Chapter 4
Environmental Health and Safety

4.1 Introduction

The proposed action would involve the handling and storage of crude oil on the project site. Additionally, crude oil would be transported by rail to the project site and by vessel from the project site to end destinations. Spills of oil related to the proposed action could occur on land or in water, at any time of day or night, and in any weather condition. It is impossible to know exactly when a spill is going to happen and how much oil is likely to be spilled. However, it is possible to identify risks based on the materials involved, where they are stored, how they are stored, the corridors through which they would travel, and typical weather conditions. While preventing a spill is the best strategy for avoiding potential damage to human health and the environment, once a spill occurs, a rapid, aggressive, and organized response can contain and control the spill and minimize damage.

4.1.1 What is the scope of this analysis?

This chapter presents the analysis of environmental health and safety impacts associated with incidents involving spills of crude oil,[1] fires, or explosions[2] during onsite handling and storage and offsite rail and vessel transport. The subsections that follow describe the scope of the analysis, study area, general approach used in this analysis, applicable regulations, and general risk considerations as developed with guidance from the co-lead agencies. The remaining sections of this chapter address potential impacts for terminal (onsite) operations, from rail transport, and from vessel transport. These sections also identify the existing requirements for each area and additional mitigation measures to offset potential impacts. The thresholds and measures were developed based on direction and guidance from the co-lead agencies. The chapter concludes with an analysis of the general environmental impacts of oil spills, fires, or explosions on the resources identified in Chapter 3, *Affected Environment, Impacts, and Mitigation.*

Impacts on environmental health and safety related to rail and vessel transport beyond the study area described below are addressed in Chapter 5, *Extended Rail and Vessel Transport*. Cumulative impacts on environmental health and safety are addressed in Chapter 6, *Cumulative Impacts*. Information on the economic and social costs of oil spills are addressed in Chapter 7, *Economics, Social Policy, and Cost-Benefit Analysis.*

[1] The analysis presented in this chapter focuses on Bakken crude oil but generally applies to any crude oil proposed for storage and handling by the applicant (i.e., diluted bitumen). In places where there is a material change in risk or consequence due to the chemical properties of a specific material (e.g., Bakken crude oil versus diluted bitumen), the difference is discussed specific to the material in question. Potential hazardous materials impacts associated with onsite operations are addressed in Section 3.14, *Hazardous Materials*.

[2] The term *explosion* is defined as a sudden, violent, and destructive blowing apart of something. A technical definition of explosion is a violent expansion in which energy is transmitted outward as a shock wave. For purposes of the EIS, the more general first definition is used.

4.1.2 What is the study area?

The study area for environmental health and safety includes humans and resources that could be harmed in the event of a spill during operation at the project site, during rail transport along the Puget Sound & Pacific Railroad (PS&P) rail line—from Centralia, Washington, to the project site—and during vessel transport along the Grays Harbor Navigation Channel.[3] These resources are described generally in this chapter and in detail in Chapter 3, *Affected Environment, Impacts, and Mitigation Measures*.

Because transport of oil would extend beyond this study area, the risks of rail transport beyond the PS&P rail line (on the BNSF and Union Pacific main lines) and beyond state waters (during transit along the west coast and abroad) are discussed qualitatively in Chapter 5, *Extended Rail and Vessel Transport*.

4.1.3 What is the approach to this analysis?

4.1.3.1 Information Sources

Numerous sources provided information on materials, risks, and transportation, as cited in the appropriate sections. A guiding source of information was the *Washington State 2014 Marine and Rail Oil Transportation Study* published by the Washington State Department of Ecology (Ecology) in March 2015 (Washington State Department of Ecology 2015).

The Washington State Legislature directed Ecology, in consultation with the Washington Utilities and Transportation Commission, Washington Military Department's Emergency Management Division, Federal Railroad Administration, and Washington State Department of Transportation to conduct a study on marine and rail oil transportation. In June 2014, Governor Inslee issued an Oil Transport Directive to Ecology outlining key components to be addressed. The Legislature's and Governor's actions were driven by the rapid changes in how crude oil is moving through rail corridors and over Washington waters, creating new safety and environmental risks. The study focused on developing recommendations to foster public health and safety, environmental protection, and respect for tribal treaty rights. Recommendations and information from the study are included as appropriate throughout this draft environmental impact statement.

New oil transportation safety legislation was passed in 2015 at the request of Governor Inslee. The legislation became effective July 1, 2015, in Engrossed Substitute House Bill (ESHB) 1449. The bill addresses financial assurance requirements for facilities and vessels, oil spill prevention plans and oil spill contingency plans, oil tanker tug escorts, and emergency response planning. Final and draft rules are discussed further in Section 4.2, *Applicable Regulations*.

4.1.3.2 Risk Analysis

Risk management involves the systematic identification, evaluation, and control of impacts that may arise from uncertain future events such as spills, fires, explosions, toxic releases, or natural

[3] The proposed action would result in increased rail and vessel traffic related to the transport of crude oil to and from the project site. Therefore, resources that could be affected during rail and vessel transportation are considered in this analysis.

disasters. Assessing a risk to a particular resource requires identifying possible hazards, evaluating the frequency of adverse events and the magnitude of their consequences, and determining appropriate measures for prevention or mitigation. By anticipating the level of risk and the potential impacts, preventive and mitigation measures can be implemented to reduce the frequency of an event, the impacts, or both.

Because it is not possible to predict the timing or exact magnitude of a spill, this chapter focuses on spill scenarios. Scenarios were developed for a range of potential incidents involving the terminal, trains, and vessels. These scenarios considered spills, fires, and explosions related to existing conditions (no-action alternative), operation of the proposed action at the project site and during rail and vessel transport, and worst-case spills. The semi-quantitative or screening risk assessment considered scenarios of the following types of incidents.

- Incidents involving handling and storage of crude oil at the project site.
- Incidents involving trains transporting crude oil and bulk materials along the PS&P rail line.
- Incidents involving vessels transporting crude oil and bulk materials in Grays Harbor.

The scenarios considered various sizes of potential spills based on the activity (such as transport or transferring oil) and size of tank, rail cars, and vessels. Spill scenarios are referred to using the amount of material spilled. The potential impacts would be related to the amount spilled, location, and other conditions. Table 4.1-1 presents these spill scenarios by source (project site, rail transport, vessel transport) and spill size.

Scenarios were chosen using expert opinion on locations where spills may more typically occur, such as during railcar unloading or vessel loading, or where they would result in worst-case spills, such as a vessel incident at the entrance to Grays Harbor. The quantity of oil spilled for the scenarios was based on the regulatory definitions of worst-case spill for the relevant source: onshore facility, vessel, and rail transport (WAC 173-182-030 and 480-62-300).

For an onshore facility, the worst-case spill would involve the entire volume of the largest aboveground storage tank (approximately 8.4 million gallons or 200,000 barrels of crude oil for the proposed action). The spill scenario for vessel loading at the facility was estimated taking into account the proposed transfer rate to the vessel multiplied by approximately 1 minute and 25 seconds to account for the maximum shutdown response time.

For rail transport, the worst-case spill on the PS&P rail line would involve approximately 17.75 rail cars. This reasonable worst-case spill quantity was calculated per WAC 480-62-300. It uses the percent of the largest train load of crude oil calculated by dividing the maximum operating speed by 65 and then multiplied by 2. The maximum operating speed is the top speed for the railroad company, which for PS&P is 25 miles per hour.

For a vessel, the worst-case spill would involve the vessel's entire cargo and fuel. The largest tankers would be Panamax class with the capacity to hold up to 14.7 million gallons (350,000 barrels). An additional 420,000 gallons (10,000 barrels) was added to represent the fuel onboard the vessel.

Table 4.1-1. Oil Spill Scenarios by Size

Source	Spill Scenario
Small	
Project site	Up to 2,100 gallons (50 barrels) spilled when transferring oil from rail cars or to vessels at the project site
Rail transport	Up to 1,000 gallons (24 barrels) spilled during a derailment along the PS&P rail line
Medium	
Project site	Roughly10,000 gallons (238 barrels) spilled when transferring oil to a vessel at the project site
	Roughly 50,400 gallons (1,200 barrels) spilled from pipeline or storage tank at the project site
Rail transport	Roughly 30,000 gallons (714 barrels or the contents of one full tank car) spilled during a derailment along the PS&P rail line
Large	
Project site	Up to 8.4 million gallons (200,000 barrels, the entire contents of 1 full storage tank) spilled on project site
Rail transport	Roughly 90,000 gallons (2,140 barrels or the contents of three full tank cars) spilled during a derailment along the PS&P rail line
	Roughly 150,000 gallons (3,570 barrels or the contents of five full tank cars) spilled during a derailment along the PS&P rail line
	Roughly 900,000 gallons (21,400 barrels or the contents of 30 full tank cars) spilled during a derailment along the PS&P rail line
Vessel transport	Up to 105,000 gallons (2,500 barrels) spilled into Grays Harbor from a vessel collision
	Up to 1.2 million gallons (29,000 barrels) from a vessel grounding in Grays Harbor
	Up to 15.1 million gallons (360,000 barrels or the entire contents of one full tanker, including fuel) spilled into Grays Harbor from a vessel allision at harbor entrance

The risk assessment determined the likelihood that a spill would occur. In general, the larger the spill, the less likely that the spill would be expected to occur. The following methods were used to determine likelihood of occurrence.

- For spills at the project site, operations information, such as the number of rail car unloadings, vessel loadings, and storage tanks in use, was combined with historical information on spills associated with these activities to determine the likelihood of spills.
- For spills along the PS&P rail line, the number of rail trips carrying crude oil was combined with historical information from the Federal Rail Administration on incidents along the PS&P rail line and across the country to determine the likelihood of spills.
- For spills during vessel transport, the number of vessel trips carrying crude oil was combined with historical information on vessel incidents to determine the likelihood of spills.

The risk assessment considered the type of operations, transportation routes for trains and vessels, and historical incident data to determine the likelihood of an incident happening. The analysis looked at risks in 2017 and in 2037 to reflect changes that might occur over the lifetime of the proposed action. The impacts identified in these years would apply for the lifetime of the proposed action, and the proposed mitigation measures are intended to apply for the lifetime of the proposed action.

The analysis, which is described in Appendix M, *Risk Assessment Technical Report*, estimated the *chance* of each spill scenario occurring in a given year. The *likelihood of an incident* can also be thought of as follows.

- **Likely to happen.** Involves regular transportation and facility operations or conditions that would be expected *to frequently happen*.
- **Unlikely to happen.** Involves unusual operations or conditions that would be expected *to rarely happen*.

4.1.3.3 Chance of a Spill Reaching Water

A spill of oil or hazardous material that reaches water has a greater potential to affect the environment or people. A spill on land would affect resources but, in general, would be easier to contain and clean up. Water can move oil or other materials over a bigger area and increase the complexity of a spill. Weather conditions, tides, river flows, and wind patterns greatly affect the movement of oil or hazardous materials in water as discussed in Section 4.3, *Risk Considerations*. To provide a general idea of the movement and extent of the area that could be affected by an oil spill to water, oil spill models were done for Grays Harbor and the Chehalis River (Appendix N, *Oil Spill Modeling*).

Federal and state regulations require equipment and design features, such as containment areas to catch spills or equipment like emergency shutoffs. These requirements are factors in determining the amount of oil that could reach water and are described in Section 4.1, *Environmental Health Risks—Terminal (Onsite)*; Section 4.5, *Environmental Health—Rail Transport*; and Section 4.6, *Environmental Health—Vessel Transport.* The likelihood of a spill reaching water can be described as follows.

- **Likely to reach water.** Incident occurs on or near the water and outside of a containment area.
- **Unlikely to reach water.** All or most of the spill is within a containment area or incident is not near water.

4.1.3.4 Potential to Affect the Environment

Impacts from an incident such as an oil spill, fire, or explosion vary widely based on the material type and amount, location, proximity to water, and weather conditions. The size of a spill does not alone determine the potential impacts. A small spill in a sensitive area could have significant impacts, as could a large spill or explosion. Therefore, impacts are not specifically identified for each spill scenario but are discussed generally in Section 4.7, *Impacts on Resources*.