SHORELINES HEARINGS BOARD

FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents.	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* DIRECT TESTIMONY OF BRENT FINLEY

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I. INTRODUCTION, QUALIFICATIONS, AND EXPERIENCE

1. My name is Brent Finley. I am an environmental consultant and attorney and have a Bachelors of Science in Marine Fisheries from Texas A & M University, Galveston (1997) *cum laude*, and a Juris Doctorate from New England School of Law (2003) *magna cum laude*. Since 2004, I have worked for Environment International Ltd., a scientific consulting firm, where I currently serve as a project manager. Prior to joining Environment International Ltd., I spent approximately 6 years in various roles as a scientist and consultant conducting environmental assessments and field research. While with Environment International Ltd., I have participated in a number of environmental assessments focusing on the effects of contaminants, including oil, on freshwater and marine ecosystems, with an emphasis on harmful impacts to fish. I have participated in the analysis of causes of vessel-related incidents and oil spills in Washington waters, which entailed a review of incident reports and data from the Washington Department of Ecology ("Ecology") and United States Coast Guard. I also conducted an assessment of the environmental risks associated with a hypothetical catastrophic oil spill occurring in Commencement Bay, Washington. My CV is attached as Exhibit A.

2. I have reviewed the State Environmental Policy Act ("SEPA") checklist for the Westway Terminal Tank Farm Expansion Project; the Westway Terminal Company LLC Tank Farm Expansion Project Findings of Fact and Conclusions of Law of the Shoreline Administrator; the City of Hoquiam and Washington Department of Ecology Responsible Officials' Amendments to the Environmental Checklist and Threshold Determination for Westway Terminal Tank Farm Expansion Project; the SEPA checklist for the Imperium Bulk Liquid Terminal Facility Project; and the City of Hoquiam and Washington Department of Ecology Responsible Officials' Amendments to the Environmental Checklist and Threshold Determination for Imperium Bulk Liquid Facility Project; and information available on the Port

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of Grays Harbor internet site regarding the terminal expansion projects proposed at Terminals 1 and 3 by the Westway Terminal Company, Imperium Terminal Services, and US Development Group.

3. I am familiar with the literature describing the harm that can occur to aquatic and marine environments from oil spills. I am generally familiar with the ecology of Grays Harbor. I am familiar with the geographic and environmental characteristics of Grays Harbor. I also am familiar with literature regarding the causes of oil spills and response technologies.

II. OIL SPILLED IN THE ENVIRONMENT IS PERSISTENT.

4. The behavior of oil when spilled into the environment is dependent upon many factors, including the environmental conditions at the time of the spill, the type of oil spilled, the volume of oil spilled, and where the spill occurs. Once introduced into the environment, oil undergoes weathering and transportation. Weathering is the physical and chemical transformation of oil that occurs when oil is released into the environment. Transportation refers to how the oil moves through the environment.

5. Weathering processes include evaporation, dispersion, dissolution, emulsification, adsorption, oxidation, and biodegradation. Evaporation occurs to the lighter, more volatile, components of oil as they enter the atmosphere. Dispersion is the process of oil spreading across the surface of the water. Dissolution refers to the process in which certain components of oil are dissolved into water. Emulsification is the mixing of water into oil which results in a frothy mixture of oil droplets and water. This is sometimes referred to as a "mouse" because of its texture and appearance. Adsorption occurs when heavier components of oil cling to surface of particles, such as sand and mud. These particles can then be spread throughout the environment and pushed into wetlands through wave and tidal action. Some components of oil will chemically react with oxygen in the air, a process called oxidation. Oxidation can break

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components of oil down into lighter compounds. Finally, certain compounds in oil can be biodegraded or broken down by micro-organisms.

6. These weathering processes are affected by environmental conditions, including temperature, wind, wave action, and type of shoreline and substrate. The colder temperatures of water and air can decrease the rate of evaporation. Conversely, evaporation may increase with increasing temperatures. Wave activity can increase the mixing of oil deeper in the water column, slowing evaporation. High energy wind and wave action can increase the rate of emulsion, which creates an oily mixture that is more persistent and difficult to clean up. The rate at which oil penetrates surfaces it comes into contact with is influenced by temperature, tending to increase penetration as temperatures increase. Environmental conditions can play an important role in influencing how long oil persists in the environment.

7. The fate of oil in the environment also is dependent upon the physical characteristics of spilled oil. Crude oil is a mixture of compounds that possess a range of different molecular weights. The molecular weight of the compounds influences the behavior of crude oil once spilled in water. Lower molecular weight compounds have a lower viscosity and are more volatile than compounds with heavier molecular weights. These lighter compounds readily evaporate into the atmosphere. Crude oils comprised of mostly lighter weight compounds tend to spread across the surface of water quickly and may decrease in volume by one-third within hours of the spill due to evaporation. As molecular weight increases, compounds are more likely to persist in the environment by clinging to particles, emulsifying, dissolving into water, and penetrating porous surfaces. Medium and heavy crude oils also are difficult to remove from surfaces with which they come into contact. The heavier weight compounds of oil may sink and form tar balls. Medium and heavy weight crude oil compounds

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can persist in the environment for years.

III. OIL IS HARMFUL TO MARINE ORGANISMS AND WILDLIFE.

8. Crude oil released into the environment can have toxic effects and harmful impacts to marine organisms and wildlife. Crude oil can affect individual animals by disrupting physiological processes that occur at the cellular level and at the organism level. Crude oil can also impact the behavior of animals. The impacts to individual animals can lead to modifications in a species population, and alter communities when multiple populations of species are affected. The biological effects of crude oil can be acute, occurring from a single exposure. Biological effects also can be chronic, resulting from multiple or continued exposure. These biological effects result from the direct internal or external exposure to crude oil compounds. Indirect biological effects may also occur, such as the modification of habitat or the loss of a food supply.

9. The direct biological effects of oil exposure vary depending on a number of factors, which include the type of oil compounds an animal is exposed to, the concentration of the compounds, the length of the exposure time, the characteristics of the species exposed, and the developmental stage of the animal.

10. The biological effects of crude oil vary by the type of oil compounds present in the environment. Studies conducted in laboratories and observations made at oil spills have demonstrated the harmful effects of exposure to oil. The lighter molecular weight compounds in crude oil, called aromatic compounds, are typically highly toxic. These light compounds present acute, or immediate, harm when animals are exposed to them. Ingestion, inhalation, or external contact can result in a range of adverse effects from irritation of skin and eyes to immediate death. Medium and heavy crude oils can pose both acute and chronic adverse biological effects. Immediate threats include suffocation or coating skin, feathers or fur impeding an animal's ability to maintain body heat or its ability to swim or float. Heavier oil compounds may pose

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risk of chronic exposure through the release of compounds called polycyclic aromatic hydrocarbons or PAHs. PAHs can be released slowly over time from oil compounds in the environment. PAHs also may bioaccumulate, meaning that they are incorporated into the tissues of some animals. The bioaccumulation of PAHs can result in the contaminants moving up the food chain at increased concentrations. Exposure to PAHs can result in developmental defects, lesions, and cancer.

11. Marine organisms are sensitive to the exposure to crude oil. Marine organisms may be exposed to oil in the environment through a number of mechanisms. Exposure routes include direct contact with oil, exposure to oil dissolved in the water, oil adsorbed to the substrate and particles, and oil compounds on or in food. Adverse effects to invertebrates and fish include death, inability to feed due to impairment of feeding mechanisms and senses, slowed growth rates, lesions, impairment of swimming ability, and behavioral impairment. Reproductive processes may be impacted, resulting in the production of fewer eggs, less viable eggs, deformation, and slowed developmental rates. If these effects occur in large enough numbers, a species population can experience reproductive failure.

12. Marine mammals and birds are also sensitive to the exposure to crude oil. These animals can become coated, or fouled, when oil is present in the water or on the shore. Oil destroys the waterproofing and insulation characteristics of feathers and fur, resulting in hypothermia and possible death. Oil can be ingested by animals while attempting to clean themselves or eating contaminated food, resulting in additional exposure that can be harmful or fatal. Another form of risk is through the inhalation of volatile vapors. Exposure to oil can result in reproductive failure. Oil transferred from bird feathers to developing eggs can inhibit the development of embryonic birds.

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13. The timing and location of an oil spill may influence the harmful impacts of an oil spill on a species, population or community. For instance, a large oil spill could occur in a location and time when there is relatively little wildlife present. Contrastingly, a small oil spill could result in the death of a large number of birds if it occurs near occupied critical habitat. Similarly, weather conditions play an important factor in the harmful exposure of marine organisms to oil. Cold water temperatures and high wave action could result in the more toxic oil compounds being mixed deeper into the water column adversely impacting fish and invertebrate populations.

14. An example of how timing and location of an oil spill can influence the harmful biological impacts of an oil spill is the 2006 *North Cape* oil spill that occurred in Rhode Island. Over 800,000 gallons of light oil was spilled after the grounding of a fuel barge in a storm. Under normal weather conditions, the highly toxic, light compounds would have been expected to evaporate quickly. However, environmental conditions, such as high-wave-energy and cold water temperatures, contributed to the slowing of the rate of evaporation. It is estimated that eighty percent of the volume of spilled oil was dispersed into the water column. The benthic community of marine organisms was substantially harmed. The oil spill killed millions of lobsters, surf clams, and fish, billions of invertebrates, and more than 2,000 birds. In addition, the spill harmed the commercial lobster fishery.

15. Not all harmful impacts of oil spills are immediately apparent, as in the death of hundreds of animals from a single release of crude oil. Repeated, smaller spills of crude oil can also have harmful and lasting impacts on ecosystems. As discussed in Section II above, the heavier compounds in oil can persist in the environment, in some cases for decades. Heavier compounds of crude oil tend to cling to sediment particles, coming to rest in low energy

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environments. Repeated oil spills in an area or system can result in oil compounds accumulating in specific areas. When present in high enough concentrations, these crude oil compounds can be toxic decreasing reproductive success, modifying the behavior of organisms, and causing physical damage to organisms making them less physically fit.

IV. THE MARINE ORGANISMS AND WILDLIFE THAT UTILIZE GRAYS HARBOR ARE AT RISK OF HARM FROM A CRUDE OIL SPILL.

16. Grays Harbor and the adjacent outer coast provides habitat for a diverse assemblage of species. Grays Harbor is an estuary that provides a range of habitat important to birds, marine mammals, fish, and invertebrates. Habitat along the shore includes mud flats, salt marshes, and rocky and sandy beaches. Birds rely on the near shore habitat for feeding and resting. Plants in these areas provide important habitat for birds and invertebrates. A number of streams and rivers are also important to anadromous fish species that pass through Grays Harbor as juveniles and adults. Dungeness crabs use Grays Harbor as a nursery ground before migrating to the outer coast. Red rock crabs are also present in the waters surrounding Grays Harbor.

17. Grays Harbor includes a National Wildlife Refuge located in Bowerman Basin, adjacent to the Port of Grays Harbor Terminals and the shipping channel. The National Wildlife Refuge has been identified as one of four major staging areas for migrating shorebirds in the Pacific Flyway. It hosts of the largest concentrations of shorebirds on the west coast. In the spring and fall hundreds of thousands of shorebirds feed and rest in the Wildlife Refuge. Shorebird species include the black bellied plover, dunlin, least sandpiper, red knot, semi-palmated plover, and western sandpiper. Birds of prey that utilize the refuge include the bald eagle, Caspian tern, great blue heron northern harrier, and peregrine falcon.

18. A number of the species that utilize Grays Harbor and its adjacent waters are listed as threatened or endangered. Threatened and endangered birds include the western snowy

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plover (*Charadrius alexandrius nivosus*) and the marbled murrelet (*Brachyramphus marmoratus*).

19. Threatened and endangered fish species that use Grays Harbor and its surrounding coast line include the bull trout (*Salvelinus confluentus*), lower Columbia River Chinook salmon (*Onchorhynchus tshawytscha*), Columbia River chum salmon (*O. keta*), upper Willamette River Chinook salmon (*O.* tshawytscha), eulachon (*Thaleichthys pacificus*), and southern green sturgeon (*Acipenser medirostris*).

20. Threatened and endangered species of marine mammals that use Grays Harbor and its surrounding coats line include the southern resident killer whale (*Orcinus orca*), Steller sea lion (*Eumetopias jubatus*), humpback whale (*Megaptera novaeangliae*), blue whale (*Balaenoptera musculus*), fin whale (*Balaenoptera physalus*), Sei whale (*Balaenoptera borealis*), sperm whale (*Physeter macrocephalus*).

21. Threatened and endangered species of marine reptiles that use Grays Harbor and its surrounding coast line include green sea turtle (*Chelonia mydas*), olive ridley sea turtle (*Lepidochelys olivacea*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*).

22. Other ecologically important species present in the waters of Grays Harbor include surf smelt (*Hypomesus pretiosus pretiosus*), sand lance (*Ammodytes hexapterus*), American shad (*Alosa sapidissima*), shiner perch (*Cymatogaster aggregate*), English sole (*Parophrys vetulus*), speckled sanddab (*Citharichthys stigmaeus*), and sand sole (*Psettichthys melanostictus*).

23. It is my opinion that a crude oil spill could substantially and harmfully impact individuals and populations of these species depending on the timing and location of the spill.

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For instance, a spill of crude oil near the National Wildlife Refuge during the spring or fall could harm hundreds of migrating shorebirds. Depending on the season, different assemblages of shorebirds or waterfowl are present, and these birds could become covered in oil, leading to death. Harmful effects of an oil spill could make habitat unsuitable for rest and nourishment that is critical for the successful migration of these birds. It is also my opinion that an oil spill could harmfully impact individuals and populations of fish species, depending on the timing and location of a spill. For instance, salmonids rely on Grays Harbor as juveniles and adults for food and shelter during their transition between rivers and oceans. An oil spill could result in the death of these sensitive fish through direct exposure. It also could result in the fish avoiding the area of the spill, forcing them into less suitable habitat or disrupting their migration cycle. This could lead to increased predation on salmonids, weakened fish, or a reduction in spawning success. It also is my opinion that an oil spill could harmfully impact individuals and populations of invertebrates, depending on the timing and location of a spill. As seen in the *North Cape* oil spill, an oil spill in the right conditions could substantially harm benthic populations. In the case of Grays Harbor, the Dungeness crab fishery could be directly harmed as Grays Harbor is a nursery for this species. Oil reaching the shores could kill the invertebrates in the mud and sediment, organisms that are an important source of food for shorebirds.

24. At all times of the year, Grays Harbor provides habitat for a diverse assemblage of birds, mammals, fish and invertebrates. Regardless of when an oil spill occurs, marine organisms and wildlife, as well as the Grays Harbor ecosystem, are at risk of harm. This harm can be direct and immediate, or it can happen through lasting impacts rendering habitat unsuitable for migrating animals.

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V. THE ADDITION OF TRANSITS BY CRUDE VESSELS AND AN INCREASE IN TANKER TRANSITS WILL INCREASE THE RISK OF OIL SPILLS IN GRAYS HARBOR.

25. Oil spills occur as a result of complex chains of events and their prevention cannot be guaranteed. The risk that a vessel will have an incident or accident that results in an oil spill is dependent on variables that I will refer to as internal and external. Internal variables relate to the operation and maintenance of the vessel itself. External variables relate to the conditions and environment in which the vessel operates. Internal variables that lead to oil spills typically involve human error and mechanical failure. These failures may be the result of a lack of or poor training of personnel, errors in judgment or perception, lack of skill, corporate culture, inadequate safety procedures, poor equipment maintenance, or malfunctioning equipment. External variables, those which are outside the control of the vessel, include environmental conditions such as weather conditions, visibility, sea state, currents, and tides. External variables also include the operation of other vessels in the vicinity of the vessel in question. Interactions between vessels can lead to vessels striking vessels, fixed objects, or running aground. Each vessel operating within a system has an intrinsic risk of experiencing an incident or accident as a result of its own internal variables and the influence of external variables. By increasing the number of vessels in a system, the risk of a single vessel spilling oil will likely also increase as a result of the change in external variables, such as the presence of other vessels.

26. Steps may be taken to minimize the risks associated with respect to some of these variables. For example, a vessel may choose not to operate in adverse conditions, such as waiting for visibility conditions to improve. However, due to the complexities of a system, decreasing the risk associated with one variable may result in the increased risk associated with another variable. Continuing with the example above, in waiting for visibility conditions to

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improve, the risk associated with vessel interactions may increase as other vessels, both small and large, may also have waited for improved visibility conditions. The ability to minimize risk associated with variables also may be impacted by the overall increase in vessel traffic. As more vessels enter a system, a large tanker vessel may have less opportunity in choosing when it transits a certain area. Increased vessel traffic will likely result in tankers operating in less than favorable environmental conditions.

27. Oil spills also may occur during the movement of oil to or from a vessel, referred to herein as the transfer of oil. Both internal and external variables influence the risk that an oil transfer may result in an oil spill. As with the increased number of vessel transits, an increase in the number of oil transfers may result in an increased risk that an oil spill will occur.

28. The potential increase in risk discussed above relates solely to the probability that an individual vessel will have an incident or accident that results in an oil spill. Another important risk to consider is the overall increased risk of an oil spill occurring in Grays Harbor. By increasing the number of tanker vessels transiting Grays Harbor, the probability that Grays Harbor will be impacted by an oil spill will be increased. Each vessel poses an individual risk that an oil spill could occur. More vessels operating means more chances of a spill. However, because the vessels are not operating independently in the system, this overall increased risk of a spill is not a simple additive increase based on the number of vessels. Rather, interactions between vessels in an increasingly complex system enhance the increased risk of a spill occurring in Grays Harbor. With each additional vessel operating in Grays Harbor, the risk or chance that an oil spill will occur in Grays Harbor goes up.

29. It is my opinion that, in general, steps may be taken that minimizes risk associated with vessel operations. It is my opinion that, in some cases, it may not be possible to minimize

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the risk of an oil spill below a threshold of risk that is advisable or acceptable. Without proper analysis, it is not possible to evaluate the potential increase of an oil spill due to increased tank vessel transits.

30. According to Vessel Entries and Transit (VEAT) data published by Ecology from 1993 to 2012, Grays Harbor has only recently begun to receive tank vessels. Of the 82 entering vessels reported in the 2012 VEAT report, only 3 were tank vessels and the remaining 79 were cargo and passenger vessels. Cargo vessels do not carry crude oil or petroleum products. While these tankers pose a risk of an accident, a potential catastrophic spill from these vessels is much smaller than the size of a catastrophic spill from a tanker transporting crude oil.

31. From 1993 to 2006, no tank vessel transits in Grays Harbor were reported in the VEAT reports. The appearance of tank vessels in the VEAT data beginning in 2007 does not necessarily indicate that these vessels transporting crude oil or petroleum products.

32. Between 1993 and 2006, according to VEAT reports, the total number of tanker vessels entering Grays Harbor ranged between a low of 31 vessels per year to 134 vessels per year. Since 1998, the annual number of tanker vessels entering Grays Harbor has not exceeded 84 tanker vessels.

33. The Mitigated Determination of Non-Significance ("MDNS") for the Westway project states that there were 84 entering vessels in 2012. This is different than the 82 entering vessels identified in the 2012 VEAT report. For purposes of my evaluation, I will assume that the number of entering vessels is 84 and 168 vessel transits (entering and departing) per year. Using 2012 levels, an average of 1 tanker vessel would be transiting Grays Harbor every 2 days.

34. The Westway proposal anticipates that 60 outbound, loaded crude tankers will be

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departing from Terminal 1. The Imperium proposal indicates that 200 outbound, loaded crude tankers will be departing from Terminal 1. The total vessel entry transits associated with these two projects would be 260, or 520 entry and departure transits.

35. The Westway proposal alone would increase tanker transits by 171 percent from the 2012 level. When the anticipated traffic from the Imperium proposal is combined with the anticipated traffic from the Westway proposal, there is a 410 percent increase in tanker traffic. At this rate, a loaded, outbound crude tanker will transit Grays Harbor on average every day and a half. In total, approximately two tankers will transit Grays Harbor per day.

36. The US Development Group project currently anticipates 60 loaded, outbound crude tankers will be departing from Terminal 3. When the anticipated tanker traffic from the Westway and Imperium projects are combined with the anticipated tanker traffic of the US Development Group project, there is a 481 percent increase in tanker traffic. At this rate, a loaded, outbound crude vessel would transit Grays Harbor every 1.14 days on average. On average, 2.2 tankers would transit Grays Harbor every day.

37. By increasing the number of tanker vessels transiting Grays Harbor, the risk that a vessel will have an accident resulting in an oil spill may be increased. By itself, adding an additional vessel transit to a system does not necessarily increase the odds that a vessel will have an incident or accident leading to an oil spill. However, Grays Harbor and the neighboring outer coast is a dynamic system. Weather conditions change. Sea state changes. Wave, current and tidal conditions change. The addition of tanker transits will also increase the rate of interactions with other vessels, both tanker vessels and small vessels. Waters in and around Grays Harbor are transited by commercial and recreational vessels, such as whale watching boats, charter fishing boats, commercial fishing vessels, sail boats, and power boats. The dynamics of these variables

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will influence the potential risk of an oil spill.

38. According to an analysis of oil spill risk in Washington waters, oil tankers pose the highest risk of a potential worst-case discharge of oil spillage (ERC, 2009). Cargo tankers pose the second highest risk. It is reported that between 1995 and 2008 tanker vessels experienced 14 oil spills and 132 near-miss casualty incidents. During this period there were 119 spills and 1,035 near-miss vessel casualties in Washington waters.

39. Grays Harbor has a rich ecosystem with habitat that is critical for ecologically and commercially important species. The habitat and species found in Grays Harbor are highly sensitive to harmful effects associated with spilled oil. In the event that an oil spill does occur, it is important to understand the probable fate and transport of the oil. It has been suggested that movement of oil from an oil spill occurring within Grays Harbor has been modeled and studied using the General National Oceanic and Atmospheric Administration ("NOAA") Operational Modeling Environment ("GNOME"); however, I am not aware that this analysis and its conclusions have been published. Based on the information readily available, it is unclear how quickly oil could be expected to impact sensitive habitat and species within Grays Harbor depending on where and when the spill occurs. Modeling conducted for oil spills occurring outside the mouth of Grays Harbor indicates that an oil spill will spread quickly throughout Grays Harbor. A study prepared for Ecology in 2005, entitled "Evaluation of the Consequences of Various Response Options Using Modeling of Fate, Effects and NRDA costs for Oil Spills into Washington Waters", showed that an oil spill occurring outside of Grays Harbor would penetrate the majority of waters throughout Grays Harbor within the first 6 hours, reaching more sensitive habitat areas within 12 hours. An oil spill occurring within Grays Harbor will most certainly spread throughout Grays Harbor in much less time. This increase the challenge of

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responding to the oil to prevent it from impacting sensitive habitat and natural resources. A spill occurring at or close to the Port of Grays Harbor could quickly impact the National Wildlife Refuge, due to its close proximity to the port.

40. It is my opinion that the anticipated 410 percent increase in tanker traffic from the Westway and Imperium projects, individually and combined, should be analyzed to understand the potential increased risk of incidents and accidents resulting in oil spills. I believe this analysis needs to occur before any decision is reached about whether the Westway or Imperium projects pose a significant probable risk of harm to the environment. The change from the present rate of a single tanker vessel transiting Grays Harbor every two days to a rate of over two tanker vessels transiting Grays Harbor each day is substantial. It is my opinion that this study is a necessary step in determining whether the project will not have a significant impact on the environment.

41. I have reviewed the declaration of Ms. Sally Toteff, the Director of the Washington Department of Ecology's Southwest Regional Office. Ms. Toteff's declaration appears to support my opinion that the vessel traffic impact analysis ("VTIA") is necessary to determine whether the Westway project will not have a probable significant impact on the environment. Ms. Toteff's declaration states that "Recognizing there was a lack of detailed documentation regarding operational safety practices specific to Grays Harbor, the Co-leads wanted to have the VTIA done to verify that there would be no probable significant impacts …" (Decl. Toteff, ¶ 6).

42. The VTIA is listed as a "mitigation measure" supporting the determination by the Co-Lead Agencies (The City of Hoquiam and Ecology) that the Westway and Imperium projects will not have a probable significant impact on the environment. The MDNS for the Westway

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and Imperium projects require that a VTIA be completed prior to operation of the crude terminal facility. It is my opinion that the VTIA is critical to making a determination as to the impacts of the Westway or Imperium proposal. Without the VTIA, it is not possible to make a determination that the Westway or Imperium projects will not have significant environmental impacts. As a result, the VTIA should have been completed before the MDS was issued.

43. In addition to analyzing the potential increase for risk of an oil spill from a vessel, it is also my opinion that the fate and effects of a likely oil spill should be analyzed. An oil spill from a loaded, crude oil tanker poses a substantially higher risk of harmful impacts to the environment, than an oil spill from a cargo tanker or smaller vessel, due to the larger volume of oil being transported. Due to the unique characteristics of Grays Harbor, the VTIA could show that there is a heightened risk of spill in certain areas of Grays Harbor due to the nature of the shipping channel, vessel patterns, and environmental conditions. In order to make a determination that the proposed increase in tanker traffic will not significantly impact the environment, it is my opinion that if an oil spill does occur, it must be determined what resources will be impacted and the level of that impact and how quickly they will be impacted. This analysis should examine each type of crude oil that is anticipated to pass through the Westway and Imperium terminals, as each type of crude oil has unique characteristics behaving differently in the environment and posing differing harm to natural resources.

VI. EVALUATION OF THE EFFECTIVENESS OF ESCORT TUG REQUIREMENTS IS INSUFFICIENT.

44. The MDNS for the Westway project requires that "[t]wo tugs shall accompany all loaded outbound crude vessels from the terminal to three nautical miles offshore and provide assistance if needed. A third tug shall also be available." It is my opinion that this precautionary measure of requiring two escort tugs acknowledges the increased risk of an oil spill in Grays

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Harbor. It is my opinion that this precautionary measure needs to be analyzed in order to evaluate its effectiveness.

45. The purpose of a tug escort is to provide assistance to a tanker vessel in the event that an incident occurs. Tug boats assist tanker vessels by applying steering or braking forces to guide and/or stop the tanker vessels. The effectiveness of tug boats to provide assistance is dependent upon factors such as the type of tug boat, the tug boats horsepower, the size and speed of the tanker vessel, environmental conditions and the location of the vessels. Tug boats need sufficient room to employ emergency maneuvers to successfully prevent an accident, such as a collision or grounding. It is my opinion that an evaluation is necessary to determine the effectiveness of two tug escorts in minimizing the risk of an oil spill. Without an understanding of the size and type of tug escorts necessary to assist the types of crude vessels anticipated to be transiting Grays Harbor under the local conditions, it is not possible to evaluate whether the two tug escort requirement will be sufficient to minimize the risk of an oil spill.

VII. PRE-BOOMING PLAN REQUIREMENTS ARE NOT SUFFICIENTLY CONSIDERED OR ADEQUATE.

46. The effectiveness of an on-water oil containment boom depends on the type of boom used and the conditions in which it is used. Environmental factors that can decrease the effectiveness of a boom to contain an oil spill include currents and winds. Currents can decrease boom effectiveness through entrainment. Entrainment is a process that occurs when currents flowing under and around the containment boom pull oil under the containment boom. Studies have shown that, in general, entrainment begins to occur when currents perpendicular to the boom exceed 0.7 knots. Entrainment increases linearly as currents increase above 1 knot to a twenty percent loss of contained oil at currents of 2 knots, and a sixty percent loss of contained oil at 4 knots. Another factor that can compromise the effectiveness of a containment boom is

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the impact of debris driven into the boom by strong currents. Wind driven waves can cause contained oil to over-top an oil containment boom.

47. The MDNS for the Westway project acknowledges that current and debris conditions may exceed the safe and effective use of preventative containment booms. The MDNS requires that "Pre-booming of all oil transfers over water is required if safe and effective. Because the Chehalis River typically has a strong current and debris present, if pre-booming cannot be safely conducted, alternative measures are required." Grays Harbor and the terminus of the Chehalis River are tidally influenced. Tidal flows may influence and enhance currents.

48. The MDNS does not specify what "alternative measures" are required. Similarly, the MDNS does not identify what "alternative measures" are contemplated, or under what circumstances they should be employed. It is my opinion that the failure to designate what alternative measures, and under what circumstances, should be used is the equivalent of not requiring that alternative measures be used.

49. I am aware of only one published study that has evaluated the effectiveness of preventative booming in the area of the Port of Grays Harbor. This is a 2006 study conducted by Environmental Research Consulting and Applied Science Associates, Inc. for Ecology Spills Program that is entitled "Oil Transfer Rule Currents Analysis Related to Vessel Oil Transfer Rule (WAC 317-40) and Oil Transfer Requirements of Facility Standards Rule (WAC 173-180A)". This study presented summary current data for the Port of Grays Harbor that indicates the current is minimal. However, this study failed to provide information on where and under what conditions the data was collected. The information presented in this study conflicts with the statements made in the MDNS that clearly indicates that strong current conditions can exist. Because of this, it is my opinion that this study and information is not helpful to the analysis of

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effectiveness pre-booming for the Westway or Imperium project.

50. It is my opinion that current and wind conditions at the Port of Grays Harbor should be analyzed. Without conducting such a study, it is not possible to evaluate whether pre-booming will be effective under local conditions. Further, it is my opinion that without conducting such an analysis, it is not possible to evaluate or identify acceptable "alternative measures" that would allow the safe and effective containment of oil spilled during a transfer to an oil tanker.

VIII. CONCLUSION

51. It is my opinion that it is unknown whether the mitigation measures required for the Westway and Imperium projects are sufficient, so that even if complied with, the risk of an oil spill presents a significant risk of environmental impact to the Grays Harbor warranting analysis in an Environmental Impact Statement. For the reasons stated above, the proposed Westway and Imperium projects pose a significant and probable risk of environmental harm to marine fish, tribal fisheries, commercial fisheries, wildlife, and the aquatic environment of Grays Harbor and the Chehalis River.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 6TH of September, 2013, at SEATTLE, WASHINGTON

BRENT FINLEY

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EXHIBIT A

CURRICULUM VITAE
OF
BRENT FINLEY, J.D., LL.M.

Environment International Ltd.
1305 NE 45th Street
Seattle, Washington 98105
206.525.3362
brent.finley@eiltd.net

EDUCATION AND PROFESSIONAL REGISTRATIONS

2008 LL.M., Sustainable Int'l Development, University Washington School of Law, Seattle, WA
2003 Washington State Bar #34575
2003 J.D., New England Law, *magna cum laude*, Boston, MA
1997 B.S., Marine Fisheries, *cum laude*, Texas A&M University

PROJECT EXPERIENCE (*Selected Relevant Projects*)

Risk Assessment of a Potential Catastrophic Oil Spill in a Major Northwest Port. Conducted an assessment of the financial and environmental risks and liabilities associated with a hypothetical large-scale oil spill in a deepwater port. Liability was assessed under federal laws, such as the Oil Pollution Act of 1990 and the Clean Water Act, and state laws. The analysis included estimating response costs, natural resource damages, penalties, property damage, and personal injury. Environmental damage focused on short and long-term injury to aquatic and terrestrial flora and fauna. The report also examined potential political and public responses and concerns.

Causal Analysis of Oil Spills in Puget Sound, WA. Conducted a comprehensive review of available data regarding the primary causes and contributing factors of oil spills in Puget Sound that occurred between 1990 and 2006 on vessels greater than 300 gross tones. The study included conducting interviews with agency and industry personnel to identify common errors, equipment failures or practices that are perceived as leading causes of spills. The study was prepared for a governor's council to identify areas in which improved practices or more adequate equipment would lead to the greatest reduction of oil spills.

An Evaluation of Regional Citizen Advisory Councils and Other Public Involvement Models to Improve Spill Response (and Prevention) in Washington in the First Twelve Hours of an Oil Spill. Conducted research for major portions of a broad-ranging study analyzing community involvement models and their ability to improve oil spill prevention and response in Washington. Prepared a report based on legal analysis and research associated with the different public involvement models used around the nation, including more than 50 interviews of personnel from federal, state and tribal agencies and industry throughout the West Coast. Evaluated a variety of community/public involvement models according to specific criteria, including their ability to assist with oil spill prevention and response.

Facilitation and Technical Support to NRDA Committee Related to Injury Determination of ESA-listed Fish Species. On behalf of five tribal trustees, led a Trustee technical group with the development of studies aimed at injury determination and quantification for fisheries resources in the Lower Willamette River, Oregon in connection with the Portland Harbor Superfund site under CERCLA. The studies focused on white sturgeon, ESA-listed spring Chinook salmon and state ESA-listed Pacific lamprey to determine exposure to and effects of chemical contaminants. Involvement includes preparing life history descriptions and adverse effects profiles for the focal species in addition to preparing adverse effects profiles for more than twenty contaminants of interest to identify data needs. The project involved close coordination with the National Oceanic and Atmospheric Administration, the U.S. Fish and Wildlife Service, the Oregon Department of Fish and Wildlife, and at least ten potentially responsible parties. Coordinated with the parties to develop a base of information from which to determine injuries. Actively participated on committees to develop toxicological profiles for contaminants of concern at the site.

Identification of Remedial Investigation (RI) and NRDA Information Needs at a Site on the Upper Columbia River, WA. On behalf of a tribal client, worked with government biologists to compile existing information on fish and wildlife populations in the Lake Roosevelt system. This information was used to determine data gaps and information needs supporting the development of remedial investigation plans and NRDA efforts.

Population Effects of Parasites Upon a Benthic Fish, British Virgin Islands. Conducted subtidal research studying the effects of a parasitic copepod upon a benthic fish population. Tagged individual fish to monitor variation in fish population and infection throughout the study area. Characterized and mapped benthic habitat and surveyed area predators. Through laboratory studies, examined infection pathways, infection rate and effect of infection upon host fish.

Community Effects of Introduced Species, Gulf of Maine. Conducted sub-tidal marine research examining the effects of a non-native algal species (*Codium fragile*) and bryozoan species (*Membranipora membranacea*) upon temperate reef communities. Research included evaluating settlement patterns of fish, laboratory feeding assays, and the abundance and distribution of flora and fauna species.

Data Collection and Geological Surveying for Eel Grass Restoration Project at a Superfund Site, Narragansett Bay, RI. Assisted in planning and conducting geological surveying. Sampling included side-scan sonar and transect video data collection and analysis of eel grass beds adjacent to a Superfund site in Rhode Island that was primarily contaminated with acids, solvents, paint, waste oil and oil contaminated with polychlorinated biphenyls.

Environmental Risk Assessment, RI. Analyzed chemical sediment and toxicology data to assess human health and ecological risk levels. Databases analyzed were derived from sediment, water and toxicology data from a river previously polluted by textile industries and a decommissioned, coastal shipyard. Data was processed to determine appropriate cleanup levels and to determine if cleanup goals had been achieved.

Geological Surveying and Contaminant Assessment of Naval Shipyard, Philadelphia, PA. Conducted sediment core sampling and processing and analyzed side-scan sonar data for unexploded ordnance and other debris in a decommissioned naval shipyard. Core samples were photographed and digitally rendered into a sample database along with chemical contaminant analysis.

Assessment of Natural Resource Injuries in a Northeastern Lake. Worked with staff to prepare a preliminary natural resource damage assessment at a formerly dammed lake, that had since diminished in size after the dam was irreparably damaged by local industrial activities. The analysis examined the loss of fish and wildlife habitat, reduction in population sizes, loss of recreational areas, and impacts on the local economy.

Study of the Impact of a Beach Renourishment Project on Invertebrate Populations. Conducted research and presented findings on the effects of a large-scale beach renourishment project on a barrier island. Interstitial invertebrate populations were monitored to evaluate short-term impacts in comparison to a 20-year baseline data. Results were presented at an annual scientific conference.

Critical Areas Ordinance Mediation for Grays Harbor County, WA. Assisted with a mediation regarding the Critical Areas Ordinance (CAO) updates for Grays Harbor County, Washington. Made contact and maintained communication with diverse individuals and groups consisting of county officials and technical staff, federal agencies, local timber industries, construction industries, farmers, and local citizens in order to ensure all stakeholders had a voice in the mediation process. Using public feedback, he conducted research into the various issues associated with the CAO in order to ensure an accurate understanding of the differing stakeholders' viewpoints.

Individual Septic Disposal Systems Compliance and Enforcement Support, Rhode Island Department of Environmental Management (RI DEM). Working with the legal department of a state agency, enforced individual septic disposal systems (ISDS) regulations. Reviewed investigation case files, primarily from urban and wetland areas, to determine compliance with state regulations. Prepared agency notices and court complaints, and notified agency technical personnel where more information was needed to make a determination of ISDSs compliance. Worked with defendants to encourage compliance and out-of-court settlement of disputes.

Assisted in Mediation of ESA Litigation, Pacific Northwest. Provided mediation support in a a legal dispute between environmental advocacy groups and federal agencies regarding the recovery of grizzly bear populations in the North Cascades under the Endangered Species act. The environmental advocacy groups were seeking to have the recovery plan enhanced and implemented.

Application of ARARs at Superfund Site, Portland, OR. Provided a review of applicable or relevant and appropriate factors (ARAR) at a creosote-contaminated site to ensure that the record of decision (ROD) required the appropriate level of safety for both human health and the environment. This required an in depth understanding of the closure requirements of the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), and the interplay between the two statutes. Some ARARs at the site included (CWA) and Oregon water quality standards.

Aberdeen Brownfield Redevelopment Permitting, Aberdeen, WA. Ensured compliance with permitting requirements of the CWA and other statutes and regulations for a Brownfield Redevelopment project cleanup being conducted under a Model Toxic Control Act (MTCA) consent decree, the Washington State equivalent of RCRA. Because the cleanup efforts occurred in coastal wetlands, a CWA Nationwide Permit 38 was obtained and the project was conducted in accordance with ESA, CWA, Shorelines Management Act, and Washington's State Water Pollution Control Act,

Natural Resource Damage Assessment Policy and Technical Support, WA. Assisted with a natural resource damage assessment in a marine ecosystem injured by a variety of hazardous contaminants released to the air, surface water, groundwater and sediments. Applied technical site information to assess strength of potential responsible party liability claims and associated defenses. Examined the spatial extent of contamination spread by marine currents, injuries to marine flora and fauna, and potential human exposure.

Compliance with Applicable Laws and Other Requirements at Federal Facilities. Assisted military installations in EMS development. Identified federal, state and local laws and other requirements that may be applicable to general and specific aspects of installation operations.

Environmental Compliance Audits. Served on a team of compliance auditors who evaluated more than 30 VA Medical Centers. Participated in facility inspection, personnel interviews, and document review. Facility visits included the inspection of fuel storage tanks, cooling and heating systems and waste disposal including methods and practices of medical and hazardous waste disposal. Assisted in preparing and presenting findings detailing best management practices employed, areas of operation that could be improved, and areas of noncompliance to facility managers and staff.

Compliance and Enforcement of Construction and Demolition Waste Disposal Regulations, Rhode Island Attorney General Office (RI AGO). Reviewed local waste disposal site records and agency documents to evaluate compliance with Rhode Island state regulations. Reviewed possible common law public nuisance claims on behalf of public where data indicated potential risk to human health and the environment. Prepared court motions in response to companies operating in violation of or without a waste disposal permit.

Wetland Permitting Litigation and Mediation Support, RI DEM. Prepared answers and complaints involving wetlands impacted by rural housing development. Assisted agency counsel in preparation for pretrial hearings and mediation efforts between property owners and attorneys.

Resource Protection and Agency Oversight, Miami, FL. Provided support in an effort to enhance fisheries resource protection in the Southeast Atlantic, Caribbean and Gulf of Mexico. A special emphasis was placed on phasing out fish traps, creation of marine protected areas and protecting grouper species. Drafted comment and request letters to government agencies and fisheries councils based on draft fisheries regulations and research. Obtained support from government officials through phone calls and letters. Also, sought public support and involvement through regional press releases and essays.

Preparation of Environmental Impact Statement (EIS) Focusing on Harmful Impacts of Long-Range Sonar on Marine Fish Populations. Managed an extensive review of existing scientific literature studying the physiological and population impacts of long-range sonar on marine ichthyofauna pursuant to the National Environmental Protection Act’s impact assessment requirements. Assisted in summarizing the data and preparing an EIS.

Finley, Brent

EMPLOYMENT HISTORY

Project Manager/Counsel, Environment International Ltd. March 2004 – Present
Seattle, Washington

- Provide policy and technical advice to government and private entities regarding environmentally related issues including, risk analysis, natural resource damage assessment, renewable energy assessment, and sustainable environmental policies and practices
- Consensus building among government agencies, NGOs and citizens through facilitation, mediation, and research and advocacy
- Provide in-house legal services and business management

Attorney, Lee & Associates, Attorneys at Law March 2013 – Present
Seattle, Washington

- Represent private clients in environmentally related matters

Judicial Clerk (Temporary), Washington Court of Appeals Division II February 2004
Tacoma, Washington

- Prepared prehearing memoranda on criminal and civil appellate cases

Researcher, University of Rhode Island Summer/Fall 2000-2003
British Virgin Islands

- Surveyed reef health throughout the British Virgin Islands
- Conducted assays studying parasitic infection in reef fish

Associate, ReefKeeper International May 2002 – July 2003
Caribbean, Gulf, Atlantic waters

- On behalf of a non-profit organization, worked with government agencies and regulatory commissions to adopt sustainable fisheries management practices

Legal Intern, Rhode Island Department of Attorney General Summer 2002
Providence, Rhode Island

- Investigated corporate compliance with waste disposal and discharge regulations
- Litigation support, drafted pleadings and conducted legal research and writing

Legal Intern, Rhode Island Dept. of Environmental Management Fall 2001
Providence, Rhode Island

- Analyzed state law and advised agency regarding creation of a waste-water reuse program
- Prepared cases for enforcement, hearings and settlement, and drafted pleadings and motions

SHORELINES HEARINGS BOARD

FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents,	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* DIRECT TESTIMONY OF JAMES E. JORGENSEN

I. INTRODUCTION AND QUALIFICATIONS

1. My name is James E. Jorgensen. I am a Salmon and Steelhead Management Biologist for the Quinault Indian Nation Department of Fisheries. I received a Bachelor of Science degree in Fisheries from the University of Washington in 1975. I have worked for the Quinault Indian Nation since September 2005. My professional experience includes field monitoring of juvenile salmonid abundances, participating in, supervising, and developing adult salmon spawner surveys, protocols, and spawner escapement assessments on the Hoh River, overseeing the accounting, sampling, and assessment of commercial and recreational fish harvest

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impacts, and assessing spawner recruit relationships as the management biologist, while also overseeing the management of a tribal hatchery program. My CV is attached as Exhibit A.

2. In preparation of this testimony, I have read and reviewed toxicology reports related to environmental and laboratory exposures of the by-products of crude oil applied to aquatic animals and habitat, reports on the composition and function of the fauna and flora that comprise the freshwater and estuary environment of the Grays Harbor Basin, and reports on the life history and behavioral attributes of the salmon, steelhead, and other fisheries populations of the Basin. I reviewed the accompanying biologic data and assessments involved with managing and protecting Grays Harbor fisheries resources and the individual salmon stocks related to the sustainability of harvest. I also reviewed the Mitigated Determination of Non-Significance (MDNS) for the Westway and Imperium Oil Terminal proposals.

II. SUMMARY OF TESTIMONY

3. This testimony will address the tribal fisheries managed by or of concern to the Quinault Indian Nation. I will also address the tribal fisheries management areas that could be affected by a crude oil spill under any or all of the three proposals to ship crude oil into Grays Harbor and subsequent effects that such a spill of crude oil could inflict on the salmon and steelhead populations originating within Grays Harbor and its freshwater basins. Other fishery interests include other finfish and invertebrate species which reside within the marine waters of Grays Harbor because it is an important nursery area which also contributes a significant fishery to the Quinault on non-resident white sturgeon. Many of these species, while not directly fished, provide important forage to multiple species, (Simenstad, C. A., & Eggers, D. M. (1981)). I will cover the relative impacts to the different salmon and steelhead populations based upon their patterns of salmonid habitat use, their migratory patterns, and direct impacts to habitat and the forage species upon which these salmonids rely.

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4. I will explain the potential effects on Quinault Nation Treaty fisheries as well as Non-Treaty fishing utilizing stock assessment methodologies jointly applied by the Quinault Nation and Washington Department of Fish and Wildlife (WDFW) each season to manage each of Grays Harbor's salmon and steelhead runs. I conclude that the transshipment of crude oil through Grays Harbor will negatively impact or seriously damage the salmon and steelhead fisheries of the Quinault Nation.

III. GRAYS HARBOR GEOGRAPHY

5. The geographic areas of concern for the salmonid populations cover the Upper and Lower Chehalis River Basin, primarily focusing on freshwater areas which lie downstream or within the vicinity of the railway routes over which crude rail shipments are being proposed and continuing downstream into the marine and adjacent waters of Grays Harbor and the outer Washington coast.

6. The map in Figure 1 (reproduced from 2008 Grays Harbor Management Plan Agreement between WDFW and Quinault) shows the entire drainage of the Chehalis Basin. The town of Chehalis lies where the Newaukum River meets the upper Chehalis River. The Newaukum drains uplands west and southwest of the town of Chehalis, while the uplands south and west of Chehalis drain into the Chehalis River before entering that town. Approximately four miles north of Chehalis, down the Chehalis River, lies the town of Centralia where the Skookumchuck River enters the Chehalis River. The Skookumchuck drains uplands north and northwest of Centralia, from the direction where the city of Olympia lies. Leaving the town of Centralia the Chehalis River flows northwest and west to the Grays Harbor. Adjacent tidal areas of Grays Harbor potentially affected include the tidal areas of the Hoquiam, Humptulips, Johns, and Elk Rivers, and numerous small tributaries emptying directly into Grays Harbor as well as

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other low lying sloughs and wetlands that serve as refuge and forage habitat for numerous aquatic organisms within this extensive ecosystem.

7. From the direction of Olympia, the Class 1 railroad enters the Chehalis basin, crosses and runs near the Skookumchuck River downriver through Centralia, then a short distance up the Chehalis River to the town of Chehalis, and then up the Newaukum River crossing it on the way out of the basin going south. The Class 1 railroad switching yards in Centralia link to the Puget Sound and Pacific Railroad, that runs through the towns of Rochester, Oakville, Porter, Elma, Montesano, Aberdeen, Hoquiam to the Port of Grays Harbor. That route runs near or adjacent to the Chehalis mainstem for significant distances and it crosses numerous tributary waters of the Chehalis River as it runs northwest and west to Grays Harbor. From the town of Montesano most of the route hugs the north shore the river and its side-channels, then the estuary before crossing the Wishkah River and arriving at the Port.

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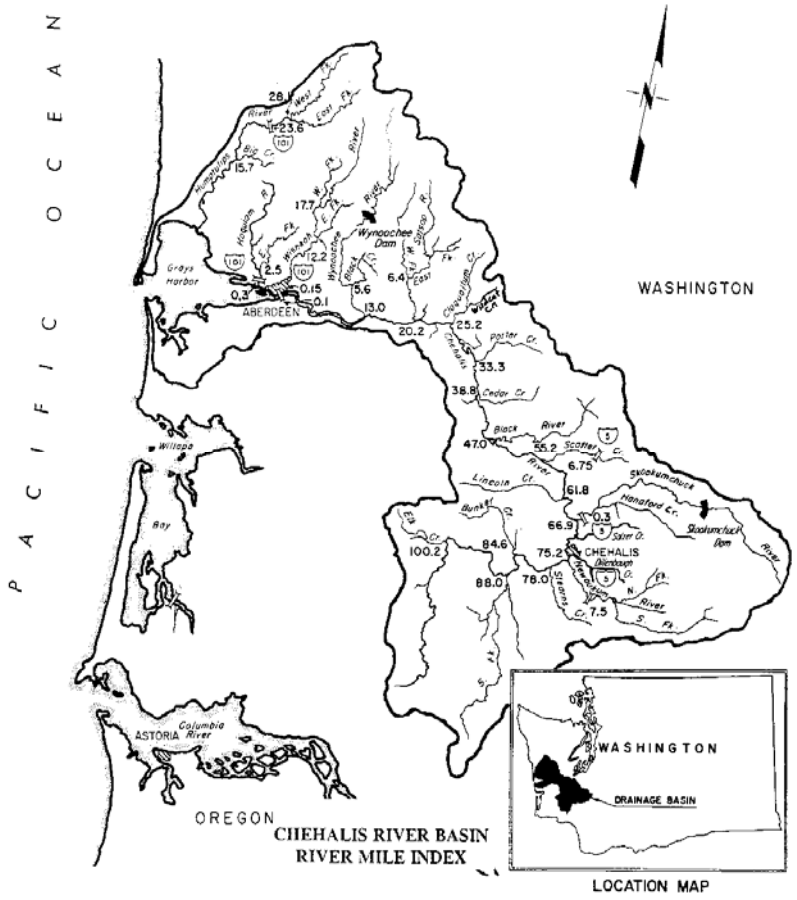
Figure 1.



8. The Level 1Watershed assessment provided for the Chehalis Basin Partnership gives the following description of this basin, excerpted in part (Michaud J., et al, 2000): "The basin is bound on the west by the Pacific Ocean, on the east by the Deschutes River Basin, on the north by the Olympic Mountains, and on the south by the Willapa Hills and Cowlitz River Basin. Elevations vary from sea level at Grays Harbor, to 5,054 foot Capitol Peak in the Olympic National Forest. The basin encompasses 2,520 square miles and drains 2,660 square miles. The Chehalis River system flows through three distinct ecoregions, Cascade (including the Olympic

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Mountains), Puget Lowland, and Coast Range before emptying into Grays Harbor near Aberdeen (Omernik, 1987). The geology and associated hydrogeologic conditions of the Chehalis Basin vary widely and reflect the complex geologic history of the area."

9. Further geologic, soil, vegetative species, temperature and water, streamflow and precipitation information is provided in that report. "The lakes and streams within the Chehalis Basin provide vital habitat for numerous species of fish. Streams range in character from cold, swift-flowing, high elevation tributaries, to warmer, meandering, lowland valley rivers. There are 180 lakes, ponds, and reservoirs in the basin. Most of these are lowland waters supporting varied fish and wildlife species."

10. The Grays Harbor estuary at its northeastern end in Hoquiam contains the Bowerman Basin, an important area managed by the U.S. Fish and Wildlife Service as a major component of habitat for migrating and wintering for waterfowl in the Pacific Flyway (Michaud J, et al, 2000). The estuary comprises approximately 99 square miles of surface area. The amount of the estuary's shallow bottom area that is flooded between high (MHW) and low (MLLW) tides ranges from 40 to 99 square miles with the intervening 59 miles of tidal flats playing and important role in the movement, mixing, and reaeration of the harbor waters during tide cycles (Beverage, J. P., & Swecker, M. N. (1969)).

11. The estuary and its dynamics and interactions with tributaries that drain into it were described in a study of the excursion distances of salinities, injected dyes, and potential pollutants within the basin when the water columns would move upstream then downstream during tide cycles at different freshwater flow regimes. The report characterizes the dispersions both in the horizontal and vertical planes of the water column as well as the flow velocities through high and ebb tides. It also describes the existing demands being placed on biologic

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communities through periods of low availability of oxygenated water as observed in the mid-1960's, being exacerbated by pulp and other lumber mill operations. The maximum mean velocities along the vertical within the water column for the upper estuary was characterized as varying from about 3 feet per second (fps) on floodtides to about 4.5 fps on ebbtides depending on the tidal stage, range of tides, fresh-water discharge, and location within the estuary (Beverage, J. P., & Swecker, M. N. (1969)).

12. The recovery of oil from a spill in time to prevent wide-spread dispersion, and prevent the wide-spread mixing of oil with suspended sediment as well as benthic sediment would be extremely limited during periods of high freshwater flows in the Chehalis River and within the tidally influenced areas during high velocity movements within the tidal cycle given the descriptions in this report. The described movements of water would also extend upstream into the lower tributaries, the Wynoochee, Wishkah, Hoquiam, Johns, Elk and Humptulips River and smaller drainages and tidal influenced wetlands lying along the Estuary. The seasonal periods of freshet and storm events would coincide with an increased threat to the integrity of a railway corridor crossing or adjacent to a river. Those periods would coincide with more difficult maneuvering of marine traffic through the harbor and its mouth. Fall and winter storm seasons also coincide with the major entry of salmon and steelhead adults and the deposition of their spawned eggs into the spawning beds compared to the other seasonal periods of calmer weather patterns.

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Figure 2 (from the Upper Estuary Study).

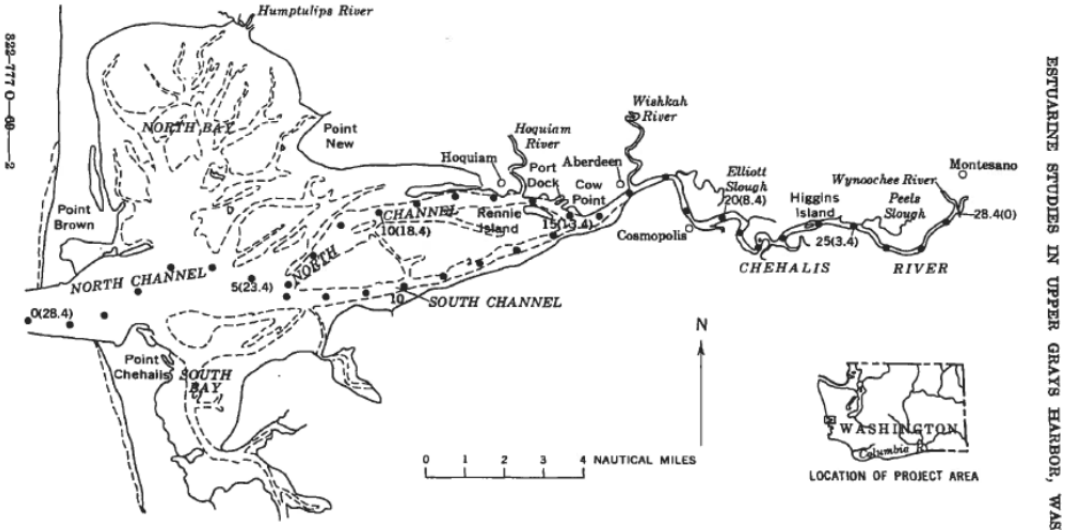

FIGURE 1.—Sketch map of Grays Harbor. Dots are spaced at 1-mile intervals, starting at mouth of harbor. Numbers outside parentheses indicate navigation-channel distances upstream from mouth. Numbers inside parentheses indicate distances downstream from State Highway 107 bridge south of Montesano. Shaded areas indicate tidal flats. Map modified after U.S. Coast and Geodetic Survey Chart 6195, 59th ed., March 21, 1966.

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ESTUARINE STUDIES IN UPPER GRAYS HARBOR, WASH. B3

13. A major Class I railway corridor transverses the Middle Chehalis Basin running from Puget Sound to the Columbia River. This is the rail route that has been proposed to carry major amounts of crude oil through the upper basin to other transshipment points north and south of Grays Harbor. Westway, Imperium, and U.S. Development Group have proposed that the Puget Sound and Pacific Railroad, which branches off this Class I railroad in Centralia will be the route to carry crude oil down along the Chehalis River into Grays Harbor from where it will also be transshipped by marine vessels elsewhere.

IV. BACKGROUND ON TRIBAL FISHERIES AND FISHERIES MANAGEMENT

14. The Quinault Indian Nation participates in the assessment of salmon and steelhead fishery impacts on those stocks of concern to the Quinault Nation with the state and other co-managers where the parties fish in common. For salmon and steelhead management of

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Grays Harbor stocks, the Quinault and Washington State (Washington Department of Fish and Wildlife or WDFW) share in the management and assessment of those stocks within the Basin for harvest and conservation purposes. For fisheries targeting on those and other stocks from various regions and rivers of origin, which occur off the coast, the Quinault Indian Nation and Washington State (though WDFW) share co-management responsibility with the National Marine Fisheries Service and other Tribes. Chinook and coho salmon are also co-managed through the international Pacific Salmon Treaty, incorporating Alaskan and Canadian ocean fisheries and their stocks of concern. Our local stocks of chinook and coho salmon are subject to harvest in these northern fisheries and managed according to terminal spawning escapement objectives provided by WDFW and the Quinault jointly.

15. For salmon and steelhead, the primary local domestic ocean fisheries occur with the commercial treaty and non-treaty troll and the non-treaty recreational fisheries off the Washington and Oregon coasts. Also, coho and chinook fisheries affecting our local stocks extend up to Southeast Alaska, where local natural origin chinook are heavily harvested. Each marine ocean area fishery is limited each season by the availability of the weakest chinook and coho stocks (across regions and rivers of origin (freshwater basins) which contain stocks, such as Grays Harbor (GH) coho and chinook which come under the federal management regime controls) in order to meet the terminal spawning escapement objective. Most of the ocean catch directed at local chinook and coho stocks involves use of commercial troll hook and line gear as well as recreational hook and line gear. Fisheries within the estuary of Grays Harbor and its freshwater tributaries consist of the Treaty commercial, subsistence, and ceremonial (home use) fisheries, the non-Treaty commercial fishery (which utilize gill-net gear), and recreational fisheries (which utilize hook and line gear). These fisheries target Grays Harbor chinook, coho,

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chum, and steelhead of both natural and hatchery origin conducted during separate seasons, the fall (targeting coho, fall chinook and chum), the winter (targeting winter steelhead) and spring/summer seasons (targeting Chehalis Spring/summer chinook and white sturgeon).

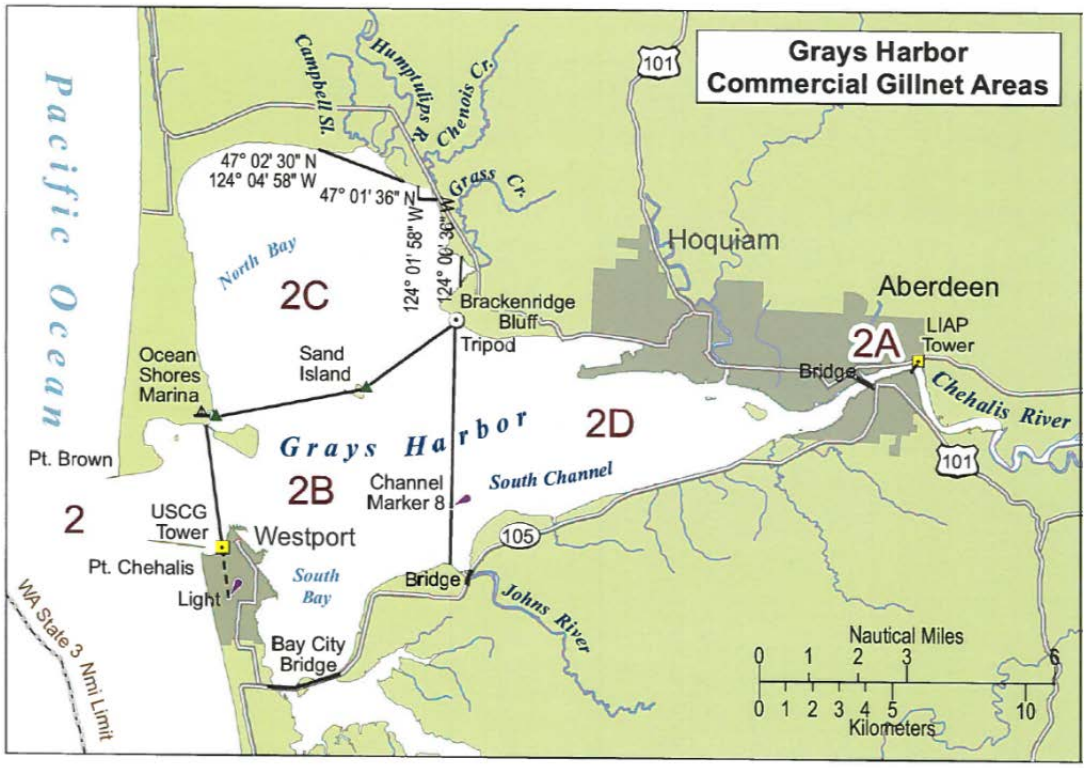

Figure 3 (WDFW: http://wdfw.wa.gov/fishing/commercial/salmon/2012_gh_map.pdf).

16. White sturgeon of non-local origin (many from the Columbia River) enter Grays Harbor in order to feed on the many varieties of forage fish and invertebrates that inhabit the estuary. Simenstad, C. A., & Eggers, D. M. (1981) documented locations and uses of the Harbor by various species. These sturgeon are available most seasons of the year. White Sturgeon make up the major targeted species of the Quinault Nation's spring/summer fisheries in area 2C (adjacent to the Humptulips river) with white sturgeon and to a lesser extent spring/summer chinook of natural origin from the Upper Chehalis being targeted in Quinault fisheries within areas 2A and 2D extending upriver into the Lower Chehalis River.

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17. Bull trout, eulachon, and green sturgeon that utilize the harbor are not targeted during fishing due to their threatened or endangered status. The largest Tribal and non-Indian Grays Harbor commercial fisheries occur in sub-areas 2D, 2A, 2A-1 and the Lower Chehalis River up to the mouth of the Wynoochee River targeting Chehalis origin coho, chinook, and chum during fall (September to November), and Chehalis winter steelhead from December to April. The Chehalis Tribe located near Oakville conducts a commercial gill-net fishery within the boundaries of the Chehalis Reservation, directed at coho, chinook (spring/summer and fall stocks), and winter steelhead from the upper Chehalis drainage. Recreational fisheries occur throughout the Chehalis River for those same stocks.

18. A considerably smaller set of Quinault and non-Indian commercial and recreational fisheries target Humptulips origin fish from much smaller populations of the same species in Grays Harbor Area 2C and the Humptulips River. Some white sturgeon catch occurs during fall and winter fishery seasons that target salmon stocks in Grays Harbor.

V. ECONOMIC VALUE OF TRIBAL AND NON-TRIBAL FISHERIES

19. The estimated landed value of both Treaty and Non-Indian commercial troll caught coho and chinook combined off the Washington has recently ranged from about $2,570,000 per season to $5,570,000 from 2009 to 2012, estimated from landing data published by PFMC, (http://www.pcouncil.org/wp-content/uploads/salsafe2012_.pdf), for an average of $4,183,000. Treaty troll landings of coho have ranged from 11,000 to 60,000 fish, an average of 30,405 from 2009-2012 off of Washington. Treaty troll landings of chinook have ranged from 5,000 to 28,000 fish, an average of 17,917 from 2009-2012.

20. In recent years there has been a significant increase in coho catch resulting from the strong showing of coho populations in response to recently improved ocean conditions. Restrictions on ocean coho harvest under the Pacific Salmon Treaty agreements have also

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contributed to increased terminal coho abundances. A significant factor that governs the conduct of the Quinault Nation's terminal fall Grays Harbor fishery is that the Grays Harbor coho run overlaps in timing with the fall chinook, which enter during the earlier segment of the coho entry and chum, which enter during the later segment of the coho run entry in October. Both of those runs have usually returned at lower abundance compared to their escapement goals than the coho run in recent years. Therefore, significant restrictions on chinook and chum harvest typically restrict harvest of coho when coho are more abundant compared to their escapement goal. A modest improvement in Chinook and/or Chum expectations would allow an increase in coho harvest.

21. The value of other significant fishery, the Non-Indian Sport, comes into perspective by comparison of the Pacific Fishery Management Council (PFMC) catches between sport and troll.

Table 1.

	WASHINGTON OCEAN CATCHES			
	COHO (*No. of fish)*		CHINOOK *(No. of fish)*	
Year	Treaty plus Non-Treaty Troll	Sport	Treaty plus Non-Treaty Troll	Sport
2008	15,970	18,870	29,543	14,635
2009	80,718	138,493	24,570	12,351
2010	13,527	36,278	77,445	36,874
2011	16,669	39,582	58,597	29,203
2012	40,539	31,434	93,038	33,729

Numbers from table I-4-http://www.pcouncil.org/wp-content/uploads/salsafe_2012.pdf

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The Quinault Nation Fall Fisheries in Grays Harbor reported the following Landings and Values (season: mid-September through November).

Table 2.

	COHO			CHINOOK		
Year	No. Caught a/	Weight	Value	No. Caught a/	Weight	Value
2008	10,204	118,075	$ 178,870.60	1,878	37,581	$ 98,401.45
2009	28,487	290,499	$ 309,595.00	2,485	40,514	$ 67,194.15
2010	25,321	269,697	$ 362,704.65	3,403	60,509	$ 150,774.10
2011	27,926	267,616	$ 452,510.39	6,407	99,240	$ 246,698.75
2012	30,665	276,132	$ 486,811.04	3,988	69,322	$ 158,537.40

	CHUM		
Year	No. Caught a/	Weight	Value
2008	2,070	25,523	$ 17,823.90
2009	4,397	47,357	$ 18,673.95
2010	8,938	102,415	$ 51,246.23
2011	17,206	157,056	$ 133,595.40
2012	11,670	160,984	$ 63,400.95

[a/]The tables showing the numbers, weight and values of Quinault Fishery Catches only represent a proportion of total Grays Harbor catch.

22. From 2008 to 2012 for the Quinault Fisheries, the coho average landed value has been around $358,098, Fall Chinook $144,321, and chum $56,948. Non-Indian Sport, Non-Indian Grays Harbor Commercial gillnet fisheries, and the Chehalis Tribe fisheries near Oakville take a substantial amount of fish that are not included in these summaries. For the winter fisheries on steelhead, the value has averaged $40,931, while for the recent five years, the year around Quinault white sturgeon harvest, which usually peaks in spring/summer months, has averaged $89,032 per year.

23. During recent years for white sturgeon and recent winter seasons for steelhead the following catches in the Quinault fisheries were recorded for Grays Harbor:

Table 3.

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	White Sturgeon-Jan-Dec.		Landed by Quinault Fishers
Year	No. Caught a/	Weight	Value
2008	3,206	69,947	$ 183,032.40
2009	1,373	32,133	$ 79,046.75
2010	1,125	27,262	$ 61,051.10
2011	944	24,268	$ 70,184.65
2012	598	17,176	$ 51,846.50

a/The tables showing the numbers, weight and values of Quinault Fishery Catches only represent a proportion of total Grays Harbor catch.

Table 4. Winter season catch: (season: November through April)

	Winter Steelhead-Nov. yr. 1 thr. Apr. yr.2		Landed by Quinault Fishers
Year	No. Caught a/	Weight	Value
2008-09	579	6,093	$ 11,765.70
2009-10	891	7,793	$ 14,781.15
2010-11	3,475	32,590	$ 67,244.95
2011-12	2,976	26,397	$ 65,858.80
2012-13	2,040	19,580	$ 45,007.20

a/The tables showing the numbers, weight and values of Quinault Fishery Catches only represent a proportion of total Grays Harbor catch.

24. The catches and values for Grays Harbor terminal coho could be substantially increased if more chinook and chum were also available to harvest given the fact that recent natural origin coho runs have well exceeded the numbers needed for spawning escapement under recent terminal harvest regimes.

25. Grays Harbor coho and chinook wild stocks contribute significant harvest to pre-terminal fisheries, coho primarily off of Washington, Oregon and southern British Columbia, and chinook probably more than 95% of pre-terminal ocean harvest occurs off of Northern British Columbia and Southeast Alaska. A stock recruitment assessment conducted according to Pacific Salmon Commission Chinook Technical Committee technical guidance (Coshow 2013) has been used to develop estimates of the distribution of Grays Harbor chinook utilizing coded wire tag recoveries according to recoveries beginning with releases from the 1986 brood. This method

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estimates the number of immature fish caught by the marine fisheries that would have returned as mature fish to the terminal Grays Harbor in the absence of any fishing in those ocean areas. Table 5 shows the relative potential value of terminal chinook landings for Grays Harbor chinook if all of the Grays Harbor terminal harvest had been commercially caught and landed at weights and prices consistent with those of the Quinault Nation Fisheries. On the other hand, in recent years coho prior interceptions have been limited to an ocean harvest rate of 20% or less, which in addition to improved ocean conditions has also contributed to fairly abundant coho runs to the terminal fisheries in recent years.

Table 5. Potential Chinook Return Value

GRAYS HARBOR FALL CHINOOK		
Brood returns from same Cohort	Current Return Value of Catch if landed commerciall y	Potential Terminal Return Catch Value with same Escapement and No Ocean Fishing
2001	$ 184,333.41	$ 694,156.27
2002	$ 257,100.28	$ 1,668,926.15
2003	$ 169,902.34	$ 1,084,259.29
2004	$ 81,381.57	$ 412,153.95
2005	$ 323,074.39	$ 1,115,430.32

26. If a coho adult return was relatively abundant in terms of meeting escapement needs compared to the chinook adult return after an exposure of the runs to crude oil during their juvenile freshwater phases, it would essentially elicit a proportional reduction in the harvest on the chinook run but also on the relatively abundant coho run. In terms of the 2013 forecast and Grays Harbor fishery plans, a general reduction of 10% in chinook harvestable fish applied to the Quinault fishery would involve a decrease of fishing time and reduced catch of 334 wild Chinook and a loss of catch of 4,488 wild plus hatchery coho to that Quinault commercial

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fishery directed at Chehalis stocks. If a serious spill occurred and it seriously impacted the subsequent production of wild juvenile chinook migrants during their freshwater rearing phase and also reduced their ocean survival that impact on subsequent adult runs returning to Grays Harbor would occur in their 4th, 5th and 6th years of age. However, adult coho from a single brood that would potentially be affected as juveniles during the same spill event would return on their 3rd year of age, one year before the affected 4-year-old chinook adults begin returning. If subsequent runs of wild coho are less affected, they will be returning when the impacted chinook begin returning 4, 5 and 6 years after that affected chinook parental brood had spawned in Grays Harbor. Thus, increased restriction to chinook harvest will also apply to those healthier coho runs.

VI. OIL HARMS FRESHWATER AND MARINE AQUATIC HABITAT.

27. The freshwater environment is a complex dynamic environment where temperature, dissolved oxygen, pH, weather, and other environmental factors can vary greatly. Oil can enter into the freshwater environment from road surfaces and other areas where vehicles travel or internal combustion engines run, releasing oil particles including oil bearing dust particles from their exhausts while also subject to other mechanical leakages. Rain flushes the accumulation into streams. Also, water soluble toxic polycyclic aromatic hydrocarbons contained in the dispersed oil will dissolve and become attached to suspended sediment, substrate and soils and be deposited as sediment in rivers and lakes (Moiz et al 1995). An episodic event would be an accident either where transport vehicles carrying oil for shipment or fuel or storage tanks at the Port would be breached or during transfer of the fuel between these elements, spilling contents in freshwater or marine waters. The MDNS identifies a substantial increase in the number of transports and transfers of hazardous liquids between transport and

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storage vessels than currently occurs in the Grays Harbor watershed that would increase risks of spills into the Harbor or its freshwaters.

28. The transport of crude oil by rail car across numerous bridges and along river banks in remote and less monitored areas of the Chehalis River at certain times will coincide with significant erosive effects of high river flows and potential slides during heavy rains at those locations to jeopardize the integrity of the rail line. Failure of a bridge or slide off an adjoining hill during the passage of a crude oil shipment that would result with a spill would coincide with conditions for increased oil dispersion. *See supra* ¶ 12. During high rain and flow periods that could coincide with such a spill event repeated changes in flow would be accompanied by repeated inundation of streamside banks, lowland areas and the vegetation, exposed large woody debris jams and gravel substrates that reside there, creating a reservoir of weathering crude dispersed over a broad area and significant range of elevation that would continue exposing and releasing dissolved toxins into the water upon repeated inundations. In such conditions, the oil would be floating in water that is heavily laden with suspended sediment, while some of it will be encountering objects and turbulence forcing some oil to mix vertically in the water column. Tiny droplets of this oil will adhere to suspended sediment, thus becoming part of the sediment load that can deposit on the stream bottom thus providing a chronic source of toxins over an extended period. Harmful water soluble PAHs from this dispersed oil will also become attached to the suspended sediment or taken up by aquatic organisms.

29. Oil that reaches the estuary or spills directly into it will be subject to the excursion distance water moves both upstream and downstream where the flow speed of 3 to 4.5 feet per second on the flood tide and the ebb-tide would prevent effective oil removal or the maintenance of log booms during critical periods during a major cleanup attempt, Beverage, J. P., & Swecker,

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M. N. (1969). Peterson, C. H., et al (2003) summarized findings on the aftermath of the Exxon Valdez Oil spill that residual oil was still present and that not all species were recovering though the spill occurred in 1989. Heintz, R. A. et al (2000) reported testing that indicated pink salmon exposed to an initial concentration of total Polycyclic Aromatic Hydrocarbons (PAHs) level of 5.4 parts per billion (ppb) experienced a 15% decrease in marine survival. A delaying effect on growth and reduced size at smoltification was measured in juvenile salmon indicating the potential for population-level effects resulting from embryonic exposure to oil's toxicity. The study identified that exposure to even low ppb produced sub lethal effects in pink salmon that led to reduced growth and marine survival, with data demonstrating that contributions of delayed mortality can be a significant component to total mortality resulting from exposure to oil. They cited a study by the author that an initial 25% mortality in incubation survival for 1993 brood pink salmon exposed to an exposure dose <18.0 resulted in the production of 40% fewer mature adults than the unexposed population (Heintz, R. A., et al, 2000). Payne J.F, et al (2003) have noted that PAH levels on many of the world's beach sediments lies around 10 ppb, but on major tanker routes in the Arabian Sea, levels of 100-200 ppb have been reported, yet guidelines indicate potential for effects in fish in the 1 ppm range or lower.

30. My first contact with the issue of oil's toxicity on fish occurred as a biological technician working for the Clearwater National Forest in Idaho. In the summer of 1978, a truck carrying heavy road oil for applying to the surface of forest roads spilled part of its contents into LoLo Creek. Biological staff briefly assessed the area above and below the spill by snorkeling in the creek. Below the spill site, I recall that there was little evidence of aquatic life present in contrast to above it. Oil globules could be seen on the creek bottom and volatile emissions of substances could be observed coming off the globules underwater. Oil sheens were observed

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coming to the surface, while our wetsuits emitted a strong odor from these emissions captured by the suits.

31. Under proposals for crude oil railroad shipment into Grays Harbor, a derailment and subsequent oil spill could originate from any number of locations extending from the uppermost part of the Grays Harbor's freshwater origin down to just above tidewater, which would affect a large segment of Grays Harbor fish production and habitat. The extent of a spill and its impacts would depend on the timing and seasonal fish habitat and migratory patterns for steelhead and salmon. The flow regime occurring at the time of the spill coupled with the location of the spill will also affect the dispersion of oil before any containment measures and removal of oil can be put in place or potentially thwarting any such measures for a period of time.

32. The Beverage, J.P. et al (1969) study of the flow regimes of the Upper Chehalis Basin identified the critical interactions of freshet and low river flows coupled with tidal action demonstrating the dynamic range of movement a spill could take. Acute exposure of aquatic life as well as chronic exposure to weathered oil cannot be contained when the initial oil contacts the water over a large area, when the water is carrying a heavy load of suspended sediment or when extensive aquatic habitat, woody debris (log jams) and stream bottom substrate has been covered or saturated with oil, which then readily exposes its dissolvable components to the aquatic environment. National Marine Fisheries Service research has established that the harmful effects of oil arise from the chemical components which readily dissolve into the water, not the oil droplets (Carls M.G., et al, 2008).

33. Juvenile chinook populations have the most extended period of migration Quinn, T.P. (2005). Chinook juveniles rear in the larger tributary and main stem areas where they

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collect as they progress downstream following their emergence from gravel which can begin after mid-February and continue through September. Juvenile chum leave the lower river and the estuary fairly early moving downstream along main stem areas. Coho during their first summer remain in habitat near or below their natal streams, overwintering then migrating to the ocean at a rapid pace in spring. Juvenile natural origin steelhead typically rear during two summers of residence to smolt size and migrate to the ocean following their second year of residence. Some coho and steelhead fry appear to pass into the estuary on their first summer and enter the estuary where they may migrate to the ocean following one overwinter in the freshwater. Adult chinook have the longest river entry period from early May through November, with early chinook also subject to stressful river temperature and dissolved oxygen levels, followed by fall chinook beginning to enter in mid-August and early September. Coho and fall chinook generally begin their most significant entry into Grays Harbor terminal fishing areas beginning the last week of September through the 3rd week of October. After this point the fall chinook entry falls off while coho extend their entry to February. Natural origin winter steelhead enters Quinault Nation fisheries beginning in December and extending through April.

34. A major oil spill at any time of the year would harm various life stages of Grays Harbor salmon and steelhead. A major spill during a fall freshet into the upper basin could kill or harm a large proportion of the adult fish that would have already entered the harbor as they would be exposed to a continuous stream of dissolved toxins affecting coho, chinook and chum. Approximately 40% of the Chehalis fall chinook spawn in the larger upriver tributaries and on the lower main stem of the Chehalis River. Approximately 37% of the steelhead spawn in these same areas. Adults and their progeny originating from these areas and from locations outside these areas will migrate through the lower main stem and estuary at some point. The dispersion

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of any spill will travel through these areas to the estuary. Exposed incubating eggs, alevins and fry emerging from such locations would be at a major risk to develop defects in cardiac function which affects their growth and survival, as a result of exposure to Polycyclic Aromatic Hydrocarbons (PAHs) (Incardona J.P (2003). The juvenile's ability to reach certain size thresholds governs their habitat use and migratory timing and smolt to adult survival. The wild adult steelhead return would be affected similar to the chinook because they spawn from mid-March until the beginning of June when freshet activity may still occur. The population of coho juveniles affected in the freshwater environment could be fairly well dispersed compared to chinook. A large segment of the coho population may be dispersed into upper tributaries above potential spill locations. Those coho progeny incubating as eggs or to the point of having emerged as fry could spend the next summer and another winter before migrating as smolts. The coho may avoid a major early exposure unlike chinook and chum. The older overwintering age parr coho would also be further dispersed than chinook or chum and migrate out of freshwater with only a portion of the population possibly being exposed in a chronic manner. The older parr steelhead will not be as dispersed coho before they begin their outmigration. The migration rates of coho and steelhead would be faster in deeper protected water when exiting the estuary at larger fish sizes compared to chinook or chum. However if an acute exposure occurs during their smolt migration impacts could also be significant for them. Any significant spill during mid-October into November for salmon or during December with the steelhead fishery could force cancelation of the fishery.

35. Concerns over the marketability of fish left to catch, such as occurred during periods of the Deepwater Horizon Spill (Upton H. F. (2011)) would affect a decision about cancelation of the fishery. The risk of the oil being within the fishing area would make fishing

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impractical, even if most fish could navigate under or around the oil. The oiling of fishing gear (set and drift gill-net) and fishing vessels, including fish coming in contact with this gear would likely render any catch unmarketable.

36. The chinook, steelhead, or chum adult population produced from a single season's return of parental adults produces offspring that return at different ages unlike the runs of coho from this area that return primarily as 3 year old adults. The effect of their exposure to crude oil toxins will then affect the fishery when they first return as adults until every offspring of each adult age has returned in subsequent seasons. For adult chinook and steelhead, affected as juveniles, their subsequent return primarily occurs four and five years after having been spawned in the river.

37. I have ranked the risk of impacts to salmon and steelhead stocks in Grays Harbor as: 1) Chinook adult and juveniles would have the most likely extensive exposure to the products from an oil spill, because they congregate and spawn in the higher densities along the lower reaches and within the larger tributaries. Chinook fry move downstream during their freshwater residence in the same waters that would lie downstream that would collect oil residue from freshwater spills with such impacts extending to the estuary over time. 2) Chum rank second because their residence time is shorter, though they also make similar use of the main stem as do chinook. 3) Winter steelhead would rank third because juveniles have a more complicated longer freshwater residence and behaviors, though their incubating eggs would be subject to a similar exposure risk as Chinook. Freshwater rearing juvenile steelhead would be more likely to find refuges within the basin because of their longer freshwater residence and ability to move upstream into new habitats. 4) Coho as both adults and juveniles have a more extensive distribution where a larger portion of adult spawners and their offspring could spawn

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and potentially find refuge above areas receiving crude oil impacts. In my opinion, if coho were initially subject to a large impact, they could recover faster than other less dispersed species.

38. For chinook, chum, and steelhead, the delayed effect of such impacts would result in the reduction of subsequent catches proportional to the reduction of returns, also where less fishing time would be provided.

39. For coho fisheries where impacts to fisheries may be limited to a level below acute exposures, catches for the coho fishery would likely be further reduced, not so much because of direct impact, but because of restrictions applied to reduce chinook or chum harvest.

VII. INCREASED MARINE VESSEL TRAFFIC WILL HARM QUINAULT FISHERIES.

40. The constant high level of movement of marine vessels into and out of their berths at any of the three projects will disrupt the QIN drift net fishing that occurs in this area of the harbor, the north commercial navigation channel. Fishermen fish both on the incoming and outgoing tides along the margins of the channel next to the lines of pilings. The nets are deployed from the fishing vessels beginning at the edge of the pile line with the vessel moving toward the center of the channel as net is deployed. The objective for the fishermen is to keep the net deployed perpendicular to the edge of the channel and the end close to the line of piles by gently maneuvering the craft as it and the net float along the pile line. Additional ships moored and moving though this area during the fishery under increased congestion will make such fishing much more dangerous as the fishermen have to be intensely watching their net while watching for ship traffic in order to be able to pull the net in time to avoid physically encountering the shipping vessel.

41. The drift gillnet fishing would be significantly impeded by increased ship traffic coinciding with the entry of the fall coho and fall chinook which peak in October, while chum peak later in that month. The Quinault fall fishery conducted in the Grays Harbor estuary is

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considered intense because that fishery and the Non-Indian commercial fishery have a very narrow window of time to harvest their fish coinciding with the entry of the major portion of the coho, chinook, and chum which would be available for the season for both commercial fisheries. Both fisheries have to adjust their respective times to avoid gear conflict issues between them while also being affected by congestion from the current commercial shipping use patterns. That opportunity will be severely compromised by further increased marine vessel traffic congestion and increasing safety risks to the fishers involved. At some point, fishers may need to abandon that fishing ground if they cannot successfully complete a drift on either the outgoing or incoming tides, compromising the treaty reserved fishing right.

VIII. RAIL TRAFFIC BEARING CRUDE OIL INCREASES RISK TO SALMON AND STEELEHAD POPULATIONS.

42. The proponents of shipping oil by railcar to the Port of Grays Harbor by use of the Puget Sound and Pacific Railroad (PSAP) and the Class I mainline and those other proponents of shipping crude oil through the upper Chehalis Basin to other ports along the Class I mainline will be putting numerous population centers, water and aquatic resources within the Grays Harbor basin at risk to train derailments, toxic oil spills, and potential explosions. One major spill into the Newaukum or Skookumchuck during a high flow during the peak of a salmon or steelhead run would spread along the main migration corridors to the marine waters of Gray Harbor and decimate a major component of the adult run in question and affect future runs. That risk potential to affect the basin water resources extends along the main railroad corridors from the uppermost part of the Chehalis Basin where the Class I mainline railroad crosses then west along the Puget Sound and Pacific railway to Grays Harbor. The Class 1 railway crossing the upper basin travels through the town of Tenino, then parallels the Skookumchuck River and a stretch of the Chehalis River. That line then runs through the town of Chehalis where it meets with the

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Newaukum River before crossing it and heading south out of the basin covering a distance of at least 20 miles within the Chehalis Basin.

43. The studies reported in the literature and recent incidents of rail car derailments with the release of toxic substances demonstrate that the impacts of such spills are irreversible under the condition in which they occur. The toxic but water soluble PAH's released into the water escape recovery, and expose aquatic life to high initial mortalities even in the rare circumstance where much of the releasing crude oil might be recovered, such as during a low flow, low tide cycle period. In the case of Grays Harbor, steelhead and salmon run entries typically coincide with high fall and winter flow regimes in the freshwater. They also coincide with higher than normal storm surges and tides in the marine waters that could render recovery effort futile.

44. The Westway and Imperium MDNSs acknowledge a significant increase in oil train and vessel traffic and an increased density and number of large storage tanks near existing tanks located near the Harbor. However, for oil spill prevention along the rail route, the only currently known requirement is equipment caches positioned near sensitive areas—a provision that should already be in place for bio-diesel and other hazardous freight. There is no evidence that a comprehensive identification of such locations in light of future increased rail congestion has been compiled or agreed to by the agencies and the Treaty Tribe which fishes in Grays Harbor and the rivers along the railroad. The Quinault Indian Nation has not been consulted.

IX. CONCLUSION

45. In my opinion this project presents a probable risk of a significant damage to fish and shellfish in Grays Harbor and the rivers that flow into Grays Harbor due to the possibility of spill as well as other increased releases of dissolved PAH toxins in the Grays Harbor watershed. The cultural and economic value of the Quinault Treaty fisheries, as well as the values to the

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other commercial and recreational fisheries, depends on the environmental health of the Grays Harbor estuary and watershed. Numerous studies show the harmful and long-lasting impacts that oil spills into marine environments can cause. Along the railway routes that crude oil would travel under these proposals, the proximity of the rail line to the River and its waters dictates the likelihood a spill would reach a water body. Any significant spill would likely occur at the least favorable time, disperse across the broadest expanses of freshwater habitat, and affect the greatest number of fish and species which typically use these dynamic type of weather and flow conditions to make their spawning runs in an attempt to maximize their use of the available habitat. A loss of the resource from an oil spill will cause a severe loss of the enjoyment and pride that numerous Quinault tribal members take in the Quinault Nation's stewardship of the resource, their ability to participate in such matters as Quinault members, and to participate in fishing as a cherished way of life to benefit their families. The harm to Quinault fisheries and Quinault fishermen and their families cannot be overstated.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 5th of September, 2013, at Taholah, Washington.

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EXHIBIT A

JAMES E. JORGENSEN

P.O. Box 1666, 233 Richwine Rd.
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Work Phone: (360) 276-8211 ext. 552 Cell phone: (360) 591-8744

Military Service: U.S. Army 4/66-4/69 (Honorable Discharge.)
Country of Citizenship: USA

EDUCATION: Bachelor of Science, Major in Fisheries, Minor in Math June 1975
UNIVERSITY OF WASHINGTON – College of Fisheries-Seattle

- **Quantitative Sciences and Math:** Elementary Statistical Methods and Statistical Inference Applications in Research, Math Models in Population Biology, Calculus and Analytical Geometry, Differential Equations, Linear Algebra, Intermediate analysis
- **Fisheries:** Classification of Economically Important Fishes, Anatomy of Fish and Shellfish, Fisheries Genetics, Reproduction of Salmonid Fishes, Nutrition and Care of Fisheries, Communicable Diseases of Fishes, Water Management and Pollution Study, Fish Management, Aquatic Entomology
- **Biology and Ecology:** Introductory Biology,Genetics, Microbiology, Limnology, Principles of Ecology, Developmental Biology of Animals, Algology
- **General Sciences:** General Chemistry, Organic Chemistry, Quantitative Analysis, Introduction to Biochemistry, Physics, Introduction to Geological Science, Introduction to Oceanography
- **Others:** Advanced Expository Writing, Introduction to Computers (Basic & FORTRAN)

Everett Community College, Everett, WA; attended before transfer to U.W.
Lake Washington High School, Kirkland, WA; High School Diploma, 1965

COMPUTER SKILLS:
Word, Excel, WordPerfect, Lotus 123

Employment History:

Quinault Dept. of Fisheries
Salmon and Steelhead Harvest Management Biologist
Sept. 2005 to present
Supervisor: Tyler Jurasin

At Quinault the position is similar to the position at the Hoh Tribe but restricted to salmon and steelhead terminal fisheries data assessments, modeling and developing management recommendations for three river systems.

Hoh Tribe Fisheries
Fisheries Harvest Management Biologist
Lower Hoh Road
Forks, Washington 98331
April 1979-Sept. 2005
Supervisor: Hoh Tribe Business Committees, Hoh Tribe Exec. Directors, Rod Thysell

Fisheries Harvest Management Biologist

At the Hoh River position was charged with directing fisheries technicians and participates in the collection of data relevant to determining the status of stocks of fish important to the Hoh Tribe. The data collection includes Hoh River wild salmon and steelhead spawner survey information, in-river catch and sampling data, and periodic juvenile abundance and habitat measurements, and seasonal wild coho smolt trapping and coded wire tagging. This data is compiled with information collected from other entities and shared with state and federal fishery agencies to analyze the harvest and escapement patterns of wild Hoh River salmon and steelhead stocks. Information on marine fisheries stocks important to the Hoh Tribe is also collected from other entities and evaluated. The Fisheries Management Biologist provides analyses of Hoh River stocks and forecasts of future abundance and potential fishery management options to the Hoh Tribe Policy Boards.

I received Watershed Analysis Training Qualifying for Fisheris and Prescription Modules: WDNR Training in 1998.

WASHINGTON STATE DEPARTMENT OF GAME
Olympia, Washington
Jan 1979 to March 1979
Supervisor: Dan Collins, Fisheries Biologist

Fisheries Biologist I:

The Fisheries Biologist conducted a creel census of steelhead fishermen on the Skagit River through the January through March 1979 season. Steelhead fishermen were interviewed and biologic samples including scales were collected. The biologist mounted these scales, summarized the data and carried out other assigned tasks at the end of the season.

UNITED STATES FOREST SERVICE
Clearwater National Forest, Supervisor's Office
Orifino, Idaho
May 12, 1978 to December 31, 1978
Supervisor: Al Espinosa, Fisheries Biologist

Biological Technician:
In this position stream habitat surveys were conducted the balance of the summer, fish census was conducted on several permanent transects where snorkeling was used to observe and enumerate the different species of salmonids observed throughout the forest. This position assisted in the enhancement of a lake outlet stream assessed to contain inadequate spawning gravel for resident cutthroat trout in the outlet stream. The area was measured, mapped, some obstructions removed and others anchored to hold gravel. Gravel

was flown in and placed by helicopter dump bucket. Assisted in the use of hydro-accoustic gear to profile this and other forest lakes and enumerated fish population abundance by scanning the tapes. Assisted in gravel sample analysis by pump testing gravel substrate in a forest stream on a permanent transect. Compiled a hierarchical listing of forest streams and stream reaches for gradients off of USGS forest topo maps.

UNIVERSITY OF WASHINGTON
Fisheries Research Institute
Seattle, Washington
Supervisor: Carl J. Cederholm, Fish Biologist, Doug Martin, Fish Biologist, Graduate Student
April, 1976 to May 1978
Supervisor: Doug Martin, Fisheries Biologist (PHD Student)

Research Aid:

In this position I helped construct and operate smolt traps on various streams of the Clearwater River Basin; enumerate the coho smolts being trapped and apply coded wire tags. A Peterson Mark/Recapture study was done to obtain smolt estimates. The position also conducted coho and steelhead redd and spawner surveys in study areas.

I also lead the mapping of a 1200 meter section of study stream for wetted channel and full channel utilizing two tapes and a staff compass to collect the measurements; then constructed a full map of the stream study sections. On the same study stream I also helped construct and maintained a year long working fish weir on Bear Creek near Forks and participated in the electrofishing of the study stream reaches a number of times in order to monitor conduct periodic Peterson Mark/Recapture estimates of the size of the resident cutthroat population..

MILITARY EXPERIENCE:
US ARMY
Station in the U.S.A. and Thailand
April. 1966 – April. 1969

Communications Electrons Technician

- Communications Electronics Technician on tropo-scatter telephone relay sites in Thailand-1967-68.
- Electronics School Teaching Assistant at Fort Sill Artillery School - 1968 1969

SHORELINES HEARINGS BOARD

FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents,	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* DIRECT TESTIMONY OF PAUL S. O'BRIEN

I. INTRODUCTION AND QUALIFICATIONS

1. My name is Paul S. O'Brien. I have over 36 years of experience in the field of oil and hazardous substance spill prevention, preparedness and response, both in the public and private sectors. I have a broad range of knowledge and expertise on spill prevention, preparedness, and response issues relating to land and water spills; marine transportation; and storage facilities/terminal operations. A copy of my CV is attached.

2. I am currently the Manager of ECM Maritime Services' (ECM) Seattle office. ECM provides regulatory compliance services for the shipping industry. My areas of

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responsibilities with ECM include coordinating the company's federal and state mandated oil spill exercise/training programs for our shipping clients, conducting environmental audits on ships and responding to oil and hazardous substance spills.

3. Prior to ECM, I worked in the Washington Department of Ecology's (Ecology) spill prevention, preparedness, and response program (SPPR) for about 18 years. For 16 of those years, I was the SPPR program's Northwest Regional Supervisor and State On-Scene Coordinator (SOSC) where I was responsible for directing the State's response to hundreds of oil and hazardous substance spills and reviewing/approving numerous industry facility and vessel oil spill contingency plans for compliance with Ecology's regulations. In addition, I participated in more than 100 spill/emergency response training exercises to test the adequacy of spill contingency plans. During my last two years with Ecology's SPPR program, I was the manager of the Spill Prevention Section where I was responsible for developing and implementing new oil transfer regulations. In addition, I managed a staff of facility and vessel inspectors that were responsible for conducting vessel inspections and reviewing oil-handling facility operations manuals, prevention plans, and tank vessel voluntary oil spill prevention plans to ensure operators met Ecology's environmental standards and regulations. I also participated on the Puget Sound Harbor Safety Committee.

4. Prior to Ecology, I was employed at the Alaska Department of Environmental Conservation (ADEC) for over 12 years in several capacities including the manager of the oil pollution control program. With ADEC, I reviewed numerous Environmental Impact Statements (EISs) for offshore oil and gas development for compliance with State regulations. I also served as the Alaska representative on the multi-agency Alaska Regional Response Team (RRT). I reviewed scores of contingency plans for tank vessels/facilities; approved spill training programs

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and reviewed tank vessel design and construction standards for vessels trading in Alaska. In addition, I annually approved an industry funded multi-million dollar five year Arctic oil spill research and development program.

5. I have read Imperium's project proposal Environmental Checklist, City of Hoquiam and WA Department of Ecology Responsible Officials' Amendments to the Environmental Checklist and Threshold Determination for both the Imperium and Westway facility projects; U.S. Development Group's Frequently Asked Questions about their proposed bulk liquid facility at Grays Harbor; Scope of Services and Fee Schedule for Contract Task Order 001 for the Westway Project; Recommendations for the Scope of Rail Transportation Impact Analysis and Vessel Transportation Impact Analysis for Imperium; and Dale Jensen's memo of February 8, 2013, to Diane Butorac and Sally Toteff providing comments on the Westway Terminal project SEPA checklist. In reviewing these documents, I focused on the sections dealing with Environmental Health (Section 7) and Transportation (Section 14). In particular, I reviewed the subsections regarding Spill Prevention, Preparedness and Response; Spill Prevention at the Facility; Oil Spill Prevention for the Vessel Route to Reduce Risk of a Spill; Spill Response; and Vessel Traffic.

II. ENVIRONMENTAL HEALTH – SPILL PREVENTION, PREPAREDNESS AND RESPONSE

6. Currently, there is very limited spill response capability in Grays Harbor. Two primary spill response contractors have spill response equipment and materials in Grays Harbor - Cowlitz Clean Sweep (CCS), and the National Response Corporation (NRC) or its subsidiaries. CCS has vacuum trucks, one portable storage tank, small amounts of containment boom and support equipment. NRC has larger stockpiles of equipment than CCS although still relatively limited. NRC has several thousand feet of containment boom, a small portable storage tank, a

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portable oil skimmer, a fast response vessel and supporting equipment. Providing sufficient water storage capacity in Grays Harbor for recovered waste liquids from a significant oil spill has been problematic for response contractors and cooperatives such as NRC, CCS, and WSMC in this area due to the limited availability. Imperium states in their SEPA checklist that "Imperium will contract with local and national Spill Response Companies to provide the required 18,500 bbls and 25,000 bbls …on water storage. However, they do not provide any specifics regarding how or when this would be completed. Response contractors such as CCS and NRC would have to supplement their existing inventories with offsite response assets if a spill response from a facility or vessel exceeded available capability. A significant oil spill from either of the two proposed oil facilities could certainly exceed currently available response resources in Grays Harbor. The result of exceeding available response resources would delay a response and allow oil to spread to other areas in Grays Harbor, resulting in increased environmental impacts.

7. Oil spills can occur during a multitude of facility and vessel operations although one of leading sources of oil spills is from oil transfers during cargo loading or fueling (bunkering) operations. Under Ecology's oil transfer rule, pre-booming would be required at any facility involved in over the water transfers (e.g. both the Imperium and Westway facilities) if it's safe and effective to do so. However, due to Chehalis River currents that are typically present in the vicinity of both terminals, pre-booming is not considered safe and effective much of the time. Therefore, alternative measures would have to be used during oil transfers at these facilities. While the MDNS does not list what these alternatives might be, I know from experience that any such measures are generally considered less effective than pre-booming a vessel since containment boom and other response resources must actively be deployed to

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respond to a spill after it has occurred. In the swift and debris laden Chehalis River, oil is not likely to be as effectively and readily contained and/or recovered, thereby providing an opportunity for oil to rapidly spread and impact nearby shorelines in Grays Harbor.

8. Besides pre-booming considerations, river environments present unique spill response challenges. As I previously indicated, river currents can quickly spread oil downriver and impact shorelines faster than in a more static marine/freshwater environment. This can cause major response and logistical problems since equipment, materials and personnel have to be rapidly repositioned and/or expanded to handle a constantly changing spill picture. Strong river currents can rapidly dissipate and disperse oil, thereby hampering an effective response.

9. Sediment in the river can also sink heavy oil to the bottom or suspend it in the water column, making spill tracking and cleanup extremely difficult, meaning that it is important to spill response planning to know the type of oil a facility will transport. Methods to recover sunken oil are imperfect, at best. Tides can also contribute to rapid oil movement. All of this can be further compounded by the potential for simultaneous spills from multiple facilities. Due to all of these factors, there is an urgent need for Imperium, Westway, and response contractors to make a strong commitment to build much larger response equipment and materials inventories in Grays Harbor during the projects' permitting process and not after operating permits have been issued.

III. ENVIRONMENTAL HEALTH - OIL SPILL PREVENTION AT THE FACILITY

10. Weather, river conditions, visibility, tides, winds, and other environmental parameters can vary considerably in Grays Harbor throughout the year as they do in many other parts of Washington. The Imperium and Westway facilities will be operating in essentially the same environment. As such, these two facilities, and any additional proposed oil terminal developments, should work collaboratively to the maximum extent possible to develop consistent

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oil transfer procedures, minimum weather criteria (e.g. winds, seas, river conditions, tides) for conducting oil transfer operations, personnel staffing and training requirements, and other facility/oil transfer operating parameters. Topics to consider should include the development of safe and effective threshold determination reports, equivalent compliance plans, alternative measures, facility operations manuals, and other issues required by Ecology's oil transfer rule and other related regulations. Sharing information and working together to develop similar operating standards at the two oil handling facilities could help to reduce costs, ensure safe and consistent oil transfer operations at both facilities, increase efficiencies and add to the overall level of environmental protection in the port. To my knowledge, they have not taken any such steps.

IV. OIL SPILL PREVENTION FOR THE VESSEL ROUTE TO REDUCE RISK OF A SPILL

11. With the increased tank vessel traffic from the proposed facility projects, salvage and marine fighting (SMFF) issues become even more important. Vessel casualties require SMFF resources/services such as salvage masters, dive teams to conduct hull surveys and damage assessment, emergency towing, emergency lightering, vessel stabilization, salvage and other related services. The United States Coast Guard (USCG) currently requires all regulated tank vessels operating in the US to contract with one of five nationwide SMFF providers that has been vetted and accepted by the agency. These SMFF companies must demonstrate they have the qualifications to provide 15 specific SMFF salvage related services including remote assessment and consultation; hull and bottom surveys, emergency towing; emergency lightering, and salvage plan development, to name several. The USCG evaluates the ability of the SMFF providers to provide these services in the nearshore, inland, and offshore waters within defined Captain of the Port (COTP) zones according to prescribed timeframes.

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12. Grays Harbor lies within the USCG's Columbia River COTP zone. However, the USCG's SMFF regulations don't necessarily address specific local geographic issues. For example, the SMFF regulations require that a tank vessel transiting the Sector Columbia River COTP zone inbound for Grays Harbor must have a SMFF company that is capable of providing on-site salvage assessment within 6 hours, an assessment of structural stability within 12 hours and a hull survey within 12 hours. Emergency towing is required within 12 hours. One of the most critical ways to control a vessel in distress and prevent a potential significant oil spill is to ensure that large ocean tugs with sufficient horsepower and bollard pull are readily available to provide emergency towing services. Normally, the closest large rescue tugs capable of handling a major vessel casualty near Grays Harbor are located in the Columbia River and Neah Bay area unless a tug of opportunity is available at the time. It would take several hours for a rescue tug in these areas to mobilize and respond to a vessel casualty near Grays Harbor, which could increase the risks of an oil spill. Therefore, a comprehensive evaluation should be conducted of the adequacy of existing SMFF contracted resources, including rescue tugs, to provide rapid response services in the immediate Grays Harbor area in the event of a vessel casualty due to the Port's relatively isolated location. The MDNS does not contain any such analysis.

13. There are inconsistencies in the additional mitigating measures required for tug escorts in the Westway and Imperium MDNSs. On page 9 of the Imperium MDNS, two tugs are required for crude oil vessels inbound and outbound to the Imperium oil terminal to three miles offshore with a third tug being available. However, on page 10 of the Westway MDNS, only outbound vessels would be required to have a single tug escort from the terminal to the 3 mile limit. Since both terminals will be essentially involved in the same operations, there should be similar tug escort requirements. To provide the maximum level of environmental protection, the

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two tug escort/ third tug available requirement described in the Imperium MDNS should be the standard applied to both facility proposals.

V. TRANSPORTATION – VESSEL TRAFFIC

14. The Westway and Imperium proposals would result in a maximum increase of 120 and 400 vessel transits/year, respectively. The 2012 level of vessel transits in Grays Harbor was 168 (as stated in the Westway and Imperium MDNSs). Therefore, the total maximum number of vessel transits would increase from 168 to 688, a threefold increase from current levels. This does not account for additional potential traffic created by any other port facility development projects that could occur in the future such as the U.S. Development project.

15. Currently, Grays Harbor is a relatively small, albeit important, deep water port between the Columbia River and Puget Sound. The four terminals in the Port handle dry bulk, roll on/roll off, liquid bulk, break bulk, and wood chip products from tank vessels, car carriers, bulk carriers, and other deep draft vessels. Recreational boats, a commercial fishing fleet, cargo barges, and other vessels also use the harbor. Vessel traffic is regulated by both the International Maritime Organization (IMO) and US Coast Guard. The USCG manages Vessel Traffic Services (VTS) and Traffic Separation Schemes (TSS) in several larger ports and areas on the west coast such as the Strait of Juan de Fuca, Puget Sound, San Francisco Bay and Los Angeles/Long Beach. TSSs are used to regulate the traffic at busy, confined waterways. Vessel traffic lanes are established that indicate the general direction of the ships in that zone. The USCG's VTS is recognized by the International Maritime Organization (IMO) and all applicable commercial vessels are required to follow the VTS regulations governing marine traffic in these areas. The USCG's VTS provides timely information to vessels about traffic movement, weather, and hazards to navigation.

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16. Grays Harbor does not have a well developed vessel traffic system such as those that exist in the aforementioned areas which Imperium acknowledges on page 24 of their SEPA checklist where they state that "…Grays Harbor does not have a Vessel Traffic Service to coordinate vessel traffic…." The additional vessel traffic growth projected by the development of oil facilities in Grays Harbor will apply considerable pressure on the ability to safely manage vessel traffic without an ensuing potential increase in risk to the safe transportation of oil and other products/goods in the port. There is no discussion in the MDNS of these considerations.

17. I understand that a Harbor Safety Committee (HSC) for Grays Harbor has been only recently established within the past year or so. Mature HSCs exist in many ports around the U.S. including Puget Sound, Columbia River, San Francisco, and other locations. HSCs are usually comprised of various stakeholders with an interest in marine transportation issues including state and federal agencies, pilots, port associations, environmental groups, local government, marine trade organizations, public, vessel operators/shippers, tribes, etc. The purpose of a HSC is to promote safe and secure harbors/ports by providing an active forum for evaluating, planning, and implementing operational and environmental measures beyond existing federal and state regulatory requirements.

18. One of the typical work products of the HSC's work is a Harbor Safety Plan (HSP). The HSP is a comprehensive document that contains procedures, guidelines and operating standards on many different issues. "Standards of Care" (SOC) are contained in an HSP. SOCs are procedures and practices that experienced mariners follow to ensure safe and responsible marine operations in their professional lives. They are not enforceable since they are not regulations. Topics that can be covered in SOCs include anchoring, bridge team

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management, bunkering operations, heavy weather, lightering, restricted visibility, propulsion loss, tanker escorts, and towing operations.

19. Since the HSP has not yet developed SOCs and/or other comprehensive operating procedures, and in light of the development proposals from Imperium and Westway, the Grays Harbor HSC should rapidly move forward to organize a robust and effective HSC that addresses important marine transportation issues for the area. Operating guidelines, procedures, and SOCs should be developed to ensure that both current and future marine traffic related growth in Grays Harbor is safely conducted.

20. Reducing oil spill risks and properly managing increased vessel traffic are key issues in regulating the growth of oil handling facilities in Grays Harbor. The proposed Vessel Traffic Transportation Impact Analysis' (VTIA) are intended to evaluate potential negative effects to current vessel traffic in Grays Harbor from projected increases in the Imperium and Westway development proposals. Mitigating measures should be developed to address any identified deficiencies and incorporated into final project approval conditions by the regulatory agencies. Issues to consider in such an analysis should included:

a. Vessel traffic patterns/requirements such as one way traffic
b. Minimum bar closures
c. Minimum weather conditions for vessel entry into Grays Harbor- winds, seas, bar conditions, restricted visibility, tides, currents, etc.
d. Adequacy of existing hydrographic data for the port of Grays Harbor and the vicinity including bottom surveys, navigational hazards, near shore oceanographic/shoreline processes, etc.
e. Safe maneuvering speeds for prevailing port conditions
f. Vessel and port communications
g. Navigational hazards and related safety issues
h. Anchorages – adequacy of available anchorages, impact to accommodate increased vessel traffic growth, water depths, safe weather operating criteria
i. Escort tug availability and emergency towing capability
j. Automatic Information System (AIS) – international/federal required vessel tracking system – A vessel's AIS should be properly operated and programmed with proper navigation status, draft, destination, estimated time of arrival, etc.

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k. Small vessel management – International rules (COLREGS 72 - Rules of the Road)
l. Pilotage – Availability, adequacy of staffing levels to meet increasing demands, identifying pilot concerns through formal process (regulatory process, Harbor Safety Committee)
m. Heavy weather impacts/restrictions

21. It is very important to note that the VTIAs required by the agencies will not be completed until after Ecology and the City of Hoquiam have made a decision regarding the need for a full EIS. This means that any additional mitigating measures concerning spill risks and vessel traffic from the VTIA will occur only after the agencies' have given their overall approval to move forward on the projects. In fact, Ecology's requirement is for the VTIA to be completed only prior to the projects' receiving a Certificate of Occupancy by the City of Hoquiam.

22. This is a key decision in the regulatory process since many of the important planning and permitting decisions for both projects will have been largely finished by the time the VTIA's results are known. Ecology is requiring that "the applicant shall provide evidence to the City of Hoquiam that mitigation measures identified in the VTIA are implemented or are obligated to be implemented by the appropriate entities having responsibility for such policies and procedures" and that "mitigating measures implemented shall be completed to be the satisfaction of the Harbor Safety Committee and/or the US Coast Guard prior to receiving the project Certificate of Occupancy…."

23. This approach is fraught with potential problems. First, the HSC is relatively new and has not yet had an opportunity to fully organize and develop comprehensive vessel and facility operating guidelines and procedures. Organizing a diverse set of stakeholders into a cohesive working group can be extremely challenging. Secondly, developing specific operating guidelines or mitigating measures on complex and sometimes controversial topics that must be approved by the tribes, recreational groups, environmental organizations, the US Coast Guard,

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pilots, the State of Washington, and other parties participating on the HSC is usually a time consuming process. This is due to many different factors including staffing/resource limitations, time constraints, budget shortfalls, jurisdictional conflicts and political influences. Thirdly, mitigating measures left to post development implementation can often be problematic because of the involved parties' differing interpretations and approaches to resolve issues, thereby negatively affecting consensus building and delaying results. It is my opinion that the VTIA should have been completed before the MDNS was issued because its results and mitigation requirements are needed to evaluate whether there is a probable significant impact from these projects.

VI. CONCLUSION

24. The information considered in issuing the MDNS leaves too many unknowns to allow a determination that there will be no probable significant adverse effect to the environment. Instead, the MDNSs demonstrate many oil spill and vessel traffic related risks that aggregate to form a probable significant adverse effect. There is no in-depth analysis of how the current shortfall in spill response capability in the Grays Harbor region will be addressed. There is no discussion of alternatives to pre-booming, and it is my opinion that the possible alternatives have weaknesses that should have been considered. Information regarding the availability and response times of tugs is relevant and should have been considered. Finally, the substantial increase in vessel traffic warrants detailed analysis before the issuance of the MDNSs since its results and mitigation are important to understanding the likely environmental effects of the projects.

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I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 9th day of September, 2013, at Bainbridge Island, Washington.

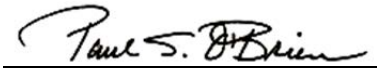

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EXHIBIT A

PAUL S. O'BRIEN

ECM Maritime Services
900 Winslow Way E., Suite 250
Bainbridge Island, WA 98110

Curriculum Vitae

HIGHLIGHTS OF QUALIFICATIONS/SKILLS:

- Over 36 years of experience in environmental work in the field of oil and hazardous substance spill prevention, preparedness and response, both in the public and private sectors.
- Broad range of knowledge and expertise on spill prevention, preparedness and response issues relating to land and water spills; marine transportation; and storage facilities/terminal operations.

EDUCATION:

1975 B.S. Physics, University of Idaho

RELEVANT PROFESSIONAL WORK EXPERIENCE:

2008 – Present **ECM Maritime Services, LLC** – Manager, Seattle Office

Manage ECM's worldwide spill training and exercise program, respond to oil and hazardous substance spills; and conduct vessel inspections and environmental audits for shipping clients. Provide specialized training to vessel owners/operators on various regulatory compliance issues associated with spill prevention, response and preparedness; the Incident Command System, etc.

2007 – 2008 **Environment International Ltd**. – Project Manager

Supported various environmental projects under contract to government and non-government clients. Prepared project proposals containing technical, management and cost elements. Also involved in business development activities.

2005 – 2007 **Washington Department of Ecology** – Spills Program – Spill Prevention Section Manager

Managed the Spill Prevention Section in Ecology's Spill Prevention, Preparedness and Response (SPPR) program. Developed and managed Section work plans, project priorities, budgets, workforce management plans, policies, guidelines and procedures. Managed a $3.0 million budget and a staff of 24. Responsible for approving oil-handling facility oil spill operating manuals; prevention plans; and tank vessel voluntary oil spill prevention plans demonstrating best achievable protection of Washington's marine environment. Initiated rulemaking to accomplish legislative mandates and spill prevention objectives. Coordinated spill prevention activities with the U.S. Coast Guard; Pacific States/British Columbia Oil Spill Task Force; and other

international, federal, state, local and tribal organizations. Initiated enforcement actions for violations of spill prevention regulations and state laws as appropriate.

1989 – 2005 **Washington Department of Ecology** - Spills Program – Northwest Regional Supervisor and State On-Scene Coordinator (SOSC)

Managed regional SPPR program activities including supervising 13 professional staff. Served as the State On-Scene Coordinator (SOSC) to direct the State's response to hundreds of oil and hazardous substance spills (see below). As SOSC, participated with the regulated industry, governmental agencies, tribal groups and contractors in spill drills to test the adequacy of spill contingency plans. Served as regional spokesperson on SPPR issues to the media, public and others. Reviewed and approved numerous industry facility and vessel oil spill contingency plans. Participated in more than 100 spill/emergency response training exercises. Worked extensively with the regulated industry, governmental agencies, elected officials, the tribes, the media, and other stakeholders on SPPR related issues. Issued penalties, orders, and other enforcement actions for violations of state law. Participated in the development and implementation of program policy, procedures and guidelines.

Responded to the following major oil spills:

- Olympic Pipeline gasoline fire/spill – Bellingham, WA
- Foss Maritime Barge 248-P heavy oil spill – Seattle, WA
- T/V POLAR TEXAS crude oil spill – Tacoma, WA
- Trans Mountain Pipeline spills – Bellingham, WA
- Crowley Maritime Barge 101 gasoline spill – Anacortes, WA
- Texaco refinery crude oil spill – Anacortes, WA
- Numerous tank truck product spills – Seattle, WA
- T/V Exxon Valdez oil spill – Valdez, AK

1976 – 1989 **Alaska Department of Environmental Conservation (ADEC) -** Oil Pollution Control Program – Various positions including Program Manager

Managed ADEC's oil pollution control, coastal zone management, leaking underground tank (LUST) and oil and gas leasing programs. Led ADEC's development of new regulations, oil and gas leasing stipulations, and public participation programs. Reviewed numerous Environmental Impact Statements (EISs) for offshore oil and gas development for compliance with State regulations. Served as the Alaska State representative on the Alaska Regional Response Team (RRT). Reviewed and approved scores of contingency plans for tank vessels/facilities and spill training programs. Reviewed tank vessel design and construction standards for vessels trading in Alaska. Annually approved an industry funded multi-million dollar Arctic oil spill research and development program. Administered a large EPA grant for ADEC's initial LUST program. Formulated program policies, strategies, work plans, procedures and guidelines. Supervised professional staff. Worked with the state legislature on the development of new legislation relating to oil pollution control.

HONORS: Several achievement awards from EPA, ADEC and Ecology for outstanding performance and contributions in the preparation of a Congressional report on the Exxon Valdez oil spill (EPA), advancing spill response technology (ADEC), and leadership in developing new response policies and initiatives (Ecology).

SHORELINES HEARINGS BOARD

FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents,	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* DIRECT TESTIMONY OF PAUL ROSENFELD, PH.D.

1. This report discusses the logistical issues and environmental risks associated with the proposed expansion of petroleum product rail transport and bulk storage operations on Grays Harbor in Hoquiam, Washington. Upon review of the Mitigated Determination of Non-significance (MDNS) and Shoreline Substantial Development Plan (SSDP) documents prepared for the Westway and Imperium projects, I have determined that further investigation into the impacts that will be caused by these developments is necessary. A comprehensive

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Environmental Impact Statement should be required to address the numerous issues outlined herein. Approval of the MDNS documents is inappropriate due to the remaining unknowns.

2. As a soil chemist, I have extensive experience conducting assessment of the environmental hazards of crude oil releases. I have worked on several projects to evaluate risks posed by spills occurring on both land and water, involving crude oil as well as other chemicals. Following an oil spill in Lake Charles, LA in 2006, I quantified hydrocarbon vapor exposures to hundreds of workers and residents in the nearby area, and examined the harmful nature of petroleum odors. In the aftermath of a 2010 crude oil spill in Port Arthur, TX, I was tasked with examining air quality data and emergency response cleanup efforts. I also reconstructed chemical exposures of residents living near the disastrous 2005 Graniteville chlorine rail car crash and analyzed the adequacy of emergency response efforts. Finally, I reviewed the effectiveness of remediation strategies at an ethylene dichloride spill in Lake Charles, LA, and the persistent nature of residual contamination. Based upon this previous work, I am qualified to offer opinions regarding the various risks associated with amplified crude oil rail traffic resulting from the proposed projects that are the subject of this evaluation.

I. APPLICATION AND MDNS HAD INSUFFICIENT INFORMATION TO ASSESS AND/OR MITIGATE THE RISKS INVOLVED IN THE INCREASED RAIL TRAFFIC CARRYING CRUDE OIL DUE TO FACILITY EXPANSION.

3. The Imperium Terminal Services, LLC ("Imperium") facility and the Westway Terminal Services, LLC ("Westway") facility are situated adjacent to a deep water port in Hoquiam, Washington and are proposing to provide transmission of petroleum products and other bulk liquids from incoming rail cars to outgoing barges and oil tankers bound for the Pacific Ocean. Each of these entities submitted SEPA checklists that were approved by the City of Hoquiam and the Washington Department of Ecology in Mitigated Determinations of Non-Significance ("MDNS") and Shoreline Substantial Development Permits ("SSDP"). However, it

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is evident that the information considered in preparation of these documents was inadequate to assess the increased environmental risks and logistical problems that may be encountered by the facility expansions, including additional rail and marine vessel traffic. For these reasons it is critical that full Environmental Impact Statements be required to assess potential community and ecological damages prior to project commencement.

4. The incoming rail line to Hoquiam runs northwest from Centralia, Washington, passing through multiple municipalities on the route. In the event of a crude oil spill, mitigation and remediation efforts would be complicated and require both short-term and long-term strategies. Techniques to be employed immediately would consist of excavation in the case of soil contamination. There is a high flammability hazard when dealing with crude oil transport failures, in addition to the human health risks that would be associated with a spill regardless of whether it were to catch fire. The availability of aqueous foam treatment at all unloading stations may not be sufficient to address issues encountered if an accident were to occur along the rail line between Centralia and Hoquiam. The Puget Sound and Pacific (PSAP) rail route transects portions of Grays Harbor, Lewis, and Thurston Counties between the two cities, passing through numerous smaller municipalities that may not be equipped with a full cache of mitigation equipment. A preliminary spill response plan prepared by National Response Corporation (NRC) identified that minimum response times to some locations would be approximately one and a half to two hours, and could be longer depending on traffic and accessibility. Fires and explosions resulting from spills would be capable of causing significant damages within these timeframes. In Hoquiam, residential properties lie within 200 feet of the railway as it enters the terminal facilities, and a spill would present imminent hazards to the safety of community members. Winds coming off the Harbor would likely disperse vapors and

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smoke toward the neighboring residences and businesses. The complex geographic setting of the storage terminals near wetlands, the Chelalis River mouth, and Fry Creek present additional complications in mitigating spills with respect to protecting local ecology and preventing spread to waterways.

II. INCREASED RAIL TRAFFIC WILL INCUR UNANTICIPATED LEVELS OF RISK.

5. The proposed Westway and Imperium expansion projects would bring unprecedented levels of harbor vessel and rail traffic to the Hoquiam terminals. Current baseline rail traffic as of 2012 is approximately seven (7) loaded trains per week passing through the Imperium and Westway combined. In the Westway MDNS there is a table displaying existing and anticipated transit numbers for harbor vessels and trains based on the proposals provided by the two entities. The number of loaded and unloaded trains annually passing through the terminals would potentially rise from 730 in 2012 to 1,703, an increase of 133%. This amounts to approximately nine (9) additional loaded trains entering the Hoquiam terminals every week. However, the Freight Rail Plan 2013, drafted by the Puget Sound and Pacific (PSAP) Railroad and Port of Grays Harbor, only accounts for infrastructure enhancements to accommodate an increase of three to seven (average five) loaded trains per week. There is no discussion of how PSAP, Westway, or Imperium would address this disparity. Inadequate rail infrastructure would increase the likelihood of an incident. The logistical deficiencies of the proposed augmentations to infrastructure further complicate the ability to anticipate the effectiveness of the abatement strategies in the event of an incident. For these reasons, it is my opinion that a comprehensive environmental assessment is warranted prior to the advancement of either of these terminal development projects.

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A. Possibility of catastrophic or small spills

6. The volume of materials that are contained in a bulk transport train provide the opportunity for a range of incidents with varying degrees of hazards. A recent railcar accident demonstrates the persisting dangers associated with crude oil transport by rail. On July 6, 2013, a train carrying crude oil from the Bakken formation in North Dakota derailed in Lac-Megantic, Quebec, causing an explosion that resulted in the deaths of 47 people. Since the incident, the crude petroleum transit industry has been subjected to intense scrutiny to identify shortcomings in the extraction, transport, and storage of crude oil products en route to refineries. The Federal Railroad Administration (FRA) responded by conducting an investigation that consisted of examination of rail car safety parameters, recommendations for testing crude product for accurate chemical properties prior to transport, and evaluating the adequacy of emergency response plans.

7. In a letter to the American Petroleum Institute on July 29, 2013, the Director of the Office of Safety Assurance and Compliance stated that, "FRA has specific safety concerns about the proper classification of crude oil being shipped by rail, the subsequent determination or selection of the proper tank car packaging used for transporting crude oil, and the corresponding tank car outage requirements." (FRA, 2013). These issues would be critical factors in determining the potential consequences of large and small spills at various locations along the rail route from Centralia to Hoquiam, as well as at the terminal facilities. Understanding the potential severity of incidents in transporting hazardous materials requires obtaining accurate information about the product being shipped as well as the safety parameters of the containers. Items such as determining required tank head space depend on appropriate classification and influence the probability of tank failure in the event of a derailment or other incident. The

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concerns voiced by the FRA apply directly to crude oil being shipped en route to Hoquiam but do not appear to have been considered.

B. Deficiencies identified in rail tank cars

8. Following investigation of a 2009 derailment and fire in Cherry Valley, Illinois, the National Transportation Safety Board (NTSB) issued a letter report on March 2, 2012 evaluating the susceptibility of tank car failures in crashes and recommendations for modifications to the cars. "During a number of accident investigations over a period of years, the NTSB has noted that DOT-111 tank cars have a high incidence of tank failures during accidents." This model of tank car is the most commonly used in bulk rail transport, accounting for approximately 69 percent of the national fleet (NTSB, 2012). Beginning in October 2011, new DOT-111 tank cars are required to have "enhanced tank head and shell puncture resistance systems and top fittings protection that exceeds existing design requirements for DOT-111 tank cars." However, the "NTSB concluded that the safety benefits of new specification tank cars will not be realized while the current fleet of DOT-111 tank cars remains in hazardous materials unit train service, unless the existing cars are retrofitted with appropriate tank head and shell puncture resistance systems."

9. There is disagreement in the opinions held by the NTSB and the other organizations responsible for overseeing the safety of tank cars in the hazardous materials rail transport system. Despite the enhanced safety features required and implemented on newly constructed cars, the American Association of Railroads (AAR) "does not support retrofitting existing DOT-111 tank cars, nor does the Federal Railroad Administration. However, the NTSB is convinced that something must be done to increase the crashworthiness of these tank cars, which carry crude oil and other hazardous materials." (NTSB, 2013) Without cooperation from the AAR and FRA, there will remain a vast number of tank cars in circulation that do not adhere

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to the increased safety parameters. Given the FRA's concerns regarding the determination of crude oil volatility that were previously mentioned, it is surprising that they do not require the implementation of enhanced engineering precautions to the existing tanks to ensure lower failure rates in the event of a derailment. Neither MDNS requires these engineering precautions.

10. The accelerated expansion rate of crude oil bulk transport by rail underlines the necessity for increased safety precautions with respect to tank car design. According to the AAR, between 2005 and 2012 crude oil transport increased by 443 percent nationally. Furthermore, the AAR admits that "nearly 25 percent of the DOT-111 fleet carrying crude today meets the higher design standards." (AAR, 2013) Therefore, approximately 75 percent of the tank car fleet does not currently meet the safety recommendations set forth by the NTSB and are being used against their guidance. If the manufacture of upgraded tank cars cannot keep up with the increases in bulk crude oil transport, it is likely that accidents that would have been mitigated by the more stringent standards would result in more catastrophic environmental consequences.

11. The increase in Hoquiam rail traffic as outlined in the Westway MDNS would more than double current rates, and there is no accurate representation of safety implications set forth by either Imperium or Westway at this juncture. The well-publicized uncertainty in this area and a discussion of how it tank car design may affect risk associated with the projects should have been discussed; a complete picture of the probable environmental effects of the projects is not possible otherwise.

III. DISCUSSION OF HARMS INCURRED BY INCIDENTAL SPILL OF BULK CARGO

12. An examination of human health hazards, contamination of environmental media, and a compromise of ecological habitats in the event of a release of crude oil into the environmental, is necessary. The information contained in the MDNS, SEPA checklists, and accompanying materials does not provide sufficient analysis; a comprehensive Environmental

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Impact Statement should be required. Prior to the approval of any permits or plans, it is important that Imperium, Westway, Ecology, and Hoquiam provide a detailed analysis of the potential severity of damages to each of these environmental receptors and allow the public the opportunity to assess their evaluations. The information provided to date does not allow for any such evaluation.

A. Exposure of oil to sensitive communities and associated harms

13. The rail route between Centralia and Hoquiam transects multiple municipalities and lies in close proximity to numerous residential and commercial tracts along the way. Spills occurring in populated areas would present significant risks of environmental exposures to crude oil constituents, primarily through air and soil vapor pathways. Contamination of potable water sources would also be a concern if the water table of aquifers were substantially shallow in the affected area. Petroleum hydrocarbons and sulfur compounds found in crude oil are known to cause numerous adverse health effects in humans, including, but not limited to: eye irritation, respiratory complications, neurological disorders, and cancer under severe or prolonged conditions. Under the most dire of situations, evacuation of nearby communities would be necessary during the primary stages of emergency response. An analysis of the availability of medical facilities is crucial to examining the adequacy of mitigation efforts. However, none of this information was provided in the MDNS, and I have not seen anything that would lead me to believe it was considered by any party.

14. The Imperium and Westway bulk storage facilities are situated along the Grays Harbor channel, in close proximity to residential communities. Residential properties located within 1,000 feet of the harbor channel could be exposed to petroleum hydrocarbons evaporating off the surface in the event of a marine spill.

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15. Remediation efforts following a spill on land would include excavation, soil vapor extraction, bioremediation, groundwater treatment and testing, and additional strategies that do not appear to have been considered by Ecology or Hoquiam. Use of geo-probes or installation of monitoring wells would be necessary to assess the effectiveness of the ongoing remediation efforts, which would be required for an extended period of time. The presence of wetlands nearby in Grays Harbor, as well as the mouth of the Chelalis River, further complicates the remediation approaches.

B. Risk of destructive damage to nearby communities

16. The FRA has raised considerable concern regarding the chemical properties of crude oil being transported in bulk by rail. Crude oil is often sourced from multiple wells in a given region, and products with differing chemical properties can become mixed in the activity of loading rail cars for transport. This was one of the primary focuses of the FRA in assessing potential factors in the severity of the fire and explosion that occurred in Quebec in July 2013. In the aftermath of the Lac-Megantic incident, investigating officials were concerned to find that,

> FRA audits of crude oil loading facilities indicate that the classification of crude oil being transported by rail is often based solely on Material Safety Data Sheet (MSDS) data that only provides a material classification and a range of material properties. This MSDS information is typically provided by the consignee to the shipper, and the shipper is unaware of validation of the values of the crude oil properties. Further, FRA's audits indicate that MSDS information is not gleaned from any recently conducted tests or from testing for the many different sources (wells) of crude oil.

17. The MDNSs and accompanying material fail to discuss these issues and their relationship to potential risks of a derailment and subsequent explosion in their considerations for emergency response in the event of a rail accident. In comparison to the incident in Quebec, the trains entering the Hoquiam transit yards will be substantially longer. An estimate of the blast radius from the 63-car Quebec derailment was approximately one kilometer (National Post,

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August 7, 2013). Along the rail corridor from Centralia to Hoquiam, there are numerous towns and cities with residential and commercial tracts located within a one-kilometer proximity of the rail line. Depending on the number of cars involved, the blast radius may be even larger than one kilometer. It would be prudent to evaluate the devastating effects of an even larger accident as part of the environmental concerns and emergency response planning. This work has not yet been conducted and should be included in the emergency response planning within a comprehensive Environmental Impact Statement that is merited by this proposed development.

C. Position of equipment caches unknown

18. To my knowledge, a proposed map and inventory of locations and equipment of the spill response caches has not yet been provided. Without that information, it is impossible to anticipate the chemical impacts a marine or rail spill would have, and it would likely go beyond the minimal analysis provided to date.

IV. THE DISCUSSION OF RELEASE MITIGATION EFFORTS IS INSUFFICIENT.

19. Both Imperium and Westway fail to provide an acceptable inventory of mitigation strategies in the event of an environmental release. Standard practice for risk assessment involving hazardous materials would include an evaluation of the potential impacts and the effectiveness of abatement techniques given varying degrees of severity. In the event of a spill on land, even the best mitigation will not prevent significant environmental impacts and impacts to surrounding communities. If a spill occurs in a developed or populated area, there will be extreme difficulty in identifying the extent of the ground contamination and effectively reclaiming all released product. Geologic investigations will be required to determine subsurface mobility of the chemicals. Excavation cannot take place underneath existing structures, and soil vapor extraction is a complicated remediation technique of varying effectiveness. Chemical-

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specific cleanup goals should be set consistent with the EPA's Screening Levels to ensure that both short-term and long-term risks to human health are minimized.

20. Additionally, the aqueous foam identified to be used in the case of a fire is capable of causing eye and skin irritation upon exposure according to industry MSDS. Petroleum vapors from the spill as well as smoke from any accompanying fire will result in air pollution to which neighboring residential and commercial properties will be exposed. If an explosion occurs, debris from the rail cars could damage properties close to the site, and proximal buildings could be leveled. There would be minimal time to address these consequences, and thus it is important that the locations at highest risk of devastating accidents be identified. I am not aware of any such discussion in either MDNS or accompanying documents.

21. Finally, the provision of safety plans at a later date is inappropriate as they should be subject to peer review and public comment; they also are necessary to assess the likely effects the projects will have on the environment. It is not clear to me that the decision makers have taken into account a wide enough range of emergency scenarios and are capable of responding accordingly in the event of an incident. To fully and properly analyze these projects, all relevant information pertaining to the environmental risks of such massive expansion of these facilities should be provided *prior* to the approval of any permits. The increase in rail traffic to levels never before experienced in the area present safety hazards requiring extensive analyses that neither Imperium nor Westway have undertaken at this stage.

V. CONCLUSIONS

22. The existing MDNSs and supporting documents do not address the numerous environmental issues that would result from a catastrophic rail incident at or en route to the Imperium and Westway bulk storage facilities. In my opinion, Ecology and Hoquiam did not

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consider sufficient information to justify their finding of no probable significant environmental impact. Based on my review of available materials and experience involving crude oil exposures and emergency response, these projects will have a probable significant impact on the environment, and, at the very minimum, more information must be provided to determine otherwise. Furthermore, neither has there been an adequate consideration of the consequences of an incidental release, and an Environmental Impact Statement is necessary to fully address the complexity of such an event.

VI. CLOSING

23. The opinions set forth herein are based upon review of available documents pertaining to the environmental consequences of proposed expansion at the Imperium and Westway terminal facilities. Limitations on the evaluation were imposed by the lack of appropriate plans required for a comprehensive determination of non-significance with respect to the projects at hand. I reserve the right to amend these statements upon provision of additional information at a later date.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 9th of September, 2013, at Pasadena, California.

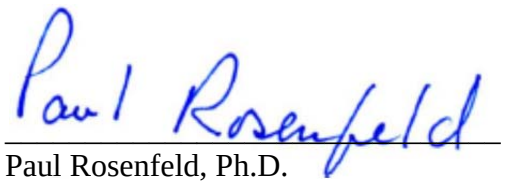

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EXHIBIT A

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Principal Environmental Chemist

Risk Assessment & Remediation Specialist

Education

Ph.D. Soil Chemistry, University of Washington, 1999. Dissertation on VOC filtration.

M.S. Environmental Science, U.C. Berkeley, 1995. Thesis on organic waste economics.

B.A. Environmental Studies, U.C. Santa Barbara, 1991. Thesis on wastewater treatment.

Professional Experience

Dr. Rosenfeld is the Co-Founder and Principal Environmental Chemist at Soil Water Air Protection Enterprise (SWAPE). His focus is the fate and transport of environmental contaminants, risk assessment, and ecological restoration. His project experience ranges from monitoring and modeling of pollution sources as they relate to human and ecological health. Dr. Rosenfeld has investigated and designed remediation programs and risk assessments for contaminated sites containing, petroleum, MtBE and fuel oxygenates, chlorinated solvents, pesticides, radioactive waste, PCBs, PAHs, dioxins, furans, volatile organics, semi-volatile organics, perchlorate, heavy metals, asbestos, PFOA, unusual polymers, and odor. Significant projects performed by Dr. Rosenfeld include the following:

Litigation Support

Client: Louisiana Department of Transportation and Development (Baton Rouge, Louisiana)
Serving as an expert witness, conducting groundwater modeling of an ethylene dichloride DNAPL and soluble plume resulting from spill caused by Conoco Phillips.

Client: Baron & Budd, P.C. (Dallas, Texas) and Weitz & Luxenberg (New York, New York)
Served as a consulting expert in MTBE Federal Multi District Litigation (MDL) in New York. Consolidated ground water data, created maps for test cases, constructed damage model, evaluated taste and odor threshold levels. Resulted in a settlement of over $440 million.

Client: The Buzbee Law Firm (Houston, Texas)
Served as a as an expert in ongoing litigation involving over 50,000+ plaintiffs who are seeking compensation for chemical exposure and reduction in property value resulting from chemicals released from the BP facility. a

Client: Environmental Litigation Group (Birmingham, Alabama)
Serving as an expert on property damage, medical monitoring and toxic tort claims that have been filed on behalf of over 13,000 plaintiffs who were exposed to PCBs and dioxins/furans resulting from emissions from Monsanto and Cerro Copper's operations in Sauget, Illinois. Developed AERMOD models to demonstrate plaintiff's exposure.

Client: Baron & Budd P.C. (Dallas Texas) and Korein Tillery (St. Louis, Missouri)
Served as a consulting expert for a Class Action defective product claim filed in Madison County, Illinois against Syngenta and five other manufacturers for atrazine. Evaluated health issues associated with atrazine and deterimied treatment cost for filtration of public drinking water supplies. Resulted in $105 million dollar settlement.

Client: The Buzbee Law Firm (Houston, Texas)
Served as a consulting expert in catalyst release and refinery emissions cases against the BP Refinery in Texas City. A jury verdict for 10 employees exposed to catalyst via BP's irresponsible behavior resulted in a $100,000,000 jury verdict

Client: Baron & Budd, P.C. (Dallas, Texas)
Served as a consulting expert to calculate the Maximum Allowable Dose Level (MADL) and No Significant Risk Level (NSRL), based on Cal EPA and OEHHA guidelines, for Polychlorinated Biphenyls (PCBs) in fish oil dietary supplements.

Client: Girardi Keese (Los Angeles, California)
Served as an expert testifying on hydrocarbon exposure of a woman who worked on a fuel barge operated by Chevron. Demonstrated that the plaintiff was exposed to excessive amounts of benzene.

Client: Mason & Cawood (Annapolis, Maryland) and Girardi & Keese (Los Angeles, California)
Serving as an expert consultant on the Battlefield Golf Club fly ash disposal site in Chesapeake, VA, where arsenic, other metals and radionuclides are leaching into groundwater, and ash is blowing off-site onto the surrounding communities.

Client: California Earth Mineral Corporation (Culver City, California)
Evaluating the montmorillonite clay deposit located near El Centro, California. Working as a Defense Expert representing an individual who owns a 2,500 acre parcel that will potentially be seized by the United States Navy via eminent domain.

Client: Matthews & Associates (Houston, Texas)
Serving as an expert witness, preparing air model demonstrating residential exposure via emissions from fracking in natural gas wells in Duncan, Texas.

Client: Baron & Budd P.C. (Dallas, Texas) and Korein Tillery (St. Louis, Missouri)
Served as a consulting expert for analysis of private wells relating to litigation regarding compensation of private well owners for MTBE testing. Coordinated data acquisition and GIS analysis evaluating private well proximity to leaking underground storage tanks.

Client: Lurie & Park LLP (Los Angeles, California)
Served as an expert witness evaluating a vapor intrusion toxic tort case that resulted in a settlement. The Superfund site is a 4 ½ mile groundwater plume of chlorinated solvents in Whittier, California.

Client: Mason & Cawood (Annapolis, Maryland)
Evaluated data from the Hess Gasoline Station in northern Baltimore, Maryland that had a release resulting in flooding of plaintiff's homes with gasoline-contaminated water, foul odor, and biofilm growth.

Client: The Buzbee Law Firm (Houston, Texas)
Evaluated air quality resulting from grain processing emissions in Muscatine, Iowa.

Client: Anderson Kill & Olick, P.C. (Ventura, California)
Evaluated historical exposure and lateral and vertical extent of contamination resulting from a ~150 million gallon Exxon Mobil tank farm located near Watts, California.

Client: Packard Law Firm (Petaluma, California)
Served as an expert witness, evaluated lead in Proposition 65 Case where various products were found to have elevated lead levels.

Client: The Buzbee Law Firm (Houston, Texas)
Evaluated data resulting from an oil spill in Port Arthur, Texas.

Client: Nexsen Pruet, LLC (Charleston, South Carolina)
Serving as expert in chlorine exposure in a railroad tank car accident where approximately 120,000 pounds of chlorine were released.

Client: Girardi & Keese (Los Angeles, California)
Serving as an expert investigating hydrocarbon exposure and property damage for ~600 individuals and ~280 properties in Carson, California where homes were constructed above a large tank farm formerly owned by Shell.

Client: Brent Coon Law Firm (Cleveland, Ohio)
Served as an expert, calculating an environmental exposure to benzene, PAHs, and VOCs from a Chevron Refinery in Hooven, Ohio. Conducted AERMOD modeling to determine cumulative dose.

Client: Lundy Davis (Lake Charles, Louisiana)
Served as consulting expert on an oil field case representing the lease holder of a contaminated oil field. Conducted field work evaluating oil field contamination in Sulphur, Louisiana. Property is owned by Conoco Phillips, but leased by Yellow Rock, a small oil firm.

Client: Cox Cox Filo (Lake Charles, Louisiana)
Served as testifying expert on a multimillion gallon oil spill in Lake Charles which occurred on June 19, 2006, resulting in hydrocarbon vapor exposure to hundreds of workers and residents. Prepared air model and calculated exposure concentration. Demonstrated that petroleum odor alone can result in significant health harms.

Client: Cotchett Pitre & McCarthy (San Francisco, California)
Served as testifying expert representing homeowners who unknowingly purchased homes built on an old oil field in Santa Maria, California. Properties have high concentrations of petroleum hydrocarbons in subsurface soils resulting in diminished property value.

Client: Law Offices Of Anthony Liberatore P.C. (Los Angeles, California)
Served as testifying expert representing individuals who rented homes on the Inglewood Oil Field in California. Plaintiffs were exposed to hydrocarbon contaminated water and air, and experienced health harms associated with the petroleum exposure.

Client: Orange County District Attorney (Orange County, California)
Coordinated a review of 143 ARCO gas stations in Orange County to assist the District Attorney's prosecution of CCR Title 23 and California Health and Safety Code violators.

Client: Environmental Litigation Group (Birmingham, Alabama)
Served as a testifying expert in a health effects case against ABC Coke/Drummond Company for polluting a community with PAHs, benzene, particulate matter, heavy metals, and coke oven emissions. Created air dispersion models and conducted attic dust sampling, exposure modeling, and risk assessment for plaintiffs.

Client: Masry & Vitatoe (Westlake Village, California), Engstrom Lipscomb Lack (Los Angeles, Califronia) and Baron & Budd P.C. (Dallas, Texas)
Served as a consulting expert in Proposition 65 lawsuit filed against major oil companies for benzene and toluene releases from gas stations and refineries resulting in contaminated groundwater. Settlement included over $110 million dollars in injunctive relief.

Client: Tommy Franks Law Firm (Austin, Texas)
Served as expert evaluating groundwater contamination which resulted from the hazardous waste injection program and negligent actions of Morton Thiokol and Rohm Hass. Evaluated drinking water contamination and community exposure.

Client: Baron & Budd P.C. (Dallas, Texas) and Sher Leff (San Francisco, California)

Served as consulting expert for several California cities that filed defective product cases against Dow Chemical and Shell for 1,2,3-trichloropropane groundwater contamination. Generated maps showing capture zones of impacted wells for various municipalities.

Client: Weitz & Luxenberg (New York, New York)
Serving as expert on Property Damage and Nuisance claims resulting from emissions from the Countywide Landfill in Ohio. The landfill had an exothermic reaction or fire resulting from aluminum dross dumping, and the EPA fined the landfill $10,000,000 dollars.

Client: Baron & Budd P.C. (Dallas, Texas)
Served as a consulting expert for a groundwater contamination case in Pensacola, Florida where fluorinated compounds contaminated wells operated by Escambia County.

Client: Environmental Litigation Group (Birmingham, Alabama)
Served as an expert on groundwater case where Exxon Mobil and Helena Chemical released ethylene dichloride into groundwater resulting in a large plume. Prepared report on the appropriate treatment technology and cost, and flaws with the proposed on-site remediation.

Client: Environmental Litigation Group (Birmingham, Alabama)
Served as an expert on air emissions released when a Bartlo Packaging Incorporated facility in West Helena, Arkansas exploded resulting in community exposure to pesticides and smoke from combustion of pesticides.

Client: Omara & Padilla (San Diego, California)
Served as a testifying expert on nuisance case against Nutro Dogfood Company that constructed a large dog food processing facility in the middle of a residential community in Victorville, California with no odor control devices. The facility has undergone significant modifications, including installation of a regenerative thermal oxidizer.

Client: Environmental Litigation Group (Birmingham, Alabama)
Serving as an expert on property damage and medical monitoring claims that have been filed against International Paper resulting from chemical emissions from facilities located in Bastrop, Louisiana; Prattville, Alabama; and Georgetown, South Carolina.

Client: Estep and Shafer L.C. (Kingwood, West Virginia)
Served as expert calculating acid emissions doses to residents resulting from coal-fired power plant emissions in West Virginia using various air models.

Client: Watts Law Firm (Austin, Texas), Woodfill & Pressler (Houston, Texas) and Woska & Associates (Oklahoma City, Oklahoma)
Served as testifying expert on community and worker exposure to CCA, creosote, PAHs, and dioxins/furans from a BNSF and Koppers Facility in Somerville, Texas. Conducted field sampling, risk assessment, dose assessment and air modeling to quantify exposure to workers and community members.

Client: Environmental Litigation Group (Birmingham, Alabama)
Served as expert regarding community exposure to CCA, creosote, PAHs, and dioxins/furans from a Louisiana Pacific wood treatment facility in Florala, Alabama. Conducted blood sampling and environmental sampling to determine environmental exposure to dioxins/furans and PAHs.

Client: Sanders Law Firm (Colorado Springs, Colorado) and Vamvoras & Schwartzberg (Lake Charles, Louisiana)
Served as an expert calculating chemical exposure to over 500 workers from large ethylene dichloride spill in Lake Charles, Louisiana at the Conoco Phillips Refinery.

Client: Baron & Budd P.C. (Dallas, Texas)
Served as consulting expert in a defective product lawsuit against Dow Agroscience focusing on Clopyralid, a recalcitrant herbicide that damaged numerous compost facilities across the United States.

Client: Sullivan Papain Block McGrath & Cannavo (New York, New York) and The Cochran Firm (Dothan, Mississippi)

Served as an expert regarding community exposure to metals, PAHs PCBs, and dioxins/furans from the burning of Ford paint sludge and municipal solid waste in Ringwood, New Jersey.

Client: Rose, Klein & Marias LLP (Los Angeles, California)
Served as an expert in 55 Proposition 65 cases against individual facilities in the Port of Los Angeles and Port of Long Beach. Prepared air dispersion and risk models to demonstrate that each facility emits diesel particulate matter that results in risks exceeding 1/100,000, hence violating the Proposition 65 Statute.

Client: Rose, Klein & Marias LLP (Los Angeles, California) and Environmental Law Foundation (San Francisco, California)
Served as an expert in a Proposition 65 case against potato chip manufacturers. Conducted an analysis of several brands of potato chips for acrylamide concentrations and found that all samples exceeded Proposition 65 No Significant Risk Levels.

Client: Gonzales & Robinson (Westlake Village, California)
Served as a testifying expert in a toxic tort case against Chevron (Ortho) for allowing a community to be contaminated with lead arsenate pesticide. Created air dispersion and soil vadose zone transport models, and evaluated bioaccumulation of lead arsenate in food.

Client: Environment Now (Santa Monica, California)
Served as expert for Environment Now to convince the State of California to file a nuisance claim against automobile manufactures to recover MediCal damages from expenditures on asthma-related health care costs.

Client: Trutanich Michell (Long Beach, California)
Served as expert representing San Pedro Boat Works in the Port of Los Angeles. Prepared air dispersion, particulate air dispersion, and storm water discharge models to demonstrate that Kaiser Bulk Loading is responsible for copper concentrate accumulating in the bay sediment.

Client: Azurix of North America (Fort Myers, Florida)
Provided expert opinions, reports and research pertaining to a proposed County Ordinance requiring biosolids applicators to measure VOC and odor concentrations at application sites' boundaries.

Client: MCP Polyurethane (Pittsburg, Kansas)
Provided expert opinions and reports regarding metal-laden landfill runoff that damaged a running track by causing the reversion of the polyurethane due to its catalytic properties.

Risk Assessment And Modeling

Client: Hager, Dewick & Zuengler, S.C. (Green Bay, Wisconsin)
Conducted odor audit of rendering facility in Green Bay, Wisconsin.

Client: ABT-Haskell (San Bernardino, California)
Prepared air dispersion model for a proposed state-of-the-art enclosed compost facility. Prepared a traffic analysis and developed odor detection limits to predict 1, 8, and 24-hour off-site concentrations of sulfur, ammonia, and amine.

Client: Jefferson PRP Group (Los Angeles, California)
Evaluated exposure pathways for chlorinated solvents and hexavalent chromium for human health risk assessment of Los Angeles Academy (formerly Jefferson New Middle School) operated by Los Angeles Unified School District.

Client: Covanta (Susanville, California)
Prepared human health risk assessment for Covanta Energy focusing on agricultural worker exposure to caustic fertilizer.

Client: CIWMB (Sacramento, California)

Used dispersion models to estimate traveling distance and VOC concentrations downwind from a composting facility for the California Integrated Waste Management Board.

Client: Carboquimeca (Bogotá, Columbia)
Evaluated exposure pathways for human health risk assessment for a confidential client focusing on significant concentrations of arsenic and chlorinated solvents present in groundwater used for drinking water.

Client: Navy Base Realignment and Closure Team (Treasure Island, California)
Used Johnson-Ettinger model to estimate indoor air PCB concentrations and compared estimated values with empirical data collected in homes.

Client: San Diego State University (San Diego, California)
Measured CO_2 flux from soils amended with different quantities of biosolids compost at Camp Pendleton to determine CO_2 credit values for coastal sage under fertilized and non-fertilized conditions.

Client: Navy Base Realignment and Closure Team (MCAS Tustin, California)
Evaluated cumulative risk of a multiple pathway scenario for a child resident and a construction worker. Evaluated exposure to air and soil via particulate and vapor inhalation, incidental soil ingestion, and dermal contact with soil.

Client: MCAS Miramar (San Diego, California)
Evaluated exposure pathways of metals in soil by comparing site data to background data. Risk assessment incorporated multiple pathway scenarios assuming child resident and construction worker particulate and vapor inhalation, soil ingestion, and dermal soil contact.

Client: Naval Weapons Station (Seal Beach, California)
Used a multiple pathway model to generate dust emission factors from automobiles driving on dirt roads. Calculated bioaccumulation of metals, PCBs, dioxin congeners and pesticides to estimate human and ecological risk.

Client: King County, Douglas County (Washington State)
Measured PM_{10} and $PM_{2.5}$ emissions from windblown soil treated with biosolids and a polyacrylamide polymer in Douglas County, Washington. Used Pilat Mark V impactor for measurement and compared data to EPA particulate regulations.

Client: King County (Seattle, Washington)
Created emission inventory for several compost and wastewater facilities comparing VOC, particulate, and fungi concentrations to NIOSH values estimating risk to workers and individuals at neighboring facilities.

Air Pollution Investigation and Remediation

Client: Republic Landfill (Santa Clarita, California)
Managed a field investigation of odor around a landfill during 30+ events. Used hedonic tone, butanol scale, dilution-to-threshold values, and odor character to evaluate odor sources and character and intensity.

Client: California Biomass (Victorville, California)
Managed a field investigation of odor around landfill during 9+ events. Used hedonic tone, butanol scale, dilution-to-threshold values, and odor character to evaluate odor sources, character and intensity.

Client: ABT-Haskell (Redlands, California)
Assisted in permitting a compost facility that will be completely enclosed with a complex scrubbing system using acid scrubbers, base scrubbers, biofilters, heat exchangers and chlorine to reduce VOC emissions by 99 percent.

Client: Synagro (Corona, California)
Designed and monitored 30-foot by 20-foot by 6-foot biofilter for VOC control at an industrial composting facility in Corona, California to reduce VOC emissions by 99 percent.

Client: Jeff Gage (Tacoma, Washington)

Conducted emission inventory at industrial compost facility using GC/MS analyses for VOCs. Evaluated effectiveness of VOC and odor control systems and estimated human health risk.

Client: Daishowa America (Port Angeles Mill, Washington)
Analyzed industrial paper sludge and ash for VOCs, heavy metals and nutrients to develop a land application program. Metals were compared to federal guidelines to determine maximum allowable land application rates.

Client: Jeff Gage (Puyallup, Washington)
Measured effectiveness of biofilters at composting facility and conducted EPA dispersion models to estimate traveling distance of odor and human health risk from exposure to volatile organics.

Surface Water, Groundwater, and Wastewater Investigation/Remediation

Client: Confidential (Downey, California)
Managed groundwater investigation to determine horizontal extent of 1,000 foot TCE plume associated with a metal finishing shop.

Client: Confidential (West Hollywood, California)
Designing soil vapor extraction system that is currently being installed for confidential client. Managing groundwater investigation to determine horizontal extent of TCE plume associated with dry cleaning.

Client: Synagro Technologies (Sacramento, California)
Managed groundwater investigation to determine if biosolids application impacted salinity and nutrient concentrations in groundwater.

Client: Navy Base Realignment and Closure Team (Treasure Island, California)
Assisted in the design and remediation of PCB, chlorinated solvent, hydrocarbon and lead contaminated groundwater and soil on Treasure Island. Negotiated screening levels with DTSC and Water Board. Assisted in the preparation of FSP/QAPP, RI/FS, and RAP documents and assisted in CEQA document preparation.

Client: Navy Base Realignment and Closure Team (MCAS Tustin, California)
Assisted in the design of groundwater monitoring systems for chlorinated solvents at Tustin MCAS. Contributed to the preparation of FS for groundwater treatment.

Client: Mission Cleaning Facility (Salinas, California)
Prepared a RAP and cost estimate for using an oxygen releasing compound (ORC) and molasses to oxidize diesel fuel in soil and groundwater at Mission Cleaning in Salinas.

Client: King County (Washington)
Established and monitored experimental plots at a US EPA Superfund Site in wetland and upland mine tailings contaminated with zinc and lead in Smelterville, Idaho. Used organic matter and pH adjustment for wetland remediation and erosion control.

Client: City of Redmond (Richmond, Washington)
Collected storm water from compost-amended and fertilized turf to measure nutrients in urban runoff. Evaluated effectiveness of organic matter-lined detention ponds on reduction of peak flow during storm events. Drafted compost amended landscape installation guidelines to promote storm water detention and nutrient runoff reduction.

Client: City of Seattle (Seattle, Washington)
Measured VOC emissions from Renton wastewater treatment plant in Washington. Ran GC/MS, dispersion models, and sensory panels to characterize, quantify, control and estimate risk from VOCs.

Client: Plumas County (Quincy, California)
Installed wetland to treat contaminated water containing 1% copper in an EPA Superfund site. Revegetated 10 acres of acidic and metal laden sand dunes resulting from hydraulic mining. Installed and monitored piezometers in wetland estimating metal loading.

Client: Adams Egg Farm (St. Kitts, West Indies)
Designed, constructed, and maintained 3 anaerobic digesters at Springfield Egg Farm, St. Kitts. Digesters treated chicken excrement before effluent discharged into sea. Chicken waste was converted into methane cooking gas.

Client: BLM (Kremmling, Colorado)
Collected water samples for monitoring program along upper stretch of the Colorado River. Rafted along river and protected water quality by digging and repairing latrines.

Soil Science and Restoration Projects

Client: Hefner, Stark & Marois, LLP (Sacramento, California)
Facilitated in assisting Hefner, Stark & Marois, LLP in working with the Regional Water Quality board to determine how to utilize Calcium Participate as a by-product of processing sugar beets.

Client: Kinder Morgan (San Diego County, California)
Designed and monitored the restoration of a 110-acre project on Camp Pendleton along a 26-mile pipeline. Managed crew of 20, planting coastal sage, riparian, wetland, native grassland, and marsh ecosystems. Negotiated with the CDFW concerning species planting list and success standards.

Client: NAVY BRAC (Orote Landfill, Guam)
Designed and monitored pilot landfill cap mimicking limestone forest. Measured different species' root-penetration into landfill cap. Plants were used to evapotranspirate water, reducing water leaching through soil profile.

Client: LA Sanitation District Puente Hills Landfill (Whittier, California)
Monitored success of upland and wetland mitigation at Puente Hills Landfill operated by Sanitation Districts of Los Angeles. Negotiated with the Army Corps of Engineers and CDFG to obtain an early sign-off.

Client: City of Escondido (Escondido, California)
Designed, managed, installed, and monitored a 20-acre coastal sage scrub restoration project at Kit Carson Park, Escondido, California.

Client: Home Depot (Encinitas, California)
Designed, managed, installed and monitored a 15-acre coastal sage scrub and wetland restoration project at Home Depot in Encinitas, California.

Client: Alvarado Water Filtration Plant (San Diego, California)
Planned, installed and monitored 2-acre riparian and coastal sage scrub mitigation in San Diego California.

Client: Monsanto and James River Corporation (Clatskanie, Oregon)
Served as a soil scientist on a 50,000-acre hybrid poplar farm. Worked on genetically engineering study of Poplar trees to see if glyphosate resistant poplar clones were economically viable.

Client: World Wildlife Fund (St. Kitts, West Indies)
Managed 2-year biodiversity study, quantifying and qualifying the various flora and fauna in St. Kitts' expanding volcanic rainforest. Collaborated with skilled botanists, ornithologists and herpetologists.

Publications

Rosenfeld, P.E. & Feng, L. (2011). *The Risks of Hazardous Waste*, Amsterdam: Elsevier Publishing.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2011). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Agrochemical Industry*, Amsterdam: Elsevier Publishing.

Gonzalez, J., Feng, L., Sutherland, A., Waller, C., Sok, H., Hesse, R., **Rosenfeld, P.** (2011). PCBs and Dioxins/Furans in Attic Dust Collected Near Former PCB Production and Secondary Copper Facilities in Sauget, IL. *Procedia Environmental Sciences* 4(2011):113-125.

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Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2010). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Wood and Paper Industries*, Amsterdam: Elsevier Publishing.

Cheremisinoff, N.P., & **Rosenfeld, P.E.** (2009). *Handbook of Pollution Prevention and Cleaner Production: Best Practices in the Petroleum Industry*, Amsterdam: Elsevier Publishing.

Wu, C., Tam, L., Clark, J., **Rosenfeld, P.** (2009). 'Dioxin and furan blood lipid concentrations in populations living near four wood treatment facilities in the United States', in Brebbia, C.A. and Popov, V., eds., *Air Pollution XVII: Proceedings of the Seventeenth International Conference on Modelling, Monitoring and Management of Air Pollution*, Tallinn, Estonia. 20-22 July, 2009, Southampton, Boston. WIT Press.

Tam L. K.., Wu C. D., Clark J. J. and **Rosenfeld, P.E.** (2008) A Statistical Analysis Of Attic Dust And Blood Lipid Concentrations Of Tetrachloro-p-Dibenzodioxin (TCDD) Toxicity Equivalency Quotients (TEQ) In Two Populations Near Wood Treatment Facilities. Organohalogen Compounds, Volume 70 (2008) page 002254.

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Hensley, A.R. A. Scott, J. J. J. Clark, **P. E. Rosenfeld** (2007) "Attic Dust and Human Blood Samples Collected near a Former Wood Treatment Facility" Environmental Research. 105, pp 194-197.
Rosenfeld, P.E., J. J. J. Clark, A. R. Hensley, M. Suffet. (2007) "The Use of an Odor Wheel Classification for Evaluation of Human Health Risk Criteria for Compost Facilities" –Water Science & Technology 55(5): 345-357.

Rosenfeld, P. E., M. Suffet. (2007) "The Anatomy Of Odour Wheels For Odours Of Drinking Water, Wastewater, Compost And The Urban Environment " Water Science & Technology 55(5): 335-344.

Sullivan, P. J. Clark, J.J.J., Agardy, F. J., **Rosenfeld, P.E.**, (2007) "Toxic Legacy, Synthetic Toxins in the Food, Water, and Air in American Cities," Elsevier Publishing, Boston Massachusetts.

Rosenfeld P.E., and Suffet, I.H. (Mel) (2007) "Anatomy Of An Odor Wheel" Water Science and Technology, In Press.

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Hensley A.R., Scott, A., **Rosenfeld P.E.**, Clark, J.J.J. (2006) "Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility." The 26th International Symposium on Halogenated Persistent Organic Pollutants – DIOXIN2006, August 21 – 25, 2006. Radisson SAS Scandinavia Hotel in Oslo Norway.

Rosenfeld, P.E., and Suffet I.H. (2004) "Control of Compost Odor Using High Carbon Wood Ash", Water Science and Technology, Vol. 49, No. 9. pp. 171-178.

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Rosenfeld, P.E., and Suffet, I.H. (2004) "Understanding Odorants Associated With Compost, Biomass Facilities, and the Land Application of Biosolids" Water Science and Technology. Vol. 49, No. 9. pp 193-199.

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Rosenfeld, P. E., Grey, M. A., Sellew, P. (2004) Measurement of Biosolids Odor and Odorant Emissions from Windrows, Static Pile and Biofilter. Water Environment Research. 76 (4): 310-315 JUL-AUG 2004.

Rosenfeld, P. E., Grey, M., (2003) Two stage biofilter for biosolids composting odor control. Seventh International In Situ And On Site Bioremediation Symposium. Batelle Conference Orlando Florida. June 2 and June 6, 2003.

Rosenfeld, P.E., Grey, M and Suffet, M. 2002. "Controlling Odors Using High Carbon Wood Ash." Biocycle, March 2002, Page 42.

Rosenfeld, P.E., Grey, M and Suffet, M. (2002). "Compost Demonstration Project, Sacramento, California Using High-Carbon Wood Ash to Control Odor at a Green Materials Composting Facility Integrated Waste Management Board Public Affairs Office, Publications Clearinghouse (MS–6), Sacramento, CA Publication #442-02-008. April 2002.

Rosenfeld, P.E., and C.L. Henry. 2001. Characterization of odor emissions from three different biosolids. Water Soil and Air pollution. Vol. 127 Nos. 1-4, pp. 173-191.

Rosenfeld, P.E., and Henry C. L., 2000. Wood ash control of odor emissions from biosolids application. Journal of Environmental Quality. 29:1662-1668.

Rosenfeld, P.E., C.L. Henry and D. Bennett. 2001. Wastewater dewatering polymer affect on biosolids odor emissions and microbial activity. Water Environment Research. 73: 363-367.

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Rosenfeld, P.E, C.L. Henry, R. Harrison. 1998. Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Bellevue Washington.

Chollack, T. and **P. Rosenfeld.** 1998. Compost Amendment Handbook For Landscaping. Prepared for and distributed by the City of Redmond, Washington State.

P. Rosenfeld. 1992. The Mount Liamuiga Crater Trail. Heritage Magazine of St. Kitts, Vol. 3 No. 2.

P. Rosenfeld. 1993. High School Biogas Project to Prevent Deforestation On St. Kitts. Biomass Users Network, Vol. 7, No. 1, 1993.

P. Rosenfeld. 1992. British West Indies, St. Kitts. Surf Report, April issue.

P. Rosenfeld. 1998. Characterization, Quantification, and Control of Odor Emissions From Biosolids Application To Forest Soil. Doctoral Thesis. University of Washington College of Forest Resources.

P. Rosenfeld. 1994. Potential Utilization of Small Diameter Trees On Sierra County Public Land. Masters thesis reprinted by the Sierra County Economic Council. Sierra County, California.

P. Rosenfeld. 1991. How to Build a Small Rural Anaerobic Digester & Uses Of Biogas In The First And Third World. Bachelors Thesis. University of California.

England Environmental Agency, 2002. Landfill Gas Control Technologies. Publishing Organization Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury BRISTOL, BS32 4UD.

Presentations

Sok, H.L.; Waller, C.C.; Feng, L.; Gonzalez, J.; Sutherland, A.J.; Wisdom-Stack, T.; Sahai, R.K.; Hesse, R.C.; **Rosenfeld, P.E.** "Atrazine: A Persistent Pesticide in Urban Drinking Water." Urban Environmental Pollution, Boston, MA, June 20-23, 2010.

Feng, L.; Gonzalez, J.; Sok, H.L.; Sutherland, A.J.; Waller, C.C.; Wisdom-Stack, T.; Sahai, R.K.; La, M.; Hesse, R.C.; **Rosenfeld, P.E.** "Bringing Environmental Justice to East St. Louis, Illinois." Urban Environmental Pollution, Boston, MA, June 20-23, 2010.

Rosenfeld, P.E. (2009) "Perfluoroctanoic Acid (PFOA) and Perfluoroactane Sulfonate (PFOS) Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States" Presentation at the 2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting, April 19-23, 2009. Tuscon, AZ.

Rosenfeld, P.E. (2009) "Cost to Filter Atrazine Contamination from Drinking Water in the United States" Contamination in Drinking Water From the Use of Aqueous Film Forming Foams (AFFF) at Airports in the United States" Presentation at the 2009 Ground Water Summit and 2009 Ground Water Protection Council Spring Meeting, April 19-23, 2009. Tuscon, AZ.

Rosenfeld, P. E. (2007) "Moss Point Community Exposure To Contaminants From A Releasing Facility" Platform Presentation at the 23rd Annual International Conferences on Soils Sediment and Water, October 15-18, 2007. University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (2007) "The Repeated Trespass of Tritium-Contaminated Water Into A Surrounding Community Form Repeated Waste Spills From A Nuclear Power Plant" Platform Presentation at the 23rd Annual International Conferences on Soils Sediment and Water, October 15-18, 2007. University of Massachusetts, Amherst MA.

Rosenfeld, P. E. (2007) "Somerville Community Exposure To Contaminants From Wood Treatment Facility Emissions" Poster Presentation at the 23rd Annual International Conferences on Soils Sediment and Water, October 15-18, 2007. University of Massachusetts, Amherst MA.

Rosenfeld P. E. "Production, Chemical Properties, Toxicology, & Treatment Case Studies of 1,2,3-Trichloropropane (TCP)" – Platform Presentation at the Association for Environmental Health and Sciences (AEHS) Annual Meeting, San Diego, CA, 3/2007.

Rosenfeld P. E. "Blood and Attic Sampling for Dioxin/Furan, PAH, and Metal Exposure in Florala, Alabama" – Platform Presentation at the AEHS Annual Meeting, San Diego, CA, 3/2007.

Hensley A.R., Scott, A., **Rosenfeld P.E.**, Clark, J.J.J. (2006) "Dioxin Containing Attic Dust And Human Blood Samples Collected Near A Former Wood Treatment Facility." APHA 134 Annual Meeting & Exposition, Boston Massachusetts. November 4 to 8th, 2006.

Paul Rosenfeld Ph.D. "Fate, Transport and Persistence of PFOA and Related Chemicals." Mealey's C8/PFOA Science, Risk & Litigation Conference" October 24, 25. The Rittenhouse Hotel, Philadelphia.

Paul Rosenfeld Ph.D. "Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, Toxicology and Remediation PEMA Emerging Contaminant Conference. September 19. Hilton Hotel, Irvine California.

Paul Rosenfeld Ph.D. "Fate, Transport, Toxicity, And Persistence of 1,2,3-TCP." PEMA Emerging Contaminant Conference. September 19. Hilton Hotel in Irvine, California.

Paul Rosenfeld Ph.D. "Fate, Transport and Persistence of PDBEs." Mealey's Groundwater Conference. September 26, 27. Ritz Carlton Hotel, Marina Del Ray, California.

Paul Rosenfeld Ph.D. "Fate, Transport and Persistence of PFOA and Related Chemicals." International Society of Environmental Forensics: Focus On Emerging Contaminants. June 7,8. Sheraton Oceanfront Hotel, Virginia Beach, Virginia.

Paul Rosenfeld Ph.D. "Rate Transport, Persistence and Toxicology of PFOA and Related Perfluorochemicals". 2005 National Groundwater Association Ground Water And Environmental Law Conference. July 21-22, 2005. Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld Ph.D. "Brominated Flame Retardants in Groundwater: Pathways to Human Ingestion, Toxicology and Remediation." 2005 National Groundwater Association Ground Water And Environmental Law Conference. July 21-22, 2005. Wyndham Baltimore Inner Harbor, Baltimore Maryland.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. and Rob Hesse R.G. Tert-butyl Alcohol Liability and Toxicology, A National Problem and Unquantified Liability. National Groundwater Association. Environmental Law Conference. May 5-6, 2004. Congress Plaza Hotel, Chicago Illinois.

Paul Rosenfeld, Ph.D., 2004. Perchlorate Toxicology. Presentation to a meeting of the American Groundwater Trust. March 7th, 2004. Pheonix Arizona.

Hagemann, M.F., **Paul Rosenfeld, Ph.D.** and Rob Hesse, 2004. Perchlorate Contamination of the Colorado River. Invited presentation to a meeting of tribal representatives, Parker, AZ.

Paul Rosenfeld, Ph.D. A National Damage Assessment Model For PCE and Dry Cleaners. Drycleaner Symposium. California Ground Water Association. Radison Hotel, Sacramento, California. April 7, 2004.

Paul Rosenfeld, Ph.D. and James Clark Ph.D. Understanding Historical Use, Chemical Properties, Toxicity and Regulatory Guidance of 1,4 Dioxane. National Groundwater Association. Southwest Focus Conference. Water Supply and Emerging Contaminants. February 20-21, 2003. Hyatt Regency Phoenix Arizona.

Paul Rosenfeld, Ph.D. Underground Storage Tank Litigation and Remediation. California CUPA Forum. Marriott Hotel. Anaheim California. February 6-7, 2003.

Paul Rosenfeld, Ph.D. Underground Storage Tank Litigation and Remediation. EPA Underground Storage Tank Roundtable. Sacramento California. October 23, 2002.

Rosenfeld, P.E. and Suffet, M. 2002. Understanding Odor from Compost, Wastewater and Industrial Processes. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association. Barcelona Spain. October 7- 10.

Rosenfeld, P.E. and Suffet, M. 2002. Using High Carbon Wood Ash to Control Compost Odor. Sixth Annual Symposium On Off Flavors in the Aquatic Environment. International Water Association. Barcelona Spain. October 7- 10.

Rosenfeld, P.E. and Grey, M. A. 2002. Biocycle Composting For Coastal Sage Restoration. Northwest Biosolids Management Association. Vancouver Washington. September 22-24.

Rosenfeld, P.E. and Grey, M. A. 2002. Soil Science Society Annual Conference. Indianapolis, Maryland. November 11-14.

Rosenfeld. P.E. 2000. Two stage biofilter for biosolids composting odor control. Water Environment Federation. Anaheim California. September 16, 2000.

Rosenfeld. P. E. 2000. Wood ash and biofilter control of compost odor. Biofest. October 16, 2000.Ocean Shores, California.

Rosenfeld, P. E. 2000. Bioremediation Using Organic Soil Amendments. California Resource Recovery Association. Sacramento California.

Rosenfeld, P.E., C.L. Henry, R. Harrison. 1998. Oat and Grass Seed Germination and Nitrogen and Sulfur Emissions Following Biosolids Incorporation With High-Carbon Wood-Ash. Water Environment Federation 12th Annual Residuals and Biosolids Management Conference Proceedings. Bellevue Washington.

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Rosenfeld, P.E., C.L. Henry, R. Harrison. 1998. Comparison of Microbial Activity and Odor Emissions from Three Different Biosolids Applied to Forest Soil. Brown and Caldwell, Seattle Washington.

Rosenfeld, P.E., C.L. Henry. 1998. Characterization, Quantification, and Control of Odor Emissions from Biosolids Application To Forest Soil. Biofest Lake Chelan, Washington.

Rosenfeld, P.E., C.L. Henry, R. B. Harrison, and R. Dills. 1997. Comparison of Odor Emissions From Three Different Biosolids Applied to Forest Soil. Soil Science Society of America, Anaheim California.

Professional History

Soil Water Air Protection Enterprise (SWAPE); 2003 to present; Founding And Managing Partner
UCLA School of Public Health; 2007 to 2010; Lecturer (Asst Res)
UCLA School of Public Health; 2003 to 2006; Adjunct Professor
UCLA Environmental Science and Engineering Program; 2002-2004; Doctoral Intern Coordinator
UCLA Institute of the Environment, 2001-2002; Research Associate
Komex H_2O Science, 2001 to 2003; Senior Remediation Scientist
National Groundwater Association, 2002-2004; Lecturer
San Diego State University, 1999-2001; Adjunct Professor
Anteon Corp., San Diego, 2000-2001; Remediation Project Manager
Ogden (now Amec), San Diego, 2000-2000; Remediation Project Manager
Bechtel, San Diego, California, 1999 – 2000; Risk Assessor
King County, Seattle, 1996 – 1999; Scientist
James River Corp., Washington, 1995-96; Scientist
Big Creek Lumber, Davenport, California, 1995; Scientist
Plumas Corp., California and USFS, Tahoe 1993-1995; Scientist
Peace Corps and World Wildlife Fund, St. Kitts, West Indies, 1991-1993; Scientist
Bureau of Land Management, Kremmling Colorado 1990; Scientist

Teaching Experience

UCLA Department of Environmental Health (Summer 2003 through 2010) Taught Environmental Health Science 100 to students, including undergrad, medical doctors, public health professionals and nurses. Course focuses on the health effects of environmental contaminants.

National Ground Water Association, Successful Remediation Technologies. Custom Course In Sante Fe, New Mexico. May 21, 2002. Focused on fate and transport of fuel contaminants associated with underground storage tanks.

National Ground Water Association; Successful Remediation Technologies Course in Chicago Illinois. April 1, 2002. Focused on fate and transport of contaminants associated with Superfund and RCRA sites.

California Integrated Waste Management Board, April and May, 2001. Alternative Landfill Caps Seminar in San Diego, Ventura, and San Francisco. Focused on both prescriptive and innovative landfill cover design.

UCLA Department of Environmental Engineering, February 5 2002 Seminar on Successful Remediation Technologies focusing on Groundwater Remediation.

University Of Washington, Soil Science Program, Teaching Assistant for several courses including: Soil Chemistry, Organic Soil Amendments, and Soil Stability.

U.C. Berkeley, Environmental Science Program Teaching Assistant for Environmental Science 10.

Academic Grants Awarded

California Integrated Waste Management Board. $41,000 grant awarded to UCLA Institute of the Environment. Goal: To investigate effect of high carbon wood ash on volatile organic emissions from compost. 2001.

Synagro Technologies, Corona California: $10,000 grant awarded to San Diego State University. Goal: investigate effect of biosolids for restoration and remediation of degraded coastal sage soils. 2000.

King County, Department of Research and Technology, Washington State. $100,000 grant awarded to University of Washington: Goal: To investigate odor emissions from biosolids application and the effect of polymers and ash on VOC emissions. 1998.

Northwest Biosolids Management Association, Washington State. $20,000 grant awarded to investigate effect of polymers and ash on VOC emissions from biosolids. 1997.

James River Corporation, Oregon: $10,000 grant was awarded to investigate the success of genetically engineered Poplar trees with resistance to round-up. 1996.

United State Forest Service, Tahoe National Forest: $15,000 grant was awarded to investigating fire ecology of the Tahoe National Forest. 1995.

Kellogg Foundation, Washington D.C. $500 grant was awarded to construct a large anaerobic digester on St. Kitts in West Indies. 1993.

Cases that Dr. Rosenfeld Provided Deposition or Trial Testimony

In the Court of Common Pleas of Tuscarawas County Ohio
John Michael Abicht, et al., *Plaintiffs,* vs. Republic Services, Inc., et al., *Defendants*
Case Number: 2008 CT 10 0741 (Cons. w/ 2009 CV 10 0987)

In the Court of Common Pleas for the Second Judicial Circuit, State of South Carolina, County of Aiken
David Anderson, et al., *Plaintiffs*, vs. Norfolk Southern Corporation, et al., *Defendants.*
Case Number: 2007-CP-02-1584

In the Circuit Court of Jefferson County Alabama
Jaeanette Moss Anthony, et al., *Plaintiffs*, vs. Drummond Company Inc., et al., *Defendants*
Civil action No. CV 2008-2076

In the Ninth Judicial District Court, Parish of Rapides, State of Louisiana
Roger Price, et al., *Plaintiffs*, vs. Roy O. Martin, L.P., et al., *Defendants.*
Civil Suit Number 224,041 Division G

In the United States District Court, Western District Lafayette Division
Ackle et al., *Plaintiffs*, vs. Citgo Petroleum Corporation, et al., *Defendants.*
Case Number 2:07CV1052

In the United States District Court for the Southern District of Ohio
Carolyn Baker, et al., *Plaintiffs*, vs. Chevron Oil Company, et al., *Defendants.*
Case Number 1:05 CV 227

In the Fourth Judicial District Court, Parish of Calcasieu, State of Louisiana
Craig Steven Arabie, et al., *Plaintiffs*, vs. Citgo Petroleum Corporation, et al., *Defendants.*
Case Number 07-2738 G

In the Fourteenth Judicial District Court, Parish of Calcasieu, State of Louisiana
Leon B. Brydels, *Plaintiffs*, vs. Conoco, Inc., et al., *Defendants.*
Case Number 2004-6941 Division A

In the District Court of Tarrant County, Texas, 153rd Judicial District
Linda Faust, *Plaintiff*, vs. Burlington Northern Santa Fe Rail Way Company, Witco Chemical Corporation A/K/A Witco Corporation, Solvents and Chemicals, Inc. and Koppers Industries, Inc., *Defendants.*
Case Number 153-212928-05

In the Superior Court of the State of California in and for the County of San Bernardino
Leroy Allen, et al., *Plaintiffs*, vs. Nutro Products, Inc., a California Corporation and DOES 1 to 100, inclusive, *Defendants.*
John Loney, Plaintiff, vs. James H. Didion, Sr.; Nutro Products, Inc.; DOES 1 through 20, inclusive, *Defendants.*
Case Number VCVVS044671

In the United States District Court for the Middle District of Alabama, Northern Division
James K. Benefield, et al., *Plaintiffs*, vs. International Paper Company, *Defendant.*
Civil Action Number 2:09-cv-232-WHA-TFM

In the Superior Court of the State of California in and for the County of Los Angeles
Leslie Hensley and Rick Hensley, *Plaintiffs*, vs. Peter T. Hoss, as trustee on behalf of the Cone Fee Trust; Plains Exploration & Production Company, a Delaware corporation; Rayne Water Conditioning, Inc., a California corporation; and DOES 1 through 100, *Defendants.*
Case Number SC094173

In the Superior Court of the State of California in and for the County of Santa Barbara, Santa Maria Branch
Clifford and Shirley Adelhelm, et al., all individually, *Plaintiffs*, vs. Unocal Corporation, a Delaware Corporation; Union Oil Company of California, a California corporation; Chevron Corporation, a California corporation; ConocoPhillips, a Texas corporation; Kerr-McGee Corporation, an Oklahoma corporation; and DOES 1 though 100, *Defendants.*
Case Number 1229251 (Consolidated with case number 1231299)

In the United States District Court for Eastern District of Arkansas, Eastern District of Arkansas
Harry Stephens Farms, Inc, and Harry Stephens, individual and as managing partner of Stephens Partnership, *Plaintiffs*, vs. Helena Chemical Company, and Exxon Mobil Corp., successor to Mobil Chemical Co., *Defendants.*
Case Number 2:06-CV-00166 JMM (Consolidated with case number 4:07CV00278 JMM)

In the United States District Court for the Western District of Arkansas, Texarkana Division
Rhonda Brasel, et al., *Plaintiffs*, vs. Weyerhaeuser Company and DOES 1 through 100, *Defendants.*
Civil Action Number 07-4037

In The Superior Court of the State of California County of Santa Cruz
Constance Acevedo, et al. *Plaintiffs* Vs. California Spray Company, et al. *Defendants*
Case No CV 146344

In the District Court of Texas 21st Judicial District of Burleson County
Dennis Davis, *Plaintiff*, vs. Burlington Northern Santa Fe Rail Way Company, *Defendant.*
Case Number 25,151

In the United States District Court of Southern District of Texas Galveston Division
Kyle Cannon, Eugene Donovan, Genaro Ramirez, Carol Sassler, and Harvey Walton, each Individually and on behalf of those similarly situated, *Plaintiffs,* vs. BP Products North America, Inc., *Defendant.*
Case 3:10-cv-00622

SHORELINES HEARINGS BOARD

FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents,	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* DIRECT TESTIMONY OF FRED FELLEMAN

I. INTRODUCTION AND QUALIFICATIONS

1. My name is Fred Felleman. I am an environmental consultant specializing in the impacts of maritime trade on the marine environment in the Pacific Northwest. I am the sole proprietor of WAVE Consulting and have retained a business license in the State of Washington since 1989. My primary clients have included local governments, tribal governments, and environmental organizations concerned about the sustainable use of the marine environment. A copy of my CV is attached as Exhibit A.

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2. I completed a Bachelors of Science in Psychology with a focus on the evolutionary underpinnings of animal behavior from the University of Michigan in 1981 and a Masters of Science from the University of Washington's College of Ocean and Fisheries Science in 1986. My graduate work focused on the feeding behavior of the Southern Resident Community of Killer Whales in the Salish Sea.

3. After completing my graduate studies and publishing my thesis research, I continued to work for my graduate advisor in the School of Fisheries on a variety of projects. In 1988 I was hired by the Center for Environmental Education (now Ocean Conservancy) in Washington DC to provide extensive documentation of locations in the Pacific NW suitable for designation as National Marine Sanctuaries and to usher the proposals through Congress. I worked with Congressman Lowry's office to Congressionally designate the waters up to 40 miles offshore of the Olympic Coast of Washington State, from the Copalis River to Cape Flattery, as the Olympic Coast National Marine Sanctuary. Congress also directed the National Oceanic and Atmospheric Administration (NOAA) to review the potential for designating the waters around the San Juan Islands as the NW Straits National Marine Sanctuary.

4. Having succeeded in passing the legislation, I returned to Washington State to work with local communities to assure that if these waters were to be brought this national recognition that the regulations developed were responsive to regional needs and existing uses. In December 1988, shortly before returning from DC, the oil barge *Nestucca* spilled over 230,000 gallons of heavy fuel oil after the tow lone parted from its tug in rough seas. The spill caused significant damage to the shoreline and wildlife along the entire Washington coast and extended into British Columbia. There have since been a series of incident involving tugs breaking their tow-line off the coast.

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5. In 1989, four coastal counties in Washington hired me as their Ocean Issues Coordinator to help them draft their comments to NOAA on their Environmental Impact Statement (EIS) for the Olympic Coast Sanctuary as well as the EIS the Minerals Management Service issued for Lease Sale 132 that would have allowed for oil and gas development along the entire Washington and Oregon coasts. I also consulted with four coastal tribal governments.

6. I have served on a variety of oil spill advisory committees established by the State and others to develop regulations impacting the marine environment including the Governor's Ocean Policy Workgroup, the Office of Marine Affairs and Department of Ecology's Oil Spill Advisory Committees, as well as staffed the Makah Tribe on other committees the past two years including the Puget Sound Harbor Safety Committee, Olympic Coast Sanctuary Advisory Committee, and Contingency Plan Advisory Committee. I have also sailed on the *ARCO Fairbanks* from Valdez Alaska to Cherry Point Washington at the invitation of Jerry Aspland, the president of ARCO Shipping. I have also sailed aboard tug boats of various horsepower and propulsion in Puget Sound.

7. The Olympic Coast Sanctuary was formally designated in 1994 with a permanent ban on oil and gas development in a formal ceremony presided over by former Secretary of Commerce, Rod Brown, near Kalaloch at which I received special recognition for my efforts. Since that time I continued to work with environmental organizations, NOAA, and the U.S. Coast Guard, in coordination with the Makah Tribe, to create an Area to Be Avoided (ATBA), a designation by the International Maritime Organization (IMO), to require laden oil carriers to stay offshore the Olympic Coast to avoid conflicts with fishing vessels and to provide more time for spill response efforts to work before the oil reached shore. I also identified the need for an emergency response tug to be stationed in Neah Bay to provide assistance to vessels in distress.

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Makah Bay was subsequently closed to vessels that would anchor and clean their holding tanks while waiting for their berths to open inshore.

II. THE REACTIVE HISTORY OF OIL SPILL REGULATION IN WASHINGTON

8. Ten years after identifying a need for the tug and numerous studies, committees, and vessel incidents later (including the *New Carissa* in Oregon in 1999), I championed the effort to have a tug stationed in Neah Bay with public funds for the 10 years following that event. During that time the tug responded to over 40 vessels in need of assistance that ultimately lead to legislation requiring the maritime industry to keep the tug on station with private funds since 2010.

9. Shortly after the *Nestucca* spill in the winter of 1988, the nation's worst tanker spill occurred in the spring of 1989 in Prince William Sound, Alaska, followed by the Tenyo Maru sinking with 600,000 gallons on board off Cape Flattery in 1991. Despite industry assurances that it could never happen, the *Exxon Valdez* spilled over 11 million gallons of crude oil in a biologically rich region that resulted in unprecedented amounts of fishery and wildlife impacts that persist to this day, almost a quarter century later. For example, the herring population has yet to recover and the fishery never reopened. The impacts of the spill were magnified by the industry's lack of readiness to effectuate a fast and capable response.

10. Despite the late Senator Magnuson's years of efforts to require oil tankers to have double hulls in the 1970's, Congress was not able to pass legislation until this avoidable tragedy occurred. The Oil Pollution Act of 1990 was landmark legislation that radically changed the way oil is shipped through the United States. Not only did it require double hull tankers be phased into use by 2015, it established requirements for crew standards, contingency planning, natural resource damage assessment, and liability. In addition, important oil spill prevention measures such as two tug escorts for laden single oil tankers in Prince William Sound and Puget Sound

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(east of Dungeness Spit) were included. While these measures are often cited as reducing the size and number of oil spills in the nation, it took a catastrophe for Congress to act. The failure of the Coast Guard or the State to enact regulations prior to accidents or without "legislative direction" is typical due to the undue influence the maritime industry has over regulators and legislators. In 2007, the Washington State Department of Ecology produced a publication of their Spills Program's accomplishments that documents how regulation followed major spill events. (WDOE Pub 07-08-017).

11. The unfortunately reactive nature of this regulatory environment dictates that prior to any major new maritime infrastructure being permitted, that rigorous risk assessments are conducted to determine what the appropriate mitigation would be for the vessel traffic the infrastructure will draw to the region. Conducting such analysis subsequent to providing permits, as is being proposed in Grays Harbor, not only exposes the environmentally sensitive region to unmitigated risk but also removes the leverage regulators would have to require mitigation.

III. UNLESS A VESSEL TRAFFIC ANALYSIS IS COMPLETED PRIOR TO PERMITTING, THERE IS NO COMPETENT WAY TO ASSESS THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS OF THE GRAYS HARBOR PROJECTS.

A. Case Study: BP Second Dock

12. One of the most glaring examples of the need to conduct such studies prior to permitting and construction involves my experience challenging the U.S. Army Corps of Engineers failure to complete an EIS prior to granting BP permits to construct a second wing to their refinery terminal in Cherry Point, Washington. The Corps did not undertake a full environmental analysis' it instead permitted the dock with the understanding that all oil transfers

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would be pre-boomed and in reliance on BP's assurances that two docks would be safer than having one without conducting any analysis of its own.

13. That decision was challenged in federal district court (*Ocean Advocates et al. v. U.S. Army Corps of Engineers and BP*). The district court restricted the use of the new dock that had been constructed by this time, to just refined products but did not require any further study. I subsequently discovered that once BP built the new dock, it removed the mooring system used to pre-boom their oil transfers, despite its assertions to the Corps to keep that system in place.

14. We appealed the lower court's decision, and the Ninth Circuit Court of Appeals enjoined BP's use of their new dock until they completed an EIS evaluating changes to the risk of an oil spill. Ultimately, the court approved the lifting of the injunction in exchange for a scientifically rigorous oil spill risk assessment along with a few other provisions.

15. Researchers from the George Washington University (GWU), who had conducted the most rigorous study of its kind in Alaska following the Exxon Valdez spill, were selected for the BP analysis. After two years, the GWU researchers presented their report to BP and Corps, finding that while having two docks was safer at any given volume of tanker traffic, the existence of the second dock allowed for more traffic than could be accommodated by a single one and that resulted in additional risk. However, it took another three years before the study was publically released. In the meantime, BP decided to hire another consultant to finish a separate study that has yet to be completed.

16. As a result of the Corps not requiring an EIS <u>prior</u> to issuing BP its permits, BP has had a decade of unmitigated use of a dock without sufficient environmental review. BP has selectively found consultants that would tell the company what it wanted to hear, and it has

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ignored the findings of the only peer-reviewed methodology of its kind. The Corps is scheduled to publish the draft EIS this year.

B. Without the Vessel Traffic Analysis, the MDNSs for Westway and Imperium Cannot Adequately Assess the Environmental Impacts From These Projects.

17. Having read the City of Hoquiam and Ecology's Mitigated Determinations of Non-Significance (MDNSs) for the Westway and Imperium Projects, as well as the Recommendations for the Scope of Rail Transportation Impact Analysis and Vessel Transportation Impact Analysis attached to the Declaration of Sally Toteff (Aug. 1, 2013), in my opinion, the analysis of environmental impacts cannot be supported because a marine vessel impact study has not yet been done. Although such a study is included in the mitigation measures, as with the BP second dock, no conclusions about significance of environmental harm can be justified until after such a study is completed.

18. In addition to the primary issue of the timing of the vessel traffic analysis, other aspects of marine traffic are unanalyzed and unknown. These issues include details about the tug escorts required (such as horsepower, bollard pull, sea keeping, propulsion characteristics, winch or tethering requirements, or what size vessels are subject to escorts); under what conditions the bar will be closed for oil vessel traffic, if at all; whether there will be different rules for barges versus tankers; and whether barges towed by wire will be allowed.

19. The scope of work for the Vessel Traffic Transportation Impact Analysis (VTIA) (Contract Task Order 001 – Scope of Services and Fee Schedule – Westway Terminals, LLC, Grays Harbor Facility Improvements (attached to Toteff Declaration), is also inadequate. Its scope is limited to being within Grays Harbor in the immediate vicinity of Westway Terminal, as opposed to the route tank vessels and the bunker barges that serve them will transit through Washington waters. There is no mention of the flag states of vessels that may be calling on the

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port. Escort capability cannot be evaluated for this region without sea trials given the unique challenges associated with crossing the bar in adverse weather. In Puget Sound, for example, there are tanker escort plans with specific combinations of tugs for specific tankers. It is also unclear what size ships or barges will be escorted. Additionally, an offshore traffic separation scheme should be established to allow for the orderly entrance and exit of tanker vessels.

20. There are also no provisions for public participation or observation of the vessel traffic analysis team charged with this study despite the fact that Ecology is currently involved in a cooperatively developed risk analysis for the Salish Sea utilizing a peer reviewed methodology. The same protocols for public participation and transparency should be used here.

IV. CONCLUSION

21. Given that these two projects will greatly increase traffic calling on Grays Harbor, and given the hazardous nature of the crude oil cargo that will be plying these waters for the first time in these large quantities, it is imperative that a rigorous and open vessel traffic impact study be conducted prior to any determination of non-significance and prior to the issuance of any permits.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge. Executed this 9th day of September, 2013, at Seattle, Washington.

FRED FELLEMAN

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EXHIBIT A

FRED FELLEMAN

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BORN: 2 March 1960 in Queens, New York

EDUCATION/TRAINING:

University of Washington, Seattle, WA	MSc. Fisheries	1986
University of Michigan, Ann Arbor, MI	BSc. Psychology	1981
Coast Guard/Ecology	Ecological Risk Assessment	2005
FOSS, Seattle, WA	8 Hr Incident Command System	9/94
PADI, Seattle, WA	Open Water Diver	12/86
Biosonics Inc., Seattle, WA	Hydro-acoustic short course	9/83

EXPERIENCE:

MARINE CONSERVATION CONSULTANT

Wildlife and Visual Enterprises (WAVE), Seattle, WA **1/89 - present**
Consultant: Self-employed with contracts from local, state, federal and tribal governments as well as NGO's to advance conservation of Pacific Northwest marine waters by: banning offshore oil and gas development, establishment of the Neah Bay Response Tug, creation of the Olympic Coast National Marine Sanctuary and Area To Be Avoided as well as closure of Makah Bay anchorage. Conducted damage assessment of the *Exxon Valdez* and restoration planning for *Tenyo Maru* oil spills. Worked on development and implementation of state and federal oil spill legislation including OPA 90, 2010 CG Authorization, NW Area Committee GRP development, Contingency Plan updates, dispersant use policy, tug escorts and salvage.

Makah Office of Marine Affairs. Seattle, WA. **1/09 – present**
Marine Policy Consultant. After many years of collaboration with the Makah Tribal Council (MTC) on behalf of a variety of NGO clients, began directly contracting with the MTC. The diversity of areas covered including – Coast Guard, Navy, NOAA, EPA, Ecology as well as state and federal legislation resulted in creation of the Office of Marine Affairs within the tribal organization managed by Chad Bowechop.

Bluewater Network/Friends of the Earth, Seattle, WA **10/06 – present**
Northwest Consultant: NW consultant Bluewater Network that later merged with Friends of the Earth on environmental matters regularly attending Port of Seattle Commission meetings pertaining to cruise ship discharge practices and air emissions along with new port infrastructure development.

Ocean Advocates. Seattle, WA **1/96 – 1/07**
Northwest Director/Board Member: Primarily responsible for initiating the stationing of a rescue tugboat in Neah Bay to prevent oil spills during the winters of 1998-2000 with Navy and Tenyo Maru funds and having OPA 90 double tug escort rule applied to Washington waters.

American Oceans Campaign. Seattle, WA **12/90 - 4/93**
Director, Northwest Regional Office: Contracted to provide technical support and grassroots organizing for the designation of the Olympic Coast and Northwest Straits National Marine Sanctuaries and to seek means of oil spill prevention by working closely with local, state, federal and tribal interests.

Washington State Coastal Counties. Seattle, WA **4/89 - 3/90Ocean**
Issues Coordinator: Contracted by Clallam, Jefferson, Grays Harbor and Pacific Counties through CZM Grant to provide technical review and draft comments on proposed offshore oil and gas development and management plan for the Olympic Coast National Marine Sanctuary.

Center For Environmental Education. Washington, D.C. **10/87 - 12/88**
Research Coordinator: Developed proposals for the establishment of the Olympic Coast and Northwest Straits, National Marine Sanctuaries. Coordinated with NOAA staff, regional agencies, tribal governments and conservation organizations. Presented findings to Congress resulting in legislation.

Whale Museum, Friday Harbor, WA **1980 - 1990**
Research Associate/Instructor: Conducted field observations of killer whales in Greater Puget Sound for graduate research on feeding ecology. Taught Summer courses accredited by Western Washington University on marine mammal behavioral ecology and marine habitat conservation.

MARINE LOCATION PHOTOGRPAHER

Wildlife and Visual Enterprises (WAVE), Seattle, WA **1/89 - present**
Stock photography represented by Getty Images, Seattle.

Center for Wildlife Conservation (CWC), Seattle, WA **1/94 - 1/95**
Exhibit Designer: Developed ecotourism exhibit about the Olympic Peninsula displayed at Point Defiance Zoo, Seattle Aquarium, Woodland Park Zoo, Feiro Marine Lab, and Makah Museum.

BOARD PARTICIPATION

Whale Museum. Friday Harbor, WA **10/06-11/12**
Vice President for three terms. Helped provide strategic guidance on conservation issues pertinent to the recovery of the endangered southern resident orca community.

Orca Conservancy. Seattle, WA **1/01-1/05**
Helped lead efforts to repatriate orphaned orca Springer (A73) with his natal pod in British Columbia and initiated outreach to tribal leaders in Nootka Sound in response to lone orca Luna (L98). Provided technical guidance with petition and lawsuit against NMFS to list Southern Resident orca community under the ESA. Also wrote petition to list Cherry Point herring under ESA also with Center for Biological Diversity.

Fuel Safe Washington. Seattle, WA **1/99-12/04**
Provided technical comment and review leading to the defeat of the Cross Cascades pipeline and Georgia Strait Crossing natural gas transmission line through the San Juan Islands.

Washington Environmental Council. Seattle, WA **1/92-1/96**
Organizational representative for American Oceans Campaign and member at large. Secured environmental intervention on Intertanko lawsuit. Helped lead opposition to TransMountain Pipeline and supertanker Port and helped write settlement for Gateway dock at Cherry Point.

Friends of Golden Gardens. Seattle, WA **1/92**
Helped secure over $2 million in funds from the Shoreline Parks Improvement Fund and the Pro Parks Levy to restore the beach, daylight the stream and redevelop the bathhouse at Seattle's premier saltwater park.

SIGNIFICANT LEGAL CASES

INTERTANKO v State of Washington - Intervened to uphold state's rights to protect itself from oil spills

NRDC et. al. v Secretary of Interior - Stopped Navy bombing of Sea Lion Rock in National Wildlife Refuge

Ocean Advocates et al v. U.S. ACOE – Challenged the issuance of a permit doubling Arco's Cherry Pt. tanker dock without an EIS or consideration of Magnuson's amendment to the MMPA.

Center for Biological Diversity et al v Lohn – defending the petition to list southern resident orca under ESA.

APPOINTMENTS AND AWARDS

1989 Appointed by Governor Gardner to Ocean Policy Work Group
1992 Nominated by Senator Adams for NOAA Coastal Steward of the Year Award
1993 Appointed by Office of Marine Safety, Member, Emergency Towing Vessel Task Force
1993 Appointed by Office of Marine Safety, Member, Field Operations Advisory Committee
1993 Appointed by State Senator Harriet Spanel Advisor of Pacific States Marine Fisheries Commission
1993 Appointed by Governor Lowry to the Washington State Maritime Commission (WSMC)
1994 Certificate of Appreciation Northwest Area Committee for NW Area Contingency Plan
1994 Certificate of Appreciation Olympic Coast National Marine Sanctuary dedication
1995 Office of Marine Safety/Department of Ecology Oil Spill Advisory Committee
1995 State of Washington Service Award for Outstanding Dedication to a Cleaner Marine Environment
1995 Appointed by Mayor Norm Rice to Seattle Citizens Open Space Oversight Committee
1996 Certificate of Appreciation Office of Marine Safety Cargo/Passenger Advisory Group
1997 Certificate of Appreciation Washington State Maritime Commission
2002 Department of Ecology Contingency Plan Rule Advisory Committee

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Kleiman, D.G., R.P. Reading, B.J. Miller, T.W. Clark, J.M. Scott, J. Robinson, R.L. Wallace, R.J. Cabin, and F. Felleman (2000). "Improving the Evaluation of Conservation Programs." Conservation Biology, Vol. 14 No. 2, pp. 356-365.

Felleman, F.L., J.R. Heimlich-Boran and R.W. Osborne (1991). "Feeding Ecology of the Killer Whale (Orcinus orca) in Greater Puget Sound." In: K. Pryor and K.S. Norris (Eds), Dolphin Societies, Discoveries and Puzzels. University of California Press, Berkeley, pp 112- 147.

Thomas, G.L. and F.L. Felleman (1989). "Acoustic Measurement of the Fish Assemblage Beneath Killer Whale Pods in the Pacific Northwest." Rit Fiskidieldar 11:276-284.

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Felleman, F.L. (1985). "Global Distribution of Marine Mammals and the Potential Impacts of Offshore Scientific Drilling as it Relates to Life History Requirements." In: Environmental Impact Statement for the Ocean Drilling Program. Prepared by Tetratech, for the NSF Contract #0CE84-18886.

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FOR THE STATE OF WASHINGTON

QUINAULT INDIAN NATION, Petitioner, and FRIENDS OF GRAYS HARBOR, SIERRA CLUB, SURFRIDER FOUNDATION, GRAYS HARBOR AUDUBON, and CITIZENS FOR A CLEAN HARBOR, Petitioners, vs. CITY OF HOQUIAM, WASHINGTON STATE DEPARTMENT OF ECOLOGY, WESTWAY TERMINAL COMPANY, LLC, and IMPERIUM TERMINAL SERVICES, LLC., Respondents,	SHB NO. 13-012c (SHB Nos. 13-012, -013, -020 and -021) *consolidated* CERTIFICATE OF SERVICE

I am a citizen of the United States and a resident of the State of Washington. I am over 18 years of age and not a party to this action. My business address is 705 Second Avenue, Suite 203, Seattle, Washington.

On September 9, 2013, I served a true and correct copy of the following documents on the parties listed below:

1. Direct Testimony of James E. Jorgensen
2. Direct Testimony of Brent Finley
3. Testimony of Ervin Joseph Schumacher;
4. Direct Testimony of Paul Rosenfeld, Ph.D.;

Earthjustice
705 Second Ave., Suite 203
Seattle, WA 98104
(206) 343-7340

5. Direct Testimony of Paul S. O'Brien;
6. Direct Testimony of Fred Felleman; and
7. Certificate of Service

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☐ via overnight mail
☐ via first-class U.S. mail
☐ via hand delivery
☐ via electronic service by Clerk
☒ via email [per agreement]

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Steve Johnson City Attorney CITY OF HOQUIAM 609 - 8th Street Hoquiam, WA 98550 (360) 532-4031 | Phone sjohnson@cityofhoquiam.com *Attorney for City Respondent City of Hoquiam*	☐ via facsimile ☐ via overnight mail ☐ via first-class U.S. mail ☐ via hand delivery ☐ via electronic service by Clerk ☒ via email [per agreement]
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Jay P. Derr Tadas A. Kisielius VAN NESS FELDMAN, LLP 719 2nd Avenue, Suite 1150 Seattle, WA 98104 (206) 623-9372 | Phone jpd@vnf.com tak@vnf.com jer@vnf.com *Attorneys for Intervenor-Respondent Imperium Terminal Services, LLC*	☐ via facsimile ☐ via overnight mail ☐ via first-class U.S. mail ☐ via hand delivery ☐ via electronic service by Clerk ☒ via email [per agreement]

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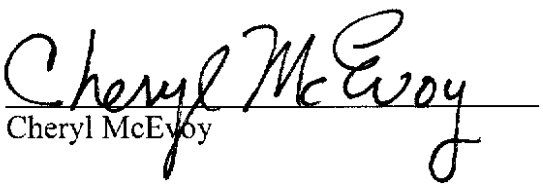
I, Cheryl McEvoy, declare under penalty of perjury that the foregoing is true and correct. Executed on this 9th day of September, 2013, at Seattle, Washington.



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