Robert	TRB	PFT
85	Einberger, Carl	WSH	PFT
86	James, Frank	CRK	PFT
87	Kegley, Daniel	SPO	PFT
88	Millar, Fred	CRK	PFT
89	Monaghan, Dan	WSH	PFT
90	Peterson, Eric	CLK	PFT
91	Senter, Wayne	VAN	PFT

Exhibit Number	Party	Description/Title
Exhibit 0001	PCE	Application May 2016.
Exhibit 0005	PCE	Applicant Response to EFSEC DEIS Data Request 1.
Exhibit 0006	PCE	Aplt Response to EFSEC DEIS Data Request 1/28/15.
Exhibit 0007	PCE	Aplt Clarifications regarding in-water work window.
Exhibit 0008	PCE	Aplt Response to EFSEC DEIS Data Request 2/5/15.
Exhibit 0009	PCE	Aplt Response to request for additional info 2/5/15.
Exhibit 0010	PCE	Aplt Response to Data Request from 2/11/15 - Wetlands.
Exhibit 0011	PCE	Aplt Response to Data Request from 2/23/15.
Exhibit 0012	PCE	Aplt Response to Data Request from 2/26/15.
Exhibit 0013	PCE	Aplt Response to Data Request from 2/27/15 401 Cert.
Exhibit 0014	PCE	Aplt Response to Data Request from 2/27/15 NPDES.
Exhibit 0015	PCE	Aplt Response to Data Request from 3/2/15.
Exhibit 0017	PCE	Aplt Response to Data Request from 3/10/15.
Exhibit 0018	PCE	Aplt Response to Data Request from 4/1/15 Proposal Description.
Exhibit 0020	PCE	Aplt Response to Data Request from 4/17/15.
Exhibit 0022	PCE	Aplt Response to Data Request from 5/12/15.
Exhibit 0024	PCE	Aplt Response to Data Request from 6/10/15.
Exhibit 0025	PCE	Aplt Supplemental Information Regarding Vessels 6/16/15.
Exhibit 0026	PCE	Aplt Response to Data Request from 7/27/15 - Berm Size.
Exhibit 0027	PCE	Aplt Response to Data Request from 8/6/15 Seismic Design Area 300.
Exhibit 0028	PCE	Aplt Response to 8/6/15 Ltr NPDES Permit Rail Car Exterior Washing - 8/31/16.
Exhibit 0029	PCE	Aplt Response to 8/6/15 Ltr NPDES Permit - 10/15/15.
Exhibit 0031	PCE	Contaminated Media Management Plan, 8/4/15.
Exhibit 0047	PCE	NPDES Premit Engineering Report 10/15/15.
Exhibit 0052	PCE	Ecology, Clark/Cowlitz Geographic Response Plan Oct. 2015.
Exhibit 0053	PCE	Ecology, Lower Columbia River GRP Oct. 2015.
Exhibit 0054	PCE	Ecology, Middle Columbia River Bonneville Pool Area GRP Oct. 2015.
Exhibit 0055	PCE	Ecology, Middle Columbia River Dalles Pool Area GRP Oct. 2015.
Exhibit 0056	PCE	Ecology, Middle Columbia River John Day Pool Area GRP Oct. 2015.
Exhibit 0057	PCE	Ecology, Middle Columbia River McNary Pool Area GRP Oct. 2015.

Exhibit Number	Party	Description/Title
Exhibit 0058	PCE	Ecology, Spokane River GRP Chapter 2, July 2011.
Exhibit 0059	PCE	Revised Joint Aquatic Resources Permit Application Form July 1, 2015.
Exhibit 0063	PCE	US Fish & Wildlife Concurrence Letter 3/16/2016.
Exhibit 0066	PCE	BergerABAM, Revised Biological Evaluation, Vancouver Energy Project Aug. 2015.
Exhibit 0101	TSS	Ramboll Environ Memorandum, Vancouver Energy DEIS Review-Calculations to Consider Construction Noise for DEIS, Jan. 11, 2016.
Exhibit 0102	TSS	DEIS Conclusion Summary Table.
Exhibit 0103	TSS	Oil Properties.
Exhibit 0104	TSS	Oil Evaporation and Density Changes.
Exhibit 0105	TSS	ADIOS Model Results.
Exhibit 0106	TSS	Summary of Oil Properties & Adverse Effects.
Exhibit 0107	TSS	ESI Shoreline Types.
Exhibit 0108	TSS	March Recovery Studies.
Exhibit 0109	TSS	T &E Species Summary Information.
Exhibit 0110	TSS	BNSF's Comments in Response to Publication of Draft Environmental Impact Statement, TSDT.
Exhibit 0111	TSS	BNSF Grade Crossing Safety Brochure.
Exhibit 0112	TSS	WA DOT Response to W A State Dept. Fish & Wildlife comments on the Pacific NW Rail Corridor Program Env'l Assessment.
Exhibit 0113	TSS	BNSF Rail Safety Presentation.
Exhibit 0114	TSS	Technical Report: At-Grade Rail Crossing Analysis for TSDT May 12, 2016.
Exhibit 0115	TSS	Plan Review Comment Form, Letter from Golder Associates, 10/30/15.
Exhibit 0116	TSS	Grette Associates, Wake Stranding in the lower Columbia River 2016.
Exhibit 0117	TSS	Potential Wake Stranding Locations in the Lower Columbia River as Predicted by Pearson et al (2008).
Exhibit 0118	TSS	Facility Siting Study and Quantitative Risk Assessment.
Exhibit 0119	TSS	BakerRisk Letter dated Jan. 22, 2016.
Exhibit 0120	TSS	Quantitative Vessel Traffic Risk Assessment, Jan. 2016.
Exhibit 0121	TSS	Vessel Traffic Risk Impact Analysis & Vessel Traffic Risk Assessment Sept. 2014.
Exhibit 0122	TSS	May 6, 2016 Letter from Kelly Flint to Steven Posner, EFSEC.
Exhibit 0123	TSS	Christopher P. L. Barkan, M.Rapik Saat, and Manuel Martin Ramos, "Petroleum Crude OilUnit Train Transportation Risk Analysis: Vancouver Energy Project.

Exhibit Number	Party	Description/Title
Exhibit 0124	TSS	Photographs of Cross Section.
Exhibit 0125	TSS	Photographs of Cross Section.
Exhibit 0126	TSS	USFWS ESA Letter of Concurrence.
Exhibit 0127	TSS	Principles of Operation and Tenets of Safe Operation.
Exhibit 0128	TSS	Vetting Cleasrance Request.
Exhibit 0129	TSS	Map by the U.S. Energy Information Administration that depicts the PADDs.
Exhibit 0130	TSS	Map by the Canadian Association of Petroleum Producers Showing Pipeline Infrastructure.
Exhibit 0131	TSS	Lawrence Livermore Nation Laboratory (LLNL) Estimated California Energy Use in 2012; Est Alaska Energy Use, Arixona Energy Use, Est Hawaii Energy Use, Est Nevada Energy EST Oregon Energy, Est Washington Energy, Est U.S,. Energy Use in 2012; LLNL Estimated U.S. Energy Use in 2013; LLNL U.S. Energy Use in 2014; LLNL U.S. Energy Use in 2015.
Exhibit 0132	TSS	California Vehicle Miles Traveled, Billion Miles/Year.
Exhibit 0133	TSS	PADD 5 Vehicle Miles Traveled.
Exhibit 0134	TSS	Vehicles Per 1000 People - US.
Exhibit 0135	TSS	Western US (PADD 5) Transportation Fuel Demand, MBPD.
Exhibit 0136	TSS	PADD 5 Growth Outlook, MBPD/Historical Demand.
Exhibit 0137	TSS	U.S. Transportation Sector Energy Demand, Oil Equivalents.
Exhibit 0138	TSS	MIT Study re Battery Technology.
Exhibit 0139	TSS	Sales by Transaction Price 2004 - 2014.
Exhibit 0140	TSS	California New Car Dealers Association, Hybrid & Electric Vehicle Market Share, Feb. 2016.
Exhibit 0141	TSS	Graph, Infrastructure Hurdles; Home Charging - Lack of Charging Stations.
Exhibit 0142	TSS	Light Duty Vehicle Stock, MM Vehicles, 2012 - 2040.
Exhibit 0143	TSS	California and Alaska Crude Oil Production, MBPD.
Exhibit 0144	TSS	ANS Production/ WC Refining System.
Exhibit 0145	TSS	Map Showing Gloval Crude Ouk Reserves.
Exhibit 0146	TSS	EIA Outlook - Shale Oil Production, MMBPD.
Exhibit 0147	TSS	Summary of Inspections.
Exhibit 0148	TSS	EPA & USCG Defined Petroleum-Based Pil Groups.
Exhibit 0149	TSS	Ranges of Physical Properties for Example Oil Type.
Exhibit 0150	TSS	Tank & Flume Experimental Results for Changesin Wathered Oil Density.

Exhibit Number	Party	Description/Title
Exhibit 0151	TSS	ADIOS Modeling Results for Bakken and Dilbit Scenarios.
Exhibit 0152	TSS	Summary of Fate & Behavior and Potential Adverse Effects on Emvironment for Major Oil Types.
Exhibit 0153	TSS	WDOE Map of PRC Equipment.
Exhibit 0154	TSS	Att. I - DEIS Appendix D.4, Section 7.1.8 Excerpts.
Exhibit 0155	TSS	Tables & Figures to Schatzki Testimony.
Exhibit 0156	TSS	Primary Impacts Report, July 28, 2014.
Exhibit 0157	TSS	Secondary Impacts Report, Sept. 5, 2014.
Exhibit 0158	TSS	Statistical Analysis of Potential Property Value Impacts from Vancouver Energy May 13, 2016.
Exhibit 0159	TSS	Technical Report: Lower Columbia River Morphology & Fish Stranding.
Exhibit 0160	TSS	Hayward Baker Ground Improvement Design Report 1.
Exhibit 0161	TSS	Project Narrative for Land Use Consistency Review.
Exhibit 0162	TSS	Appendix I.1 of the ASC (Pre-Application).
Exhibit 0163	TSS	Pre-Application Conference Sign-In Sheet.
Exhibit 0164	TSS	Pre-Application Conference Report.
Exhibit 0165	TSS	Receipt for Pre-Application.
Exhibit 0166	TSS	City Council's Agenda (Dec 9, 2013).
Exhibit 0167	TSS	Staff Determination of Consistency and Compliance with Land Use Plans & Zoning Ordinance (Draft Staff Report).
Exhibit 0168	TSS	City of Vancouver Resolution M-3821.
Exhibit 0169	TSS	City Zoning Map.
Exhibit 0170	TSS	Memorandum, City of Vancouver Management Program Compliance.
Exhibit 0171	TSS	BNSF Route Map.
Exhibit 0172	TSS	Aerial Photograph of BNSF rail line at SE 87th Avenue.
Exhibit 0173	TSS	Figure 2-2 and 2-3 to the VCCV DSEIS.
Exhibit 0174	TSS	Chapter 5 of VCCV FSEIS.
Exhibit 0175	TSS	Attachment A to City of Vancouver Ordinance M-3833.
Exhibit 0176	TSS	Appendix D to the VCCV FSEIS.
Exhibit 0177	TSS	Figure CD 1 to Vol 2 Design Guidelines for the Type IV Planned Development, Subdivision, Shoreline Substantial Development, Conditional Use and Variance Permits, and Critical Areas Permit: Columbia Waterfront LLC Vancouver Waterfront Development.
Exhibit 0178	TSS	Page from SW Washington Regional Transportation Council website (2015 TAP Applications and Selections).

Exhibit Number	Party	Description/Title
Exhibit 0179	TSS	Photograph of Beacon Rock State Park.
Exhibit 0180	TSS	Pages from Pacific Crest Trail Association and WA State Parks websites.
Exhibit 0181	TSS	BergerABAM Memorandum Regarding Columbia River Anticipated Vessel Traffic.
Exhibit 0182	TSS	Oregon LNG Letter to FERC.
Exhibit 0183	TSS	Pages 2-15 and 2-39 from Kalama Manufacturing and Marine Expert Facility DEIS.
Exhibit 0184	TSS	Fact Sheet: Gas to Methanol Facility at Port of St. Helens.
Exhibit 0185	TSS	Pages from CRITFC Website.
Exhibit 0188	TSS	GRI Report.
Exhibit 0190	TSS	Vancouver Energey DEIS Comment Letter.
Exhibit 0191	TSS	Vancouver Energy- NOAA Maps June 1, 2016.
Exhibit 0194	TSS	The Fire Protection Research Foundation, One Batterymarch Park, Quincy, MA- Fire Pump Field Data Collection and Analysis, Final Report (April 2012).
Exhibit 0195	TSS	American Fuel & Petrochemical Manufactures, A survey of Bakken Crude Oil Charactieristics Assembled for the US Department of Transportation, Prepared by Dangerous Goods Transport Consulting (May 14, 2014).
Exhibit 0196	TSS	U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration, Emergency Response Guidebook (2012).
Exhibit 0197	TSS	Williams Fire & Hazard Control, Bakken Crude Testing (Feb. 27, 2015).
Exhibit 0198	TSS	Treichel, T.T. (2014). RSI-AAR Tank Car Accident Safety Research for Crude Oil and Ethanol Cars. Presentation in: NTSB Forum- Transportation of Crude Oil and Ethanol, 22-23 April2014 Washington, DC. http://www .ntsb. gov/news/ events/ Documents/Panel%201 C Todd%20Treichel.pdf.
Exhibit 0199	TSS	Barkan, C.P.L., C.T. Dick and R. Anderson 2003. Analysis of railroad derailment factors affecting hazardous materials transportation risk. Transportation Research Record; Journal ofthe Transportation Research Board 1825: 64-74.
Exhibit 0200	TSS	Federal Railroad Administration (FRA) Highway-Rail Grade Crossing Accident/Incident Report April 29, 2010.
Exhibit 0201	TSS	Results from a sixteen year study on the effects of oiling from the Exxon Valdez on adult pink salmon returns. Marine Pollution Bulletin 52, 892-899Brannon, E. A Maki, L Moulton, K Parker, 2006 Online publication date: August 1, 2005.
Exhibit 0202	TSS	PM4SAND (Version 3): A Sand Plasticity Model for Earthquake Engineering Applications by R. W. Boulanger & K. Ziotopoulou University of California at Davis.
Exhibit 0203	TSS	Publication: The Deep Mixing Method Masaki Kitazume & Masaaki Terashi CRC Press 2013.

Exhibit Number	Party	Description/Title
Exhibit 0204	TSS	Soil Liquefaction During Earthquakes - Recent Developments Activities & Recreation Center, University of California Oct. 24, 2014.
Exhibit 0205	TSS	Figure: PSH Deaggregation on NEHRP BC rock.
Exhibit 0206	TSS	MFSA Vessel Response Plan, Umbrella Oil Spill Contingency Plan for Covered Vessels, Columbia and Willamette Rivers (Rev. 02) (July 14, 2013).
Exhibit 0207	TSS	Review of the Exxon Valdez Oil Spill Effects on Pink Salmon in Prince William Sound Alaska. Reviews in Fisheries Science E. L. Brannon, et al. Online publication date: Jan. 11, 2012.
Exhibit 0208	TSS	Applicant Letter to Public Works Administration re Application for EFSEC for Waste Discharge Permit May 27, 2016 (civil engineering drawing available upon request).
Exhibit 0209	TSS	BergerABAM Letter to EFSEC, Response to 19 February, 2016 Letter Re Industrial NPDES Permit Application Review May 27, 2016.
Exhibit 0216	TSS	Washougal Pump Station Photos.
Exhibit 0218	TSS	Aerial Photo of Camus/Washougal Area with rail crossings.
Exhibit 0219	TSS	Hydrant Test- Facility Areas 200 & 600.
Exhibit 0220	TSS	Hydrant Test Location Map.
Exhibit 0221	TSS	Keyera LP Gas Facility- StaffReport and Decision, April 16, 2010.
Exhibit 0222	TSS	FEIS for Clark County Jail (vol. I) 1997.
Exhibit 0223	TSS	Transport Canada Report Runaway & Main-Track Derailment July 6, 2013.
Exhibit 0224	TSS	BNSF Railway, Northwest Division, Fallbridge Subdivision, Reference to NW ACP Geographical Response Plan Apr. 8,
Exhibit 0225	TSS	BNSF Railway, Northwest Division, Lakeside Subdivision, Reference to NW ACP Geographical Response Plan Apr. 8, 2
Exhibit 0226	TSS	BNSF Railway, Northwest Division, Scenic Subdivision, Reference to NW ACP Geographical Response Plan Apr. 8, 201
Exhibit 0227	TSS	Powerpoint Slides, BNSF Railway, Fallbridge Subdivision Oil Spill Control Points (CCPs) Apr. 2013.
Exhibit 0228	TSS	Fishing Access Sites.
Exhibit 0229	TSS	Challenger, G., Sergy, G., and Graham, A., 2008. Vegetation Response and Sediment Polycyclic Aromatic Hydrocarbon Attenuation in a Carex marsh in Howe Sound, British Columbia, Canada Following a Spill of Bunker C Fuel Oil. International Oil Spill Conference Proceedings.
Exhibit 0230	TSS	Bauersfeld, K. 1977. Effects of peaking (stranding) of Columbia River dams on juvenile anadromous fishes below The Dalles Dam, 1974 and 1975. State ofWashington Department ofFisheries, Technical Report No. 31. Report to the U.S. Anny Corps of Engineers, Contract DACW 57-74-C-0094.

Exhibit Number	Party	Description/Title
Exhibit 0233	TSS	Ackerman, N.A. 2002. Effects of vessel wake stranding of juvenile salmonids in the Lower Columbia River, 2002-A pilot study. Produced by SP Cramer & Associates, Inc., Sandy, Oregon, for the U.S. Anny Corps of Engineers, Portland District, Portland, Oregon.
Exhibit 0234	TSS	National Marine Fisheries Service, NMFS No. NWR-2013- 10407, Columbia Pacific Bio-Refinery Barge Dock Expansion Biological Opinion (June 8, 2015).
Exhibit 0235	TSS	Environment Canada, 2013. Properties, Composition, and Marine Spill Behaviour, Fate and Transport of Two Diluted Bitumen Products from the Canadian Oil Sands (30 November 2013; rev. April 2014).
Exhibit 0236	TSS	SL Ross, 2012. Meso-scale Weathering of Cold Lake Bitumen/Condensate Blend. Report prepared for Enbridge Northern Gateway. Filed with the National Energy Board, February 6, 2013.
Exhibit 0237	TSS	Pacific Northwest Marine Cargo Forecast Update & Rail Capacity Assessment - Final Report December 2011.
Exhibit 0238	TSS	API Recommended Practice 3000 First Edition September 2014.
Exhibit 0239	TSS	Liu, X., Saat, M.R., Barkan, C.P.L. (2015). Freight-train derailment rates for railroad safety and risk analysis. Accident Analysis and Prevention (under review).
Exhibit 0240	TSS	Liu, X. (2015). Statistical temporal analysis offreight-train derailment rates in the United States: 2000 to 2012. Transportation Research Record 2476, 119-125.
Exhibit 0241	TSS	Noise Study for Port of Vancouver USA, Terminal 5 Development, Access Road Replacement Next to Clark County Jail - Final Report Wilson Ihrig & Associates, April 20, 2011.
Exhibit 0242	TSS	U.S. Army Corps of Engineers, Biological Assessment for the Continued Operations and Maintenance Dredging Program for the Columbia River Federal Navigation Channel (March 2014).
Exhibit 0243	TSS	U.S. Fish and Wildlife Service, Biological Opinion on proposed the Continued Operations and Maintenance Dredging Program for the Columbia River Federal Navigation Channel in Oregon and Washington (2014-2018).
Exhibit 0244	TSS	West Vancouver Freight Access Project Final Environmental Assessment: Appendix L: Socioecomonics & Environmental Justice Discipline Report (July 2009).
Exhibit 0245	TSS	West Vancouver Freight Access Project Schedule 2-4 Final Environmental Assessment May 2010.
Exhibit 0246	TSS	Federal Railroad Administration (FRA) Emergency Order No. 28, Notice No.1 August 7, 2012.
Exhibit 0247	TSS	USDOT Amended & Restated Emergency Restriction/ Probation Order Docket No. DOT-OST-2014-0025 Mar. 6, 2013.
Exhibit 0248	TSS	USDOT Amended & Restated Emergency Restriction/ Probation Order Docket No. DOT-OST-2014-0067 May 7, 2013
Exhibit 0249	TSS	Figure: Distribution of Flammable Liquid Traffic by Population Density

Exhibit Number	Party	Description/Title
Exhibit 0250	TSS	Enhanced Tank Car Design Improves the Safety of Transporting Crude Oil & Alcohol by Rail. Christopher Barkan, Xiang Liu, & M. Rapik Saat TR News 298 June-July-Aug. 2015.
Exhibit 0251	TSS	USACE - Bonneville Dam Emergency Contact.
Exhibit 0253	TSS	Vancouver City Center Vision Subarea Plan FSEIS.
Exhibit 0254	TSS	Columbia Waterfront Development Agreement.
Exhibit 0255	TSS	Staff Report No. 144-09 (10-19-09).
Exhibit 0256	TSS	Staff Report & Recommendation to the Hearing Examiner PRJ2007 00322/SHL2007 00004 (Apr. 4, 2008).
Exhibit 0258	TSS	American Petroleum Institute, Sunken Oil Detection and Recovery Operational Guide (Dec. 2015).
Exhibit 0259	TSS	American Petroleum Institute, Sunken Oil Detection and Recovery Technical Report (Dec. 2015).
Exhibit 0260	TSS	Archaeological Investigations Northwest, Inc., Report No. 3337, Geoprobe Work Plan for the Vancouver Energy Project, Vancouver, Clark County, Washington (Oct. 30, 2014).
Exhibit 0261	TSS	PHMSA Lessons Learned Roundtable Report (July 1, 2014).
Exhibit 0262	TSS	Unit Trains Resource Fact Sheet - May 28 2015.
Exhibit 0263	TSS	Association of American Railroads CPC-1312 (Jan. 27, 2015).
Exhibit 0264	TSS	Security and Emergency Response Training Center Example of mrgency Response Training Available to Local Response Groups.
Exhibit 0265	TSS	Figure: Geographic Risk Contour.
Exhibit 0266	TSS	MMI Countours with Jail Buildings.
Exhibit 0267	TSS	USACE Columbia River Channel Improvement Project: Final Supplemental Integrated Feasability Report and Environmental Impact Statement Jan. 2003.
Exhibit 0268	TSS	Article: Response to the Mobiloil Spill Incident William C. Park, III.
Exhibit 0269	TSS	Fate and Effects of the Mobileoil Spill in the Columbia River (NOAA).
Exhibit 0271	TSS	Figure: U.S. Crude Oil Stock Levels, MBBLS.
Exhibit 0272	TSS	Figure: Foreign Crude Price, $/BBL and Petroluem Consumption, MBBLS/Day.
Exhibit 0273	TSS	Publication: Geotechnical Earthquake Engineering Amplitude - Duration - Frequency Content Steven L Kramer.
Exhibit 0274	TSS	Michelle Hollingsed CV Savage Services Corporation.
Exhibit 0275	TSS	CRREL and SLRoss, 2015 Investigation of the Behavior of Diluted Bitumen and Heavy Conventional Crude Oil Spills, Report to the American Petroleum Institute.
Exhibit 0276	TSS	Taylor E., Challenge, G., Rios, J., Morris, J. McCathy, M.W., and C. Brown. 2014. Dilbit Crude Oil Weathering on Brackish Water; Meso-scale Tests of Behavior and Spill Countermeasures.

Exhibit Number	Party	Description/Title
Exhibit 0277	TSS	NOAA/API Oil Spills in Marshes Planning & Response Considerations (September 2013)
Exhibit 0278	TSS	Summary of Decomissioning Costs June 1, 2016.
Exhibit 0279	TSS	Kristen A. Fuld, Judith A. Chapman, and Jo Reese, Archaeological Investigations Northwest, Inc., Cultural Resource Review for the Tesoro Savage Vancouver Energy Distributio Termianl Project, Vancouver, Clark County, Washington Report No. 3116 (Dec. 9, 2013).
Exhibit 0280	TSS	Department of Commerce "Petroleum Supply and Use in Washington State" (Oct. 2013).
Exhibit 0281	TSS	Washington Research Council 'the Econocmic Contribution of Washingint State's Petroleum Refining Industry in 2013" Dec. 2014.
Exhibit 0282	TSS	U.S. Energy Information Administration PADD5 Transportation Fuels Markets (Sept. 2015).
Exhibit 0283	TSS	Area 0500 transfer Pipelines Plan View - Sections 1,2, 3 Nov. 14, 2014.
Exhibit 0284	TSS	E-Mail from D. Davis to D. Shafar 2013 0520 re Port of Vancouver - Fire Flow & Water System Maps.
Exhibit 0285	TSS	E-Mail from D. Davis to D Shafar 2013 0524 re Hydrant Flow Tests.
Exhibit 0286	TSS	E-mail for G. Hancock to D Shafer 2013 0530 Re Fire Flow Tests.
Exhibit 0287	TSS	Marine Pollution Bulletin "Prolonged recovery of sea otters from the Exxon Valdez oil spill? A re-examination of the evi
Exhibit 0288	TSS	Human and Ecological Risk Assessment "Kille Whale (Iricinus orca) Deaths in Prince William Sound Alaska, 1985 - 199
Exhibit 0289	TSS	Crude Rail Off-Landing Facility - Anacortes.
Exhibit 0290	TSS	Marine Loading Photos.
Exhibit 0291	TSS	Vicinity & Site.
Exhibit 0292	TSS	MFSA Vessel Response Plan Revision 09 - 03/18/2016.
Exhibit 0294	TSS	CV of Kristin Wallace (Wallace Att. A).
Exhibit 0296	TSS	CV of Greg Challenger (Challenger Att. A).
Exhibit 0297	TSS	Impact Risk Category Chart (Challenger Att. B).
Exhibit 0298	TSS	Event Scenarios Used in Impact Analysis (Challenger Att. D).
Exhibit 0299	TSS	Bibliography (Challenger Att. L).
Exhibit 0302	TSS	CV of Brian Dunn (Dunn Att. A).
Exhibit 0305	TSS	CV of Glenn Grette (Grette Att. A).
Exhibit 0307	TSS	Impact Sections from the DEIS Affected by Erroneous Conclusions about Where Vessel Wake Stranding Occurs (Grette Att. E).
Exhibit 0309	TSS	CV of J. Kelly Thomas (Thamos Att. A).
Exhibit 0311	TSS	CV of Dennis O'Mara (O'Mara Att. A).

Exhibit Number	Party	Description/Title
Exhibit 0313	TSS	CV of Eric Hansen (Hansen Att. A).
Exhibit 0316	TSS	CV of Christopher Barkan.
Exhibit 0319	TSS	CV of Daniel Gunderson (Gunderson Att. A).
Exhibit 0322	TSS	CV of Brad Roach (Roach Att. A).
Exhibit 0324	TSS	CV of Elliot Taylor (Taylor Att. A).
Exhibit 0326	TSS	CV of Todd Schatzki.
Exhibit 0328	TSS	CV of Vladmir Shepsis (Shepsis Att. A).
Exhibit 0329	TSS	Nomination Package - Seattle Chapter of ASCE (Shepsis Att. B).
Exhibit 0331	TSS	CV of Mark Rohrbach (Rohrbach Att. A).
Exhibit 0333	TSS	CV of Brian Carrico (Carrico Att. A).
Exhibit 0335	TSS	CV of Matthew Shanahan (Shanahan Att. A).
Exhibit 0337	TSS	CV of Russ Gibbs (Gibbs Att. A).
Exhibit 0339	TSS	CV of Daniel Roscoe (Roscoe Att. A).
Exhibit 0341	TSS	CV of Stephanie Butler (Butler Att. A).
Exhibit 0343	TSS	CV of Norman Bennion (Bennion Att. A).
Exhibit 0345	TSS	CV of Jeffrey Hale (Hale Att. A).
Exhibit 0347	TSS	CV of Scott McMahon (McMahon Att. A).
Exhibit 0349	TSS	CV of Nicholas Nash (Nash Att. A).
Exhibit 0351	TSS	CV of Lars Olavson (Olavson Att. A).
Exhibit 0353	TSS	CV of Greg Rhoads (Rhoads Att. A).
Exhibit 0355	TSS	CV of Ken Ames (Ames Att. A).
Exhibit 0357	TSS	CV of Jo Reese (Att. A).
Exhibit 0359	TSS	CV of Daniel Shafar (Shafar Att. A).
Exhibit 0360	TSS	Reference Source Data (Shafar Att. B).
Exhibit 0361	TSS	Containment Berm.
Exhibit 0362	TSS	Applicant Letter re Additional Seismic Modeling June 7, 2016.
Exhibit 0365	TSS	Geotechnical Aspects of the January 2003 Tecoman, Mexico Earthquake.
Exhibit 0367	TSS	Aerial Photo Depicting Project Vicinity.
Exhibit 0368	TSS	Email Correspondence from Steve Eldred to Eric Haugstad - Mar. 24, 2016.
Exhibit 0369	TSS	Maritime Fire & Safety Association Comment Letter Jan. 22, 2016.

Exhibit Number	Party	Description/Title
Exhibit 0370	TSS	Applicant Response to EFSEC DEIS Data Request No. 10.
Exhibit 0371	TSS	CV of Keith Casey.
Exhibit 0372	TSS	BNSF Northwest Division 2016 Wild Fire Preparedness Plan.
Exhibit 0373	TSS	COV Waterline Improvements.
Exhibit 0374	TSS	Clark Regional Comprehensive Emergency Management Plan.
Exhibit 0375	TSS	Rail Time Indicators, A Review of Rail Traffic Trends & Key Economic Indicators Shaping Demand for Rail Transportat
Exhibit 0376	TSS	Emergency Support Function 10-Hazardous Materials.
Exhibit 1001	POR	Summaries of work experience, qualifications, and licensing of team members at The Sawicki Group, LLC (Attachment to Sawicki Testimony).
Exhibit 1002	POR	Resume of Christopher Earle, PhD ICF International Inc. (Attachment to Earle Testimony).
Exhibit 1003	POR	Photographs Depicting Sites along the Lower Columbia River where wake stranding has been observed by prior investigators (Ackerman 2002 Attachment to Earle Testimony.
Exhibit 1004	POR	Figure 1 and Figure 2 (as revised) from Port of Vancouver USA, Comment Letter on Tesoro Savage Energy Project DEIS (Coleman 2016, Attachment to Earle Testimony).
Exhibit 1005	POR	Résumé of Larry R. Guthrie, to Guthrie Testimony TUV Rheinland Mobility (Attachment to Guthrie Testimony).
Exhibit 1006	POR	Résumé of Jack S. Chislett, P.E., TUV Rheinland Mobility (Attachment to Guthrie Testimony).
Exhibit 1007	POR	Résumé of Cory J. Hogan, TUV Rheinland Rail Sciences, Inc. (Attachment to Guthrie Testimony).
Exhibit 1008	POR	Train Operations Study, Port of Vancouver Conne.ction Track, Final Report, Prepared for HDR Engineering, Inc. by TUV Rheinland Mobility Rail Sciences Division (Feb. 19,2014)(Attachment to Guthrie Testimony).
Exhibit 1009	POR	Port of Vancouver, Schedule 1 Rail Engineering, Operations, and Safety Review, Final Report, Prepared for HDR by TUV Rheinland Mobility Rail Sciences Division (Mar 25, 2014) (Attachment to Guthrie Testmony).
Exhibit 1010	POR	Port of Vancouvsr, T-5 Loop Track Assessment, Final Report, Prepared for Port of Vancouver by TUV Rheinland Mobility, Inc. Rail Sciences Division (May 11, 2016) (Attachment to Guthrie Testimony).
Exhibit 1011	POR	Résumé of Alastair Smith, Chief Marketing/Sales Officer, Port of Vancouver USA.
Exhibit 1012	POR	Aerial Mosaic Photograph of Port of Vancouver USA (Sept. 21 , 2015).
Exhibit 1013	POR	Port of Vancouver USA Facilities Map and Tenant List (May 2016).
Exhibit 1015	POR	Photograph of Old Viaduct Looking East on 6th Street in Vancouver with White Truck in Background.
Exhibit 1017	POR	NOAA Columbia River Navigation Charts (Chart Nos. 18521, 18523, 18524, and 18252).
Exhibit 1018	POR	Overview Chart of Recent Years' Revenue for Port of Vancouver USA (Rating Presentation by Port of Vancouver USA to Standard and Poor's May 17, 2016).

Exhibit Number	Party	Description/Title
Exhibit 1019	POR	2014 Economic Impacts of Port of Vancouver USA Seaport and Non-Maritime Real Estate Tenants - Summary of Results (2014 Economic Impact of the Port of Vancouver USA: Executive Summary, Martin Associates Nov. 10, 2015).
Exhibit 1020	POR	Funding Sources for V/est Vancouver Freight Access Project (Port of Vancouver USA website. May 23, 2016.
Exhibit 1021	POR	Port of Vancouver USA Strategic Plan 2016-2025 (Revised Dec. 2015).
Exhibit 1022	POR	Port of Vancouver USA Waterfront Project Master Plan (Nov. 13, 2015).
Exhibit 1023	POR	Port of Vancouver USA, Compiled Comment Letter on Tesoro Savage Vancouver Energy Project DEIS (Jan. 20, 2016) (Coleman, T.2016, Reference Cited in Earle Testimony).
Exhibit 1024	POR	Columbia River Steamship Operators' Association, Comment Letter on Tesoro Savage Vancouver Energy Proiect DEIS (Jan. 21, 2016).
Exhibit 1025	POR	Merchants Exchange of Portland, Otegon, Comment Letter on Tesoro Savage Vancouver Energy Project DEIS (Jan.22,2016) (Wainwrieht,E.2016, Reference Cited in Earle Testimony).
Exhibit 1026	POR	Pacific Northwest Waterways Association, Comment Letter on Tesoro Savage Vancouver Energy Project DEIS (Jan.22,2016) (Meira, K. 2016, Reference Cited in Earle Testimony).
Exhibit 1027	POR	Washington Public Ports Association, Comment Letter on Tesoro Savage Vancouver Enerqy Proiect DEIS (Jan. 21, 2016).
Exhibit 1028	POR	Ackerman, N.K. 2002. Effects of Vessel Wake Stranding of Juvenile Salmonids in the Lower Columbia River, 2002 - A Pilot Study. Prepared by S.P. Cramer & Associates, Inc. for U.S. Army Corps of Engineers, Portland District, Portland, Oregon, USA (Reference Cited in Earle Testimony).
Exhibit 1029	POR	Bauersfeld, K. 1977. Effects of Peaking (Stranding) of Columbia River Dams on Juvenile Anadromous Fishes Below the Dalles Dam, 1974 and 1975. Prepared by Washington State Department of Fisheries, Technical Report No. 31, for the U.S. Army Corps of Engineers, Portland District, Portland Oregon USA (Reference Cited in Earle Testimony).
Exhibit 1030	POR	Coast and Harbor Engineering.2016. Technical Report, Lower Columbia River Morphology and Fish Stranding (Reference Cited in Earle Testimony).
Exhibit 1031	POR	ENTRIX Inc. 2008. Spatial Analysis of Beach Susceptibility for Stranding of Juvenile Salmonids by Ship Wakes. Final Report. Prepared for the Port of Vancouver (Reference Cited in Earle Testimony).
Exhibit 1032	POR	Grette Associates.2016. Wake Stranding in the Lower Columbia River. Prepared for Vancouver Energy. Wenatchee, WA: Grette Associates (Reference Cited in Earle Testimony).
Exhibit 1033	POR	Hinton, S.A., and Emmett, R.L., 1994. Juvenile Salmonid Stranding in the Lower Columbia River, 1992 and 1993. National Marine Fisheries Service, Northwest Fisheries Science Center, Coast Zone and Estuarine Studies Division, Seattle, V/ashington, USA (Reference Cited in Earle Testimony).

Exhibit Number	Party	Description/Title
Exhibit 1034	POR	MacDonald, N.J. 2003. Numerical Modelling of Coupled Drawdown and Wake. Canadian Coastal Conference (Reference Cited in Earle Testimony).
Exhibit 1035	POR	Maynord, S. 2004. Ship Effects at the bankline of navigation channels. Maritime Engineering 157: 93-100 (Reference Cited in Earle Testimony).
Exhibit 1036	POR	O'Mara, D. and Matuszak, M. 2016 Vancouver Energy 2014 AIS Traffic Analysis, Technical Memo to Vancouver Energy Petroleum Terminal LLC. Katy, TX: Det Norske Verita (U.S.A.), Inc. (Reference Cited in Earle Testimony).
Exhibit 1037	POR	Osborne, P.D. 2003 Dynamics of Whitcomb Flats. Prepared for: Port of Grays Harbor in coordination with the Coastal Communities of Southwest Washington, Edmonds, WA:Pacific International Engineering P:L:C (reference Cited in Earle Testimony).
Exhibit 1038	POR	Pearson, W.H., Skalski, J.R., Sobocinski, K.L., Miller, M.C., Johnson, G.E., Williams, G.D., Southard, J.A., and Buchanan, R.A. 2006. A Study of Stranding of Juvenile Salmon by Ship Wakes Along the Lower Columbia River Using a Before-and-After Design: Before-Phase Results. Prepared for the U.S. Army Corps of Engineers, Portland District, Portland, Oregon, USA (Reference Cited in Earle Testimony).
Exhibit 1039	POR	Pearson, W.H. and Skalski, J.R. 2010. Factors Affecting Stranding of Juvenile Salmonids by Wakes from Ship Passage in the Lower Columbia River. River Research and Applications. DOI: 10.1002/rra. 1397 (Reference Cited in Earle Testimony).
Exhibit 1040	POR	Roegner, G.C., McNatt, R., Teel, D.J., and Bottom, D.L. 2012. Distribution, Size, and Origin of Juvenile Shinook Salmon in Shallow-Water Habitiats of the Lower Columbia River and Estuary, 2002-2007. Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science 4:(1)450-475 (Reference Cited in Earle Testimony).
Exhibit 1041	POR	Roegner, C., Bottom, D., Baptista, A., Campbell, L., Clairborne, A., Fresh, K., Hilton, S., McNatt, R., Simenstad, C., Teel, D., and Zabel, R. 2013. The contribution of tidal fluvial habitats in the Columbia River Estuary to the recovery of diverse salmon ESUs. NMFS Northwest Fisheries Science Center report to the US Army Corps of Engineers (Northwestern Division, Portland District), Seattle Washington (Jan . 2016) (Reference Cited in Earle Testimony).
Exhibit 1042	POR	Templeton, W.J., and Jay, D.A. 2013. Lower Columbia River Sand Supply and Removal; Estimates of Two Sand Budget Components. J. Waterway, Port Coastal, Ocean Eng. 139:383-392 (Reference Cited in Earle Testimony).
Exhibit 1043	POR	Photograph.
Exhibit 1044	POR	Photograph.
Exhibit 1045	POR	Photograph.
Exhibit 1047	POR	Aquatic Lands Management Agreement, Port of Vancouver.

Exhibit Number	Party	Description/Title
Exhibit 1048	POR	Email Correspondence from Kathy Holtby to Donald Olmsted re: DNR-Tesoro Savage Land Lease Notification and T5 O
Exhibit 1501	ENV	Resume of James Holmes, ABT Associates.
Exhibit 1502	ENV	Resume of Eric English, Bear Creek Economics.
Exhibit 1503	ENV	Potential Fishing Impacts and Natural Resource Damages from Worst-Case Discharges of Oil on the Columbia River Report submitted by ABT Associates and Bear Creek Economics.
Exhibit 2001	CLA	MMI Report - Hazard Screening Assessment and Qualtitative Risk Assessment.
Exhibit 2002	CLA	Port of Vancouver Petition for Condemnation and Support Exhibits.
Exhibit 2003	CLA	Clark County Comments on EFSEC Draft Environmental Impact Statement (DEIS).
Exhibit 2004	CLA	Clark County Hazard Identification Vulnerability Analysis.
Exhibit 2005	CLA	North Dakota Petroleum Council Study on Bakken Crude.
Exhibit 2006	CLA	Report: Effects of Flashfires on Building Occupants.
Exhibit 2007	CLA	Report: Development of a method for the determination of on-site ignition probabilities UK Health and Safety Executive, Research Report 226, 2004.
Exhibit 2008	CLA	Reducing Risk and Protecting People, Health and Safety Executive.
Exhibit 2009	CLA	Bakken Crude MSDS Report.
Exhibit 2010	CLA	Global Assest Protection (GAP) Guidelines: Oil Chemical Plant Layout and Spacing.
Exhibit 2011	CLA	Guidelines for Facility Siting and Layout, Center for Chemical Process Safety of the American Institue of Chemical Engineers, Wiley, 2003.
Exhibit 2012	CLA	CV Eric Peterson, Ph.D, Sr. Principal.
Exhibit 2013	CLA	Curriculum Vitae of Richard Bishop.
Exhibit 2501	SPO	Evaluation of Threat Posed by Bakken Crude Oil Tank Trains and Hazardous Materials Transported Through the City of Spokane Washington (PowerPoint Presentation by Michael Hildebrand).
Exhibit 2502	SPO	Sandia Report SAND2015-1823 Unlimited Release Printed March 2015 - Literature Survey of Crude Oil Properties Relevant to Handling and Fire Safety in Transport.
Exhibit 2503	SPO	City of Spokane Wellhead Capture Zones.
Exhibit 2504	SPO	June 7, 2016 Council Action Memorandum Re: Resolution 2016-0056 Concerning the Recent Oil Train Derailment and Fire in Mosier, Oregon.
Exhibit 2505	SPO	City of Spokane Points of Interest.
Exhibit 3003	VAN	Attachment 1 to Prefiled Testimony of R. Chipkevich (Photographs, October 6 &7, 2015, Track Conditions within City of Vancouver).

Exhibit Number	Party	Description/Title
Exhibit 3005	VAN	Exhibit A to Prefiled Testimony of T. Clary (August 20, 2013, Letter Clary to Adams re water availability).
Exhibit 3006	VAN	Exhibit B to Prefiled Testimony of T. Clary (Water Engineering Comments).
Exhibit 3008	VAN	Exhibit to Prefiled Testimony of M. Hildebrand (Examples of DOT-111& CPC-1232 Tank Car Damage & Types of Failures Experienced in Actual Derailments).
Exhibit 3009	VAN	Resume City Manager E. Holmes Filed by the City of Vancouver.
Exhibit 3011	VAN	Exhibit to Prefiled Testimony of S. Johnson (North-South Crossing, 2010 Census Tract Block Data - Maps).
Exhibit 3012	VAN	Resume Assistant Police Chief M. Lester filed by the City of Vancouver.
Exhibit 3014	VAN	Exhibit A to Prefiled Testimony of R. Lopossa (At-Grade or Grade-Separated Crossings Inventory List).
Exhibit 3015	VAN	Exhibit B to Prefiled Testimony of R. Lopossa (Map At-Grade or Grade-Separated Crossings).
Exhibit 3016	VAN	Resume of Fire Chief J. Molina filed by the City of Vancouver.
Exhibit 3017	VAN	Exhibit A to Prefiled Testimony of Fire Chief J. Molina (November 2, 2012, Convus Energy, Material Safety Date Sheet)
Exhibit 3018	VAN	Exhibit B to Prefiled Testimony of Fire Chief J. Molina (VFD Service Area Map).
Exhibit 3020	VAN	Corrected Exhibit C to Prefiled Testimony of Fire Chief J. Molina (Critical Facilities Map & Key).
Exhibit 3021	VAN	Exhibit D to Prefiled Testimony of Fire Chief J. Molina (Railroad Crossings Map).
Exhibit 3022	VAN	January 2007 Fourth Plain Corridor Subare Plan.
Exhibit 3026	VAN	May 13, 2014, Northwest Region Averaging Nine Freight Train Derailments per Month – Article.
Exhibit 3028	VAN	April 30, 2014, National Transportation Safety Board Railroad Accident Brief for Lynchburg.
Exhibit 3029	VAN	July 8, 2015, National Transportation Safety Board, Tank Car Performance Factual Report for Mount Carbon.
Exhibit 3030	VAN	October 20, 2006, NTSB Accident Report, Derailment of Norfolk Southern Railway Company Train 68QB119 with Release of Hazardous Materials and Fire, New Brighton, PA.
Exhibit 3032	VAN	July 6, 2013, Railway Investigation Report R13D0054, Runaway and Main-Track Derailment – Montreal, Maine & Atlantic Railway Freight Train MMA-002, Lac-Mégantic, Quebec.
Exhibit 3033	VAN	Timeline of Rail Events – Article.
Exhibit 3039	VAN	June 3, 2016, Mosier Oregon train derailment spills oil (petroleum), sparks fire – Video https://www.youtube.com/watch?v=pmRUlzJpZHU.
Exhibit 3041	VAN	1998, Esther Short Subarea Plan.
Exhibit 3042	VAN	City of Vancouver 2016-2021 Strategic Plan.
Exhibit 3043	VAN	VFD Train Accident Data Exhibit.
Exhibit 3044	VAN	Sept. 30, 2014, Letter E. Holmes to Foxx re Docket No PHMSA2012-0082.
Exhibit 3045	VAN	Sept. 30, 2014, Letter J. Inslee to Foxx re rules to address safety.

Exhibit Number	Party	Description/Title
Exhibit 3046	VAN	Dec. 9, 2015, City of Vancouver discovery request to Tesoro and Port of Vancouver.
Exhibit 3047	VAN	Jan. 8, 2016, Vancouver Energy response to City of Vancouver's discovery request dated Dec. 9, 2015.
Exhibit 3048	VAN	May 2, 2016, City of Vancouver's Second Discovery Requests.
Exhibit 3049	VAN	June 2, 2016, Vancouver Energy's response to City of Vancouver's discovery requests dated May 2, 2016.
Exhibit 3051	VAN	May 22, 2014, City of Vancouver's Request to Defer Land Use Consistency Determination and Leave Record Open.
Exhibit 3052	VAN	Dec. 13, 2013, Letter City of Vancouver Scoping Comments.
Exhibit 3053	VAN	Requests for Proposals – Risk Assessment, Gap Analysis, and Fire Protection Engineering Assessment related to the proposed Tesoro Savage Vancouver Energy Distribution Terminal Project.
Exhibit 3055	VAN	2008, Lower Grand Employment Area Subarea Plan.
Exhibit 3056	VAN	January 22, 2016, City of Vancouver Comments on Draft Environmental Impact Statement.
Exhibit 3057	VAN	May 28, 2014, City of Vancouver's Comments Regarding Consistency of Proposal with Land Use Plans and Zoning Regulations.
Exhibit 3058	VAN	July 2014, Draft Regulatory Impact Analysis [Docket No. PHMSA-2012-0082] (HM-251).
Exhibit 3059	VAN	Preliminary Report Railroad, DCA14MR004 – Casselton, ND.
Exhibit 3060	VAN	May 7, 2014, Safety Advisory 2014-01, U.S. Department of Transportation, Federal Railroad Administration, Recommendation for Tank Cars.
Exhibit 3061	VAN	Jan. 23, 2014, National Transportation Safety Board, Safety Recommendation to Federal Railroad Administration.
Exhibit 3062	VAN	Feb. 25, 2014, Emergency Restriction/Order United States Department of Transportation, Docket No. DOT-OST-2014-00
Exhibit 3063	VAN	May 7, 2014, Emergency Restriction/Order United States Department of Transportation, Docket No. DOT-OST-2014-002
Exhibit 3064	VAN	February 24, 2016, FRA Oversight of Hazmat by Rail Final Report, 16-0224.
Exhibit 3065	VAN	December 5, 2013, Comments of the Natural Resource Defense Council to Pipeline and Hazardous Materials Safety Administration, Recommendations to Improve the Safety of Railroad Tank Car Transportation.
Exhibit 3066	VAN	July 23, 2014, Notice of Proposed Rulemaking, PHMSA, Enhanced Tank Car Standards and Operational Controls for High-Hazard Flammable Trains.
Exhibit 3067	VAN	May 1, 2015, Final Regulatory Impact Analysis, Docket No. PHMSA-2012-0082, USDOT, PHMSA.
Exhibit 3068	VAN	July 23, 2013, Ground Lease Between Port of Vancouver, USA and Tesoro Savage Petroleum Terminal, LLC.
Exhibit 3069	VAN	April 12, 2016, Letter, City of Vancouver to Port of Vancouver USA Commissioners, Testimony re Tesoro Lease Extensi
Exhibit 3070	VAN	April 26, 2016, Amendment to Tesoro Savage Ground Lease.
Exhibit 3071	VAN	April 2016, Millennium Bulk Terminals - Appendix F, Rail and Vessel Corridor Information.
Exhibit 3072	VAN	Partical admittance of Millennium Bulk Terminal EIS - SEPA Rail Transportation Technical Report.

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Exhibit 3075	VAN	April 2016, Millennium Bulk Terminals, EIS, Chapter 6.
Exhibit 3076	VAN	February 19, 2016, Letter EFSEC to Tesoro re Permitting.
Exhibit 3077	VAN	July 31, 2015, Letter USEPA Region 10 to USACE Re: Permit Application NWS 2013-962, Tesoro Savage Petroleum Terminal Project.
Exhibit 3078	VAN	November 2013, VPD Community Task Force, Final Report.
Exhibit 3079	VAN	December 13, 2013, City of Vancouver Fire Department Scoping Comments.
Exhibit 3082	VAN	January 25, 2016, City of Vancouver, Chief J. McElvain Police Department Update Presentation to City Council.
Exhibit 3083	VAN	April 25, 2016, Update on ICMA recommendations regarding staffing of Vancouver Police Department.
Exhibit 3084	VAN	June 8, 2016, Letter Washington State Council of Fire Fighters to Gov. Inslee.
Exhibit 3085	VAN	2013, Emerging Risks Task Force Report, Region 10 Regional Response Team/Northwest Area Committee.
Exhibit 3086	VAN	October 1, 2014, Washington State Marine & Rail Oil Transportation Study Preliminary Findings and Recommendations, Department of Ecology.
Exhibit 3087	VAN	December 4, 2014, U.S. Rail Transportation of Crude Oil: Background and Issues for Congress, Congressional Research Service.
Exhibit 3088	VAN	March 1, 2015, Washington State 2014 Marine and Rail Oil Transportation Study, Department of Ecology.
Exhibit 3089	VAN	Risk-Based Optimization of Rail Defect Inspection Frequency for Petroleum Crude Oil Transportation, Xiang Liu and C. Tyler Dick.
Exhibit 3090	VAN	January 21, 1980, Washington Attorney General Opinion 1980-5.
Exhibit 3091	VAN	January 5, 1977, Washington Attorney General Opinion 1977-1.
Exhibit 3092	VAN	June 18, 2007, Vancouver City Center Vision & Subarea Plan.
Exhibit 3093	VAN	January 2008, Central Park Plan.
Exhibit 3094	VAN	August 25, 2009, Creating a more Sustainable Vancouver Plan.
Exhibit 3095	VAN	Downtown Vancouver Growth and Transportation Efficiency Center Plan.
Exhibit 3096	VAN	February 2, 2009, Riverview Gateway Subarea Plan.
Exhibit 3097	VAN	2011-2030, Vancouver Comprehensive Plan.
Exhibit 3098	VAN	November 21, 2011, City of Vancouver, Shoreline Master Program.
Exhibit 3099	VAN	Waterfront Photos.
Exhibit 3100	VAN	June 3, 2014, City of Vancouver Resolution M-3821.
Exhibit 3101	VAN	September 11, 2014, ORD M-4090 Moratorium on Crude Petroleum Facilities.
Exhibit 3102	VAN	March 2, 2015, ORD M-4118 Crude Oil Moratorium Extension.

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Exhibit 3103	VAN	August 17, 2015, ORD M-4132 Continuance of Moratorium on Crude Petroleum Product Facilities.
Exhibit 3104	VAN	February 1, 2016, ORD M-4157 Continuance of Moratorium on Crude Petroleum Product Facilities.
Exhibit 3105	VAN	WAC, Draft Ecology Rule RR Oil-Spill Contingency Plan.
Exhibit 3106	VAN	Prefiled Testimony of W. Senter filed by the City of Vancouver.
Exhibit 3107	VAN	Exhibit A to Prefiled Testimony of W. Senter (Letter, Senter to BNSF, Request for Information on Crude Oil Risks).
Exhibit 3108	VAN	Rail Road Crossing Photos.
Exhibit 3109	VAN	FRA Accident Database Reports.
Exhibit 3110	VAN	August 11, 2015, Washington Utility & Transportation Commission Inspection Report.
Exhibit 3111	VAN	City of Vancouver Municipal Code.
Exhibit 3113	VAN	January 26, 2016, BNSF Spending Cut – Bloomberg Article.
Exhibit 3116	VAN	February 5, 2015, Fire at Port of Vancouver sends at least one to hospital – The Columbian News Article.
Exhibit 3117	VAN	Old Evergreen Highway Neighborhood, Neighborhood Action Plan, June, 2011.
Exhibit 3118	VAN	May 22, 2008, NTSB Safety Recommendation.
Exhibit 3120	VAN	Attachment 1 to Prefiled Testimony of R. Blackburn (July 22, 2008, BNSF PowerPoint Excerpt).
Exhibit 3121	VAN	Attachment 2 to Prefiled Testimony of R. Blackburn (December 2009, US Dept. of Transportation, The Transportation of Hazardous Materials Excerpt).
Exhibit 3122	VAN	Attachment 3 to Prefiled Testimony of R. Blackburn (Photographs, Rail Accidents).
Exhibit 3123	VAN	Problem vs. Response Timeline.
Exhibit 3124	VAN	Fire Protection Assessment Report for the Tesoro Savage Vancouver Energy Distribution Terminal.
Exhibit 3125	VAN	June 23, 2016, Federal Railroad Administration, Preliminary Factual Findings Report, Derailment, Mosier, OR.
Exhibit 3126	VAN	Feb 17, 2016, National Transportation Safety Board, Locomotive Event Recorder Factual Report, Heimdal, ND.
Exhibit 3127	VAN	April 14, 2016, National Transporation Safety Board, Hazardous Material Group Factual Report, Heimdal, ND.
Exhibit 3128	VAN	May 6, 2015,National Transporation Safety Board, Office of Railroad, Pipeline and Hazardous Materials Investigations, Derailment Heimdal, ND.
Exhibit 3129	VAN	Derailment Pictures from Heimdal, ND.
Exhibit 3131	VAN	Length of Tesoro Unit Train at Old and New Switch Point Between BNSF Main and Port Rail Tracks.
Exhibit 3132	VAN	Photo.
Exhibit 3133	VAN	National Transportation Safety Board, Factual Report, Derailment, Office of Railroad, Pipeline and Hazardous Materials Investigations,September 19, 2015.

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Exhibit 3134	VAN	National Transportation Safety Board, Burlington Northern Santa Fe, Derailment Lesterville, SD Septemer 19, 2015.
Exhibit 3135	VAN	Map of Mosier Fire District.
Exhibit 3136	VAN	Half-Mile and One-Mile Buffer Maps.
Exhibit 3137	VAN	Ordinance No. M-4170 7/11/16-7/18/16.
Exhibit 3138	VAN	Letter From BNSF to State of Washington re: U.S. Department of Transportation Emergency Order Docket Number DOT-OST-2014-0067 (Issued May 7, 2014).
Exhibit 3502	WSH	Carl Einberger Resume.
Exhibit 3503	WSH	Aerial Photo Proximity of City of Washougal Westside (Lower) Wellfield to BNSF Rail Way.
Exhibit 3504	WSH	Figure 1 Surficial Geology Cross Section.
Exhibit 3505	WSH	Hydrological Cross Section.
Exhibit 3506	WSH	Wellhead Protection Capture Zone.
Exhibit 3508	WSH	Dan Monaghan Resume.
Exhibit 4002	CWF	Resume of Jerald Johnson, Johnson Economics.
Exhibit 4003	CWF	J. Johnson, Johnson Economics, Inc., Tesoro Savage Vancouver Energy Distribution Terminal DEIS Independent Review (Jan. 20, 2016).
Exhibit 4004	CWF	D. Furchtgott-Roth, Pipelines are Safest for Transportation of Oil and Gas, MANHATTAN INSTITUTE FOR POLICY RESEARCH, ISSUE BRIEF NO. 23 (June 2013).
Exhibit 4005	CWF	D. Clark, Extrernality Effects on Residential Property Values: The Example of Noise Disamenities, Grouth and Change (Sept. 2006).
Exhibit 4006	CWF	T. Carroll, et al., The Economic Impact of a Transient Hazard on property Values: The 1988 PEPCON Explosion in Henderson, Nevada, 13 Journal of Real Estate Finance and Economics 2 (1996).
Exhibit 4007	CWF	S. Farber, Undesirable Facilities and Property Values: A Summary of Empirical Studies, 24 ECOLOGICAL ECONOMICS (1998).
Exhibit 4008	CWF	R. Diaz, Impacts of Rail Transit on Property Values, American Public Transportation Association, Proceedings of 1999 Commuter Rail/Rapid Transit Conference, Toronto, Canada (1999).
Exhibit 4009	CWF	D. Forkenbrock, Comparison of External Costs of Rail and Truck Freight Transportation, Transportation Research Part A 35 (2001).
Exhibit 4010	CWF	ECONorthwest, Portland Harbor: Industrial Land Supply Analysis, Prepared for the City of Portland: Bureau of Planning and Sustainability (May 2012).

Exhibit Number	Party	Description/Title
Exhibit 4011	CWF	K. Gawande, et al., The Long-Run Impact of Nuclear Waste Shipments on the Property Market: Evidence from a Quasi-Experiment, JOURNAL OF ENVIRONMENTAL ECONOMICS AND MANAGEMENT 65 (2013).
Exhibit 4012	CWF	M. Fucht, Examining the Spatial Distribution of Externalities: Freight Rail Traffic and Home Values in Los Angeles (Nov. 11, 2011).
Exhibit 4013	CWF	M.A.J. Theebe, Planes, Trains, and Automobiles; The Impact of Traffic Noise on House Prices, SBV Research (2002).
Exhibit 4014	CWF	G. Debrezion, et al., The Impact of Rail Transport on Real Estate Prices: An Empirical Analysis of the Dutch Housing Market, Tinbergen Institute Discussion Paper, No. 06-031/3 (2006).
Exhibit 4015	CWF	K. Gawande and H. Jenkins-Smith, Nuclear Waste Transport and Residential Property Values: Estimating the Effects of Perceived Risks, Journal of Environmental Economics and Management, vol. 42 (2001).
Exhibit 4016	CWF	R. Simons & A. El Jaouhari, The Effect of Freight Railroad Tracks and Train Activity on Residential Property Values, The Appraisal Journal (Summer 2004).
Exhibit 4017	CWF	Washington Physicians for Social Responsibility, Position Statement on Crude Oil Transportation and Storage to Governors of Washington and Oregon from Concerned Washington & Oregon Health Care Professionals (Feb. 2015).
Exhibit 4018	CWF	Washington Department of Ecology, Final Cost-Benefit and Least Burdensome Alternative Analysis: Chapter 173-182 WAC, Oil Spill Contingency Plan, Pub. No. 12-08-014 (Dec. 2012).
Exhibit 4019	CWF	Rendering of Completed Columbia Waterfront Development (Downriver View).
Exhibit 4020	CWF	Rendering of Completed Columbia Waterfront Development (Upriver View).
Exhibit 4021	CWF	Rendering of Completed Columbia Waterfront Development on Aerial Photograph.
Exhibit 4022	CWF	Rendering of Completed Columbia Waterfront Development (Aerial View).
Exhibit 4023	CWF	Rendering of Completed Vancouver Waterfront Park and Pier.
Exhibit 4024	CWF	Rendering of Columbia Waterfront Development Land Use Master Plan.
Exhibit 4025	CWF	Land Use Plan for Phase I of ColumbiaWaterfront Development.
Exhibit 4026	CWF	Washington Department of Ecology, City of Vancouver Shoreline Conditional Use Permit and Variance Approval (Mar. 31,2010) (issued to Columbia Waterfront).
Exhibit 4027	CWF	Washington Department of Ecology, City of Vancouver Substantial Development Permit Approval (Mar. 27, 2010).
Exhibit 4028	CWF	City of Vancouver, Ordinance M-3936 (Dec. 7, 2009).
Exhibit 4502	DNR	Resume of Timothy Walsh.
Exhibit 4503	DNR	Final Hazard Profile - Landslide, Washington State Hazard Mitigation Plan.
Exhibit 4504	DNR	Landslide Overview Map of the Conterminous United States.
Exhibit 4505	DNR	Digital Presentation of Landslide Overview Map of the Coterminous United States.

Exhibit Number	Party	Description/Title
Exhibit 4506	DNR	DNR Landslide Database Disclaimer.
Exhibit 4507	DNR	Abstract, Pierson, T.R.C.Evarts, and J.A. Bard, Finding New and Complex Landslides in Forested Terrain: Mapping Using LiDAR in the Western Columbia River Gorge. Geological Society of America (2014).
Exhibit 4509	DNR	Resume of Robert Johnson.
Exhibit 4510	DNR	DEIS Appendix P.2--Map Book K2A Potential Landslide Areas in State Rail Corridor.
Exhibit 4511	DNR	DEIS Appendix E-Rail Spill Risk Analysis.
Exhibit 5001	TRB	Ackerman, N.K. 2002. Effects of Vessel Wake of stranding juvenile salmonids in the lower Columbia River, 2002 - a Pilot Study.
Exhibit 5002	TRB	Adams, J., Sweezy M. and P.V. Hodson. 2014.Oil and oil dispersant do not cause synergistic toxicity to fish embryos.
Exhibit 5003	TRB	Assessment of the phototoxicity of weathered Alaska North Slope Crude oil to juvenile Pink Salmon.
Exhibit 5004	TRB	Behnke, R.J. 1992. Native trout of Western North America.
Exhibit 5005	TRB	Blanc, A.M., Holland, L.G., et. al. 2010. Anthropogenically sourced low concentration PAHS: In situ bioavailability to juvenile pacific salmon.
Exhibit 5006	TRB	Bodkin, J.L., Esler, D., S.D. Rice, et. al. 2014. The effects of spill oil on coastal ecosystems: Lessons from the Exxon Valdez oil Spill.
Exhibit 5007	TRB	Brannon, E.L., Collins, K.M., Cronin, M.A. et. al. 2007. Risk of Weathered residual Exxon Valdez oil to pink embryos in Prince William Sound.
Exhibit 5008	TRB	Brannon, E.L., Collins, K.M., Moulton, L.L. and Parker, K.R. 2001. Resolving allegations of oil damage to incubating pink salmon eggs in Prince William Sound.
Exhibit 5009	TRB	Brannon, E.L., Melby, C.L. and Brewer, S.D. 1985. Columbia River Sturgeon (Acipenser transmontanus) Enhancement.
Exhibit 5010	TRB	Brannon, E.L., Powell, M.S., Quinn, T.P., Talbot, A. 2004. Population structure of Columbia River Basin Chinook Salmon and steelhead trout.
Exhibit 5011	TRB	Brette, F., Machado, B., et. al. 2014. Crude oil impairs cardiac excitation-contraction coupling in fish.
Exhibit 5012	TRB	Bue B.G., Shar, S., et. al. 1996. AFS Symposium 18:619-627.
Exhibit 5013	TRB	Bue, B.G., Shar, S., et. al. 1998. AFS 127(1):35-43.
Exhibit 5014	TRB	Carbon Emissions Reduction Taskforce. 2014. Report to WA State Governor’s office.
Exhibit 5015	TRB	Carls, M.G., et. al. 2005. Marine Ecology Progress Series 301:253-265
Exhibit 5016	TRB	Carls, M.G., et. al. 2008. Aqua Toxicology 88: 121-127.
Exhibit 5017	TRB	Carls, M.G., et. al. 2000. Environmental Toxicology and Chemistry 19 6:1649-1659.
Exhibit 5018	TRB	Carls, M.G. et. al. 1999. Environmental Toxicology and Chemistry 18(3): 481-493

Exhibit Number	Party	Description/Title
Exhibit 5019	TRB	Carvan III, M. J, et. al. Environmental Toxicology and Chemistry 18(3): 481-493.
Exhibit 5020	TRB	Coleman, A.M., et. al. 2015.Ecological Engineering 82:624-642.
Exhibit 5021	TRB	Collier, T.K., et. al. 2014.
Exhibit 5022	TRB	CRITFC (Columbia River Inter-Tribal Fish Commission). 2014. Wy-Kan-Ush-Mi Wa-Kish-Wit tribal salmon restoration plan 2014 update. CRITFC, Portland, Oregon.
Exhibit 5023	TRB	CRITFC (Columbia River Inter-Tribal Fish Commission). 2014. Wy-Kan-Ush-Mi Wa-Kish-Wit tribal salmon restoration plan 2014 update. CRITFC, Portland, Oregon.
Exhibit 5024	TRB	Dalton, J.M., et. al. 2013. Climate Change in the Northwest. Implications for our landscapes, waters and communities, Washington, D.C. Island Press.
Exhibit 5025	TRB	DeHart, M. 2015. Fish Passage Center 2014 Annual Report. Fish Passage Center. BPA Project #1994-033-00.
Exhibit 5026	TRB	Diefenderfer, H.L., et. al. 2012. Evidence Based Assessment of the Cumulative Effects of Tidal Freshwater... Early Life Stage Habitat Functions for Endangered Salmonids.
Exhibit 5027	TRB	Doelling, P, A. Davis, K. Jellison and S. Miles. 2014. Bakken Crude Oil Spill Barge E2MS 303 Lower Mississippi River February 2014.
Exhibit 5028	TRB	Ecology. 2012. Preparing for a Changing Climate. Publication No. 12-01-004. Olympia, WA.
Exhibit 5029	TRB	Edmunds, R.C., et al. 2014. Toward Enhanced MIQE Compliance: Reference Residual Normalization of qPCR gene expression data.
Exhibit 5030	TRB	Esler, D., et. al. Harlequin duck population recovery following the Exxon Valdez oil spill: progress, process and constrain
Exhibit 5031	TRB	Fang, J. and K.-F. V. Wong. 2006. An advanced VOF algorithm for oil boom design.
Exhibit 5032	TRB	FAO. Precautionary approach to fisheries. Part 1: Guidelines on the precautionary approach to capture fisheries and species introductions.
Exhibit 5033	TRB	FAO. Precautionary approach to fisheries. Part 2: scientific papers. Prepared for the Technical Consultation on the Precautionary Approach to Capture Fisheries.
Exhibit 5034	TRB	Garcia, S. M. 1995. The Precautionary Approach to Fisheries and Its Implications for Fishery Research, Technology, and Management.
Exhibit 5035	TRB	Greer, C.D., P.V. Hodson, Z. Li, T. King, and K. Lee. 2012. Toxicity of crude oil chemically dispersed in a wave tank to embryos of Atlantic herring (Clupea Harengus).
Exhibit 5036	TRB	Groot, C. and L. Margolis. 1991. Pacific Salmon Life Histories.
Exhibit 5037	TRB	Hamlet, A. F. and D. P. Lettenmaier. 2007. Effects of 20th Century Warming and Climate Variability on Flood Risk in the Western U.S. Water Resources.

Exhibit Number	Party	Description/Title
Exhibit 5038	TRB	Hatlen, K., C. A. Sloan, D. G. Burrows, et. al. Natural sunlight and residual fuel oils are an acutely lethal combination for fish embryos.
Exhibit 5039	TRB	Hawkins, A. Sound And Vibration Effects On Migrating Adult And Juvenile Salmon At Hydropower Projects, Construction Projects.
Exhibit 5040	TRB	Heintz, R. A., S. D. Rice, et al. 2000. Delayed effects on growth and marine survival of pink salmon after exposure to crude oil during embryonic development.
Exhibit 5041	TRB	Heintz, R. A., J. W. Short, et al. 1999. Sensitivity of fish embryos to weathered crude oil: Part II. Increased mortality of pink salmon.
Exhibit 5042	TRB	Hicken, C. E., T. L. Linbo, et al. 2011. Sublethal exposure to crude oil during embryonic development alters cardiac morphology and reduces aerobic capacity in adult fish.
Exhibit 5043	TRB	Incardona, J. 2005. From sensing cellular sterols to assembling sensory structures.
Exhibit 5044	TRB	Incardona, J., Carls, M.G. et. al. Cardiac arrhythmia is the primary response of embryonic Pacific herring.
Exhibit 5045	TRB	Incardona, J., Carls M., Holland, L, et. al. Very low embryonic crude oil cause lasting cardiac effects in salmon and herrin
Exhibit 5046	TRB	Incardona et. al. Aryl hydrocarbon receptor-independent toxicity of weathered crude oil during fish development.
Exhibit 5047	TRB	Incardona et. al. Oil spills and fish health: exposing the heart of the matter.
Exhibit 5048	TRB	Incardona et. al. Defects in cardiac function precede morphological abnormalities in fish embryos exposed to polycyclic aromatic hydrocarbons.
Exhibit 5049	TRB	Incardona et. al. Developmental toxicity of 4-ring polycyclic aromatic hydrocarbons on AH receptor isoforms and hepatic cytochrome P450 1A metabolism.
Exhibit 5050	TRB	Incardona et. al. Deepwater Horizon crude oil toxicity to the developing hearts of large predatory pelagic fish.
Exhibit 5051	TRB	Incardona et. al. Cardiac toxicity of 5-ring polycyclic aromatic hydrocarbons is differentially dependent on the aryl hydrocarbon receptor 2 isoform during zebrafish devel.
Exhibit 5052	TRB	Incardona et. al. Exxon Valdez to Deepwater Horizon: Comparable toxicity of both crude oils to fish early life stages.
Exhibit 5053	TRB	Incardona et. al. Unexpectedly high mortality in Pacific herring embryos exposed to the 2007 Cosco Busan oil spill in San Francisco Bay.
Exhibit 5054	TRB	Incardona et. al. 2012 Potent phototoxicity of marine bunker oil to translucent herring embryos after prolonged weathering.
Exhibit 5055	TRB	Johnston, J.M. 1982. Life histories of anadromous cutthroat with emphasis on migratory behavior.
Exhibit 5056	TRB	Jolley, J.C., G.S. Silver and T.A. Whitesel. 2010. Occurrence, detection and habitat use of larval lamprey in mainstem environments: the lower Willamette River.

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Exhibit 5057	TRB	Jolley, J.C., G.S. Silver and T.A. Whitesel. 2011a. Occurrence, detection and habitat use of larval lamprey in mainstem environments.
Exhibit 5058	TRB	Jolley, J.C., G.S. Silver and T.A. Whitesel. 2011b. Occurrence, detection and habitat use of larval lamprey in mainstem environments.
Exhibit 5059	TRB	Jolley, J. C., Silver, G. S., & Whitesel, T. A. 2012a. Occupancy and detection of larval Pacific lampreys and Lampetra spp. in a large river.
Exhibit 5060	TRB	Jolley, J. C., Silver, G. S., & Whitesel, T. A. 2012b. Occurrence, detection, and habitat use of larval lamprey in Columbia River mainstem environments.
Exhibit 5061	TRB	Jung, J., et. al. Geologically distinct crude oils cause a common cardiotoxicity syndrome in developing zebrafish.
Exhibit 5062	TRB	Keefer, M.L., C.C. Caudill, T.C. Clabough, et. al. Fishway passage bottleneck identification and prioritization: a case study or Pacific lamprey at Bonneville Dam.
Exhibit 5063	TRB	Kennedy D. M., Baca, B. J., 1985. Fate and Effects of the MOBILOIL Spill in the Columbia River.
Exhibit 5064	TRB	Krahn, M. M., L. J. Kittle Jr., and W. D. MacLeod, Jr. 1986. Evidence for exposure of fish to oil spilled into the Columbia River.
Exhibit 5065	TRB	Laetz, C.A., Hecht, S.A., Incardona, J.P., et. al. 2015. Ecological risk of mixtures. In: Aquatic ecotoxicology: advancing tools for dealing with emerging risks.
Exhibit 5066	TRB	Lee, R. and J. Anderson. Significance of cytochrome P450 system responses and levels of bile fluorescent aromatic compounds in marine wildlife following oil spills.
Exhibit 5067	TRB	Lema, et. al. 2007. Cardiac arrhythmia… and changes in cerebrospinal fluid flow in fish larvae following embryonic exposure to 2,2',4,4'-tetrabromodiphenyl ether.
Exhibit 5068	TRB	Linbo, T. L., C. M. Stehr, J. Incardona, N. L. Scholz. 2006. Dissolved copper triggers cell death in the peripheral mechanosensory system of larval fish.
Exhibit 5069	TRB	Mager E.M., Esbaugh, A.J. et. al. Acute embryonic or juvenile exposure to Deepwater Horizon crude oil impairs the swimming performance of mahi mahi.
Exhibit 5070	TRB	Matkin, C.O., et. al. 2008. Ongoing population-level impacts on killer whales Orcinus orca following the 'Exxon Valdez' oil spill in Prince William Sound, Alaska.
Exhibit 5071	TRB	Mauger, G., Se-Yeun Lee, K. Johnson and R. Walton. Flooding in the Lower Snohomish River.
Exhibit 5072	TRB	McCarthy, S. G., J. Incardona, N. L. Scholz. 2008. Coastal storms, toxic turnoff, and the sustainable conservation of fish and fisheries.

Exhibit Number	Party	Description/Title
Exhibit 5073	TRB	McIntyre, J.K., et al. Soil bioretention protects juvenile salmon and their prey from the toxic impacts of urban stormwater runoff.
Exhibit 5074	TRB	McIntyre, J.K., Davis, J.W., et. al. 2014. Zebrafish and clean water technology: assessing the protective effects of bioinfiltration as a treatment for toxic urban runoff.
Exhibit 5075	TRB	Mote, P.W. and E.P. Salathe Jr. 2010. Future Climate in the Pacific Northwest. Climatic Change.
Exhibit 5076	TRB	National Climate Assessment. Northwest Chapter. 2014. U.S. Global Change Research Program.
Exhibit 5077	TRB	National Marine Fisheries Service. 2011. Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead.
Exhibit 5078	TRB	NWPPC (Northwest Power Planning Council). 1986. Compilation of information on salmon and steelhead losses in the Columbia River basin.
Exhibit 5079	TRB	Parametrix. 2010. BA for the I-5 Columbia River Crossing for five species of ESA-listed salmon, bull trout, eulachon, green sturgeon, northern sea lion and killer whale.
Exhibit 5080	TRB	Parsley, M. J. et. al. Recovery of W. Sturgeon Populations through Natural Production: Understanding the Influence of Abiotic and Biotic Factors on Spawning.
Exhibit 5081	TRB	Pearson, W.H., R.B., Deriso, R.A. Elston, et. al. 2012. Hypotheses concerning the decline and poor recovery of Pacific herring in Prince William Sound, Alaska.
Exhibit 5082	TRB	Pearson, W H, and J R Skalski. 2011. Factors Affecting Stranding Of Juvenile Salmonids by Wakes from Ship Passage in the Lower Columbia River.
Exhibit 5083	TRB	Peterson, C.H., Rice, S.D., Short, J.W., Esler, D., Bodkin, J.L., Ballachey, B.E., and Irons, D.B. 2003.Long-Term ecosystem response to the Exxon Valdez Oil Spill.
Exhibit 5084	TRB	Quinn T.P., and K.W. Myers. 2004. Anadromy and the marine migrations of Pacific salmon and trout: Rounsefell revisited.
Exhibit 5085	TRB	Reddy, C.M., et al., 2002. The West Falmouth oil spill after thirty years: The persistence of petroleum hydrocarbons in marsh sediments.
Exhibit 5086	TRB	Rice, S. D. 2010. Persistence, toxicity, and long term environmental impact of the Exxon Valdez oil spill.
Exhibit 5087	TRB	Scholz, N. L., Incardona, J.P. 2015. Scaling PAH toxicity to fish early life stages.
Exhibit 5088	TRB	Scott, J. A., J. Incardona, K. Pelkki, et. al. 2010. AhR2-mediated, CYPIA- Independent CardioVascular Toxicity in Zebrafish (Danio rerio) Embryos.
Exhibit 5089	TRB	Short, J. W., G. V. Irvine, et. al. 2007. Slightly weathered Exxon Valdez oil persists in Gulf of Alaska beach sediments after 16 years.

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Exhibit 5090	TRB	Short, J. W., Lindeberg, et. al. . 2004. Estimate of oil persisting on the beaches of Prince William Sound 12 years after the Exxon Valdez oil spill.
Exhibit 5091	TRB	Short, J.W., K.R. Springman, et. al.. 2008. Semipermeable membrane devices link site-specific contaminants to effects: PART II.
Exhibit 5092	TRB	Silva, S.L., A.M.S. Silva, J.C. Ribero, F.G. Martins, F.A.A. Silva, and C.M. Silva. 2011. Chromatographic and spectroscopic analysis and heavy crude oil mixtures.
Exhibit 5093	TRB	Springman, K.R., J.W. Short, et. al. 2008. Semipermeable membrane devices link site-specific contaminants to effects; PART I.
Exhibit 5094	TRB	Stehr, C. M., T. L. Linbo, D. H. Baldwin, N. L. Scholz, J. Incardona. 2009. Evaluating the effects of forestry herbicides on fish development using rapid phenotypic screens.
Exhibit 5095	TRB	Stehr, C. M., T. L. Linbo, et. al. 2006. The developmental neurotoxicity of fipronil: notochord degeneration and locomotor defects in zebrafish embryos and larvae.
Exhibit 5096	TRB	Tohver, I., and A.F. Hamlet. 2010. Impacts of 21st century climate change on hydrologic.
Exhibit 5097	TRB	Trainer, V. L., L. Moore, et. al. In press. Characterizing toxic activity from Heterosigma akashiwo: a tale of two assays.
Exhibit 5098	TRB	Turner, R.E., Overton, E.B., et. al. 2014a. Changes in the concentration and relative abundance of alkanes and PAHs from the Deepwater Horizon oiling of coastal marshes.
Exhibit 5099	TRB	Turner, R.E., Overton, E.B., et. al. . 2014b. Distribution and recovery trajectory of Macondo (Mississippi Canyon 252) oil in Louisiana Coastal wetlands.
Exhibit 5100	TRB	U.S. Entity for the Columbia River Treaty. 2013. U.S. Entity regional recommendation on the future of the Columbia River Treaty after 2024.
Exhibit 5101	TRB	U.S. EPA (U.S. Environmental Protection Agency). 2002. Columbia River basin fish contaminant survey 1996–1998.
Exhibit 5102	TRB	United States v. Oregon. 1969. 302 F. Supp. 899.
Exhibit 5103	TRB	United States v. Washington. 1974. 384 F. Supp. 312.
Exhibit 5104	TRB	Weitkamp, L.A., et. al. 2015. Seasonal abundance, size, and host selection of western river and Pacific Lamprey in the Columbia River estuary.
Exhibit 5105	TRB	West, O'Neill, Doty, et. al. 2014. Evaluation of background levels of sources polycyclic hydrocarbons in naturally spawned eggs.
Exhibit 5106	TRB	CRITFC DEIS Comments.
Exhibit 5108	TRB	Fish Heartbeat video.
Exhibit 5109	TRB	CRITFC Tribal Lamprey Rest. Plan.

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Exhibit 5110	TRB	Fish Passage Center, 2012. River Flows, Fish Migration and Survival PPT.
Exhibit 5111	TRB	Columbia Basin Fish Accords.
Exhibit 5112	TRB	MOA on Col. R. Estuary Habitat Actions between WA, BOA, USACE, AND BOR.
Exhibit 5113	TRB	National Marine Fisheries Service (NMFS) 2011. Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead.
Exhibit 5114	TRB	Columbia Basin White Sturgeon Planning Framework.
Exhibit 5115	TRB	City of Vancouver DEIS Comments.
Exhibit 5116	TRB	2013 Columbia River Basin Fish and Wild life Program Costs Report.
Exhibit 5120	TRB	Photo of Cascade Locks.
Exhibit 5121	TRB	Photo of Cascade Locks.
Exhibit 5122	TRB	Photo of North Bonneville.
Exhibit 5123	TRB	Photo of North Bonneville.
Exhibit 5124	TRB	Photo of North Bonneville.
Exhibit 5125	TRB	Photo of North Bonneville.
Exhibit 5126	TRB	Photo of Cooks Landing.
Exhibit 5127	TRB	Photo of Cooks Landing.
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Exhibit 5129	TRB	Photo of Underwood.
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Exhibit 5131	TRB	Photo of White Salmon.
Exhibit 5132	TRB	Photo of White Salmon.
Exhibit 5133	TRB	Photo of White Salmon.
Exhibit 5134	TRB	Photo of White Salmon.
Exhibit 5135	TRB	Photo of Lyle.
Exhibit 5136	TRB	Photo of Lyle.
Exhibit 5137	TRB	Photo of Lyle.
Exhibit 5138	TRB	Photo of Lyle.
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Exhibit 5140	TRB	Photo of Celilo.
Exhibit 5141	TRB	Photo of Celilo.

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Exhibit 5142	TRB	Photo of Celilo.
Exhibit 5143	TRB	Photo of Dallesport.
Exhibit 5144	TRB	Photo of Dallesport.
Exhibit 5145	TRB	Photo of Dallesport.
Exhibit 5146	TRB	Photo of Dallesport.
Exhibit 5147	TRB	Photo of Dallesport.
Exhibit 5148	TRB	Photo of Near Dallesport.
Exhibit 5149	TRB	Photo of Near Dallesport.
Exhibit 5150	TRB	Photo of Wyeth.
Exhibit 5151	TRB	Photo of Wyeth.
Exhibit 5152	TRB	Photo of Wyeth.
Exhibit 5153	TRB	Photo of Wyeth.
Exhibit 5154	TRB	Declaration of Julie Carter.
Exhibit 5155	TRB	Photo of Patterson Slough.
Exhibit 5156	TRB	Photo.
Exhibit 5157	TRB	Photo of Pine Creek.
Exhibit 5158	TRB	Photo of John Day Pool fishers.
Exhibit 5159	TRB	Photo of John Day Pool.
Exhibit 5160	TRB	Photo of John Day Pool Gillnet.
Exhibit 5180	TRB	Short, J.W. 2015. Fate and Effect of Oil Spills from the Trans Mountain Expansion Project in Burrard Inlet and the Fraser River Estuary.
Exhibit 5181	TRB	Spills of Diluted Bitumen from Pipelines: a comparative study of Environmental fate, effects and response.
Exhibit 5182	TRB	Ramachandran, S.D., Hodson, P.V., Kahn, C.W., et. al. 2003. Oil Dispersant increases PAH uptake by fish exposed to crude oil.
Exhibit 5183	TRB	NOAA Technical Memorandum. 2013. Transporting Alberta Oil Sands Products- Defining the Issues and Assessing the F
Exhibit 5203	TRB	Audie Huber Attachment A - Statement of James E. Hall regarding Crude Oil Train accident risk in relation to the Proposed routing of crude oil trains through the Columbia River Basin.
Exhibit 5204	TRB	Audie Huber Attachment B.
Exhibit 5208	TRB	Blaine Parker Attachment A - CRITFC letter to Stephen Posner DEIS comments.
Exhibit 5209	TRB	Blaine Parker Resume.

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Exhibit 5211	TRB	Zachary Penney Attachment A - Columbia River Estuary ESA Recovery Plan Module for Salmon and Steelhead.
Exhibit 5212	TRB	Zachary Penney CV.
Exhibit 5214	TRB	Stanley Rice Attachment A - Bonneville Dam Av, The Dalles, John Day at MIP Flow Rate.
Exhibit 5215	TRB	Stanley Rice Attachment B - Bakken Crude Oil Spill Barge E2MS 303 :owerr Mississippi River Feb. 2014.
Exhibit 5216	TRB	Stanley Rice CV.
Exhibit 5218	TRB	Babtist Paul Lumley Attachment A - CRITFC - Pacific Northwest Fossil Fuel Transport Terminals - Rail/Ship Capacity T
Exhibit 5219	TRB	Babtist Paul Lumley Attachment B - CRITFC - Commission Resolution No. 14-01 - Opposing the Transportation of Crude Oil Through the Columbia River Gorge and Indian Reservations.
Exhibit 5221	TRB	Hicks and Broncheau Attachment A- TFAS Population Table.
Exhibit 5222	TRB	Hicks and Broncheau Attachment B - Image of Bonneville IL Site.
Exhibit 5223	TRB	Hicks and Broncheau Attachment C - Image of Cascade Locks IL Site.
Exhibit 5224	TRB	Hicks and Broncheau Attachment D - Image of Wyeth TFAS.
Exhibit 5225	TRB	Hicks and Broncheau Attachment E - Image of Wind River IL Site.
Exhibit 5226	TRB	Hicks and Broncheau Attachment F - Image of Cooks IL Site.
Exhibit 5227	TRB	Hicks and Broncheau Attachment G - Image of Underwood IL site.
Exhibit 5228	TRB	Hicks and Broncheau Attachment H - Image of White Salmon TFAS.
Exhibit 5229	TRB	Hicks and Broncheau Attachment I - Image of Stanley Rock TFAS.
Exhibit 5230	TRB	Hicks and Broncheau Attachment J - Image of Lyle TFAS.
Exhibit 5231	TRB	Hicks and Broncheau Attachment K - Image of Dallesport TFAS.
Exhibit 5232	TRB	Hicks and Broncheau Attachment L - Image of Lone Pine TFAS.
Exhibit 5233	TRB	Hicks and Broncheau Attachment M - Image of Avery TFAS.
Exhibit 5234	TRB	Hicks and Broncheau Attachment N - Image of Celilo TFAS.
Exhibit 5235	TRB	Hicks and Broncheau Attachment O - Image of Maryhill TFAS.
Exhibit 5236	TRB	Hicks and Broncheau Attachment P - Image of Rufus TFAS.
Exhibit 5237	TRB	Hicks and Broncheau Attachment Q - Image of Preachers Eddy TFAS.
Exhibit 5238	TRB	Hicks and Broncheau Attachment R - Image of North Shore TFAS.
Exhibit 5239	TRB	Hicks and Broncheau Attachment S - Image of LePage TFAS.
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Exhibit 5241	TRB	Hicks and Broncheau Attachment U - Image of Pasture Point TFAS.
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Exhibit 5243	TRB	Hicks and Broncheau Attachment W - Image of Sundale TFAS.
Exhibit 5244	TRB	Hicks and Broncheau Attachment X - Image of Roosevelt TFAS.
Exhibit 5245	TRB	Hicks and Broncheau Attachment Y - Image of Moonay TFAS.
Exhibit 5246	TRB	Hicks and Broncheau Attachment Z - Image of Pine Creek TFAS.
Exhibit 5247	TRB	Hicks and Broncheau Attachment AA - Image of Threemile Canyon TFAS.
Exhibit 5248	TRB	Hicks and Broncheau Attachment BB - Image of Alderdale TFAS.
Exhibit 5249	TRB	Hicks and Broncheau Attachment CC - Image of Aldercreek TFAS.
Exhibit 5250	TRB	Hicks and Broncheau Attachment DD - Image of Crow Butte TFAS.
Exhibit 5251	TRB	Hicks and Broncheau Attachment EE - Image of Faler Road TFAS.
Exhibit 5252	TRB	Declaration of Faron Scissons.
Exhibit 5300	TRB	Photo from Randy Settler.
Exhibit 5301	TRB	Photo from Randy Settler.
Exhibit 5302	TRB	Photo from Randy Settler.
Exhibit 5303	TRB	Photo from Randy Settler.
Exhibit 5304	TRB	Photo from Randy Settler.
Exhibit 5305	TRB	Photo from Randy Settler.
Exhibit 5306	TRB	Photo from Randy Settler.
Exhibit 5310	TRB	Photo from Brady Kent.
Exhibit 5311	TRB	Photo from Brady Kent.
Exhibit 5312	TRB	Photo from Brady Kent.
Exhibit 5313	TRB	Photo from Brady Kent.
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Exhibit 5316	TRB	Photo from Brady Kent.
Exhibit 5317	TRB	Photo from Brady Kent.
Exhibit 5318	TRB	Photo from Brady Kent.
Exhibit 5319	TRB	Photo from Brady Kent.
Exhibit 5320	TRB	Video from Brady Kent.
Exhibit 5321	TRB	Video from Brady Kent.
Exhibit 5322	TRB	Video from Brady Kent.

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Exhibit 5330	TRB	Brigham Photos.
Exhibit 5331	TRB	Huber Photo and petroglyphmap.
Exhibit 5332	TRB	Effects of Diluted Bitumen Exposure on Juvenile Sockeye Salmon - Environmental Toxicology and Chemistry.
Exhibit 5501	CRK	Applicant's Responses to EFSEC and Agency Review Comments (Jan. 2014).
Exhibit 5502	CRK	Vancouver Energy Terminal Quantitative Vessel Traffic Risk Assessment, Report No. PP111860-2, Rev. 5, Jan. 20, 2016
Exhibit 5503	CRK	Attachment ES-1 to the Applicants January 22, 2016 Comments on DEIS.
Exhibit 5504	CRK	Vancouver Energy Comments on the Draft Environmental Impact Statement, Submitted to EFSEC, Jan. 22, 2016.
Exhibit 5505	CRK	U.S. Energy Information Administration, Alaska State Profile and Energy Estimates, Oct. 15, 2015.
Exhibit 5506	CRK	U.S. Energy Information Administration, Hawaii State Profile and Energy Estimates, Oct. 15, 2015.
Exhibit 5507	CRK	Lower Columbia Region Harbor Safety Committee, Columbia River Incident Management Guidelines.
Exhibit 5508	CRK	Baker Engineering and Risk Consultants, Inc., Review of Tesoro-Savage DEIS, Final Report, Jan. 22, 2016, prepared for the Applicant.
Exhibit 5509	CRK	Vancouver Energy, Spill Response Exercise Report, Jan. 12, 2016.
Exhibit 5510	CRK	Polaris Applied Sciences, Inc., A Comparison of the Properties of Diluted Bitumen Crudes with Other Oils, 2013.
Exhibit 5511	CRK	FOSC Desk Report for the Enbridge Line 6b Oil Spill Marshall, Michigan, Apr. 2016.
Exhibit 5512	CRK	Lower Columbia Region Harbor Safety Plan, Columbia River Incident Management Guidelines Jan. 2013.
Exhibit 5513	CRK	MFSA Vessel Response Plan, Columbia and Willamette Rivers, Overall Plan Revision 09, Mar. 18, 2016.
Exhibit 5514	CRK	Preliminary Pre-Booming Diagram, Tesoro Savage Vancouver Energy Distribution Terminal, Application NO. 2013-01 Supplement, February 2014, Page 2-154.
Exhibit 5515	CRK	National Academy of Sciences, Spills of Diluted Bitumen from Pipelines (2016)
Exhibit 5516	CRK	Susan Harvey, Review of Draft Environmental Impact Statement for the Tesoro Savage Petroleum Terminal LLC (Jan. 18, 2016).
Exhibit 5517	CRK	Susan Harvey C.V.
Exhibit 5520	CRK	Comments of Dr. Ranajit Sahu on Draft Environmental Impact Statement of Tesoro Savage Vancouver Energy Distribution Terminal.
Exhibit 5521	CRK	API Staff Analysis of Crude Oil Samples Submitted to PHMSA May 19, 2014.
Exhibit 5522	CRK	ConocoPhillips, Safety Data Sheet for Bakken Crude Oil Sweet.
Exhibit 5523	CRK	A Survey of Bakken Crude Oil Characteristics Assembled for the U.S. Department of Transportation, submitted by the American Fuel & Petrochemical Manufacturers, May 2014.

Exhibit Number	Party	Description/Title
Exhibit 5524	CRK	Presentation by the Texas Commission on Environmental Quality (TCEQ) relating to the Differential Absorption Lidar (DIAL) Project, Summer 2007, Texas City, Texas, April 2010.
Exhibit 5525	CRK	Millenium Bulk Terminals Draft EIS, GHG Technical Report.
Exhibit 5526	CRK	Ranajit Sahu, Ph.D. C.V.
Exhibit 5527	CRK	Email from Dan Gunerston to Steven Manlow, Aug. 6, 2015 (Van Ness Bates No. VE-INF-002998).
Exhibit 5528	CRK	Vancouver Energy Air Quality Technical Report, Aug. 2014.
Exhibit 5530	CRK	Comments of Dr. Elinor Fanning on Draft Environmental Impact Statement of Tesoro Savage Vancouver Energy Distribution Terminal.
Exhibit 5531	CRK	Shi L et al 2016. Environmental Health Perspectives 124:46
Exhibit 5532	CRK	Washington State Department of Ecology 2008. Washington Toxic Air Pollutant Priorities Study.
Exhibit 5533	CRK	Thurston GD et al. 2016 Environmental Health Perspectives 124:484. http://dx.doi.org/10.1289/ehp.1509676. Reviewed in: Hoek et al. 2013 Environmental health 12:43.
Exhibit 5534	CRK	Gauderman et al N. Engl J. Med 2004; 351:1057 - The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age.
Exhibit 5535	CRK	Gauderman et al N. Engl J. Med 372:10:095 - Association of Improved Air Quality with Lung Development in Children.
Exhibit 5536	CRK	EPA Environmental Justice Screen Report - Fruit Valley.
Exhibit 5537	CRK	Brook RD et al. 2010 Circulation 121:2331 - Particulate Matter Air Pollution and Cardiovascular Disease.
Exhibit 5538	CRK	Elanor Fanning CV.
Exhibit 5540	CRK	Conservation Group Comments, Tank Car Standards.
Exhibit 5541	CRK	Petition to DOT to Issue Emergency Order.
Exhibit 5544	CRK	Letter from Washington Fire Chiefs RE: Request for Information on Crude Oil Risks.
Exhibit 5545	CRK	Letter from Brotherhood of Locomotive Engineers, 2014 RE: 2014 Marine & Rail Oil Transportation Study.
Exhibit 5546	CRK	12/5/13 Letter from NTSB to DOT regarding PHMSA notice.
Exhibit 5547	CRK	DOT/PHMSA draft regulatory impact analysis 2014.
Exhibit 5548	CRK	DOT Emergency Restriction/Prohibition Order
Exhibit 5549	CRK	Dept. of Ecology Washington State Marine and Rail Oil Transport Study 2014
Exhibit 5551	CRK	NTSB Hersman Remarks.
Exhibit 5552	CRK	DOT Safety Alert, Jan. 2014.
Exhibit 5553	CRK	Letter from Tesoro-Savage to North Dakota Industrial Commission, Sept. 2014.
Exhibit 5555	CRK	FEMA ER NJ Jersey City Operation Safe Delivery Workshop Slide Presentation 3 2015.

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Exhibit 5556	CRK	Fred Millar Ph.D. C.V.
Exhibit 5557	CRK	USDOT/FRA Office of Research and Development, "Event Probabilities and Impact Zones for Hazardous Materials Accidents on Railroads," November 1983 (partial copy).
Exhibit 5560	CRK	WA and OR Physicians for Social Responsibility Position Statement on Crude Oil Transport and Storage.
Exhibit 5561	CRK	Gateway Pacific Terminal Preliminary Draft Human Health Technical Analysis Methodology.
Exhibit 5562	CRK	Minimum Elements and Practice Standards for HIA.
Exhibit 5563	CRK	Dr. Suter DEIS comments.
Exhibit 5564	CRK	WA DOH scoping comments.
Exhibit 5565	CRK	WA DOH DEIS comments.
Exhibit 5566	CRK	Regional Tribal Operations Committee scoping comments.
Exhibit 5567	CRK	WA Physicians for Social Responsibility health graphic for Tesoro-Savage proposal.
Exhibit 5568	CRK	Frank Eugene James, M.D. C.V.
Exhibit 5570	CRK	TGG CA Well Stimulation Report.
Exhibit 5571	CRK	TGG TMX Report.
Exhibit 5572	CRK	TGG Quebec Report.
Exhibit 5573	CRK	TGG Costs of CBR Spills.
Exhibit 5574	CRK	TGG Line 9B Report.
Exhibit 5575	CRK	TGG Valero CA CBR Report.
Exhibit 5576	CRK	TGG KXL DSEIS Market Analysis Report.
Exhibit 5577	CRK	TGG KXL Employment Report.
Exhibit 5578	CRK	State of Washington Department of Commerce, Petroleum Supply and Use in Washington State, Oct. 2013.
Exhibit 5579	CRK	Muttit, Greg and Lorne Stockman, Tracking Emissions: The Climate Impact of the Proposed Crude-by-Rail Terminals in the Pacific Northwest.
Exhibit 5580	CRK	Enbridge, Investment Community Presentation.
Exhibit 5581	CRK	“Fracked Fuel and Petrochemical Proposals in the Northwest,” Sightline Institute, Feb. 2016.
Exhibit 5582	CRK	“The Northwest’s Pipeline on Rails,” Sightline Institute, July 2015.
Exhibit 5583	CRK	U.S. Energy Information Administration, Washington State Energy Profile.
Exhibit 5584	CRK	Tesoro Presentation, “Transformation through Distinctive Performance."
Exhibit 5585	CRK	Q3 2013 Tesoro Corporation Earnings Conference Call, November 7, 2013.
Exhibit 5586	CRK	Tesoro Presentation, “Driven to Create Value.”

Exhibit Number	Party	Description/Title
Exhibit 5587	CRK	Dakota Access, LLC, Draft Environment Assessment Dakota Access Pipeline Project Crossings of Flowage Easements and Federal Lands, November 2015.
Exhibit 5588	CRK	Technical Appendix.
Exhibit 5589	CRK	Ian Goodman C.V.
Exhibit 5590	CRK	Brigid Rowan C.V.
Exhibit 5591	CRK	Crude by Rail Chart 2010-1016.
Exhibit 5600	CRK	Joseph Wartman, Ph.D. C.V.
Exhibit 5612	CRK	EJSCREEN point-center ACS Report, Fruit Valley Neighborhood, Vancouver, Washington, produced using EJSCREEN mapper https://ejscreen.epa.gov/mapper/June 2016.
Exhibit 5620	CRK	Aerial Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5621	CRK	Aerial Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5622	CRK	Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5623	CRK	Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5624	CRK	Photograph: Mosier, Oregon, June 5, 2016.
Exhibit 5625	CRK	Drone Photograph: Mosier, Oregon, June 5, 2016.
Exhibit 5626	CRK	Drone Photograph: Mosier, Oregon, June 5, 2016.
Exhibit 5627	CRK	Aerial Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5628	CRK	Aerial Photograph: Mosier, Oregon, June 3, 2016.
Exhibit 5629	CRK	State of Oregon DEQ Memo re Mosier Spill (July 8, 2016).
Exhibit 5630	CRK	Washington State Rail Plan, Integrated Freight and Passenger Rail Plan 2013-2035.
Exhibit 5632	CRK	Secondary Economic Impacts of Costal Spills.
Exhibit 5633	CRK	Ernie Niemi Resume.
Exhibit 5901	CRK	Curriculum Vitae of David L. Wechner, M.S. AICP.
Exhibit 5902	CRK	David L. Wechner, Comments on the Tesoro Savage Vancouver Energy Distribution Terminal Draft Environmental Impact Statement (Jan. 14, 2016).
Exhibit 5903	CRK	City of Vancouver, Vancouver Comprehensive Plan: 2011–2030 (2011).
Exhibit 5904	CRK	City of Vancouver, Fruit Valley Sub Area Plan (Sept. 20, 2010).
Exhibit 5905	CRK	City of Vancouver, Riverview Gateway Subarea Plan (Feb. 2, 2009)
Exhibit 5906	CRK	City of Vancouver, Vancouver City Center Vision & Subarea Plan (June 18, 2007).
Exhibit 5907	CRK	City of Vancouver and Clark County, Regional Trail & Bikeway Systems Plan (2006).

Exhibit Number	Party	Description/Title
Exhibit 5908	CRK	City of Vancouver, Ordinances M-4090 (Sept. 11, 2014), M-4118 (Mar. 2, 2015), and M-4132 (Aug. 17, 2015).
Exhibit 5909	CRK	Johnson Economics, Predicted Impacts of the Tesoro Savage Facility on Development and Redevelopment in Downtown Vancouver, Washington (Dec. 18, 2013).
Exhibit 5910	CRK	Aerial imagery from Google Earth depicting the Fruit Valley, Esther Short, Columbia Way, Riverview, Old Evergreen Highway, and East Old Evergreen Highway.
Exhibit 5911	CRK	Northwest Area Committee & Region 10 Regional Response Team, Environmental Protection Agency, Oiled Wildlife Response (Jan. 2013).
Exhibit 5912	CRK	Vancouver Municipal Code, Chapter 20.620 (Columbia River Shoreline Enhancement Plan District).
Exhibit 5913	CRK	Johnson Economics, Estimated Economic & Fiscal Impacts of the Tesoro Savage Facility on the Waterfront Vancouver Development and Downtown Vancouver (Dec. 9, 2013).
Exhibit 5914	CRK	Elliot Njus, “Port of Vancouver to extend multiuse path that will eventually connect downtown to Vancouver Lake,” Oregonian (Aug. 19, 2013).
Exhibit 5915	CRK	Port of Vancouver USA, Notice of Mitigated Determination of Nonsignificance (MDNS), Port of Vancouver Trail Project, CP0280/281 (Mar. 21, 2014).
Exhibit 5916	CRK	Washington Bikes, Complete the Lower River Road Trail in Vancouver (Aug. 21, 2013).
Exhibit 5917	CRK	Vancouver-Clark Parks & Recreation Department, Vancouver Lake Park and Frenchman’s Bar Park.
Exhibit 5918	CRK	City of Vancouver, excerpts from Clark County Bicycle & Pedestrian Trail Use Snapshot: Fall 2010.
Exhibit 5919	CRK	Vancouver Municipal Code, § 20.630.080 (City Center Waterfront).
Exhibit 5920	CRK	City of Vancouver, Shoreline Master Program (Sept. 24, 2012).
Exhibit 5921	CRK	Vancouver Municipal Code, Chapter 20.760 (Shoreline Management Area).
Exhibit 5922	CRK	National Oceanic and Atmospheric Administration, excerpts from Sensitivity of Estuarine and Riverine Environments and Wildlife to Spilled Oil, Columbia River Atlas (June 2004).
Exhibit 5923	CRK	Excerpts from U.S. Department of Commerce, Summaries of Significant U.S. and International Spills, 1967–1991 (Nov. 1992).
Exhibit 5924	CRK	City of Vancouver, Waterfront Development Project.
Exhibit 5925	CRK	City of Camas, Resolution 1235 (Mar. 6, 2012).
Exhibit 5926	CRK	Clark County, Comprehensive Plan: Chapter 13, Shoreline Master Program (Sept. 12, 2012).
Exhibit 5927	CRK	Type IV Planned Development, Subdivision Substantial Development, Conditional Use and Variance Permits, and Critical Areas Permit: Columbia Waterfront LLC Vancouver Waterfront Development, Vol. II (June 2009).

Exhibit Number	Party	Description/Title
Exhibit 5928	CRK	Type IV Planned Development, Subdivision Substantial Development, Conditional Use and Variance Permits, and Critical Areas Permit: Columbia Waterfront LLC Vancouver Waterfront Development, Vol. I (June 2009).