REBUTTAL TESTIMONY OF PHILIP A. MEYER

Regarding Testimony of Steven E. Hughes
Concerning "Comparative Risk to Resources"

And

Regarding Testimony of James Wesley Miller
Concerning "Comparative Risk Spill Analysis"

Application No. 96-1,
Olympic Pipeline Company:
Cross Cascade Pipeline Project.

Before the:

Washington State Energy Facility Site Evaluation Council

March, 1999

Please state your name, address and professional position.

My name is Philip Meyer. My address is 2452 Bucklebury, #9, Davis, California.

I am President of Meyer Resources, Inc. – a natural resources consulting firm.

Could you please summarize your professional qualifications with respect to the testimony you are about to offer.

I hold a B.A. in Economics (1962) from the University of British Columbia, and an M.A. in Resource Economics (1965) from the University of California, Santa Barbara. I served as Chief Social Scientist, Southern Operations, and Chief Social Science Advisor for Habitat Protection, for the Canadian Department of Fisheries and Oceans, Pacific Region – 1969 through 1978. I served as Senior Economic Policy Advisor to the U.S. Fish and Wildlife Services' California Water Policy Center in Sacramento from 1979 to 1980. Since 1981 I have been President of Meyer Resources, Inc. Further details are provided in my vitae (Attachment 1).

What are your particular qualifications with respect to this energy transportation inquiry?

I have over 30 years experience assessing socioeconomic impacts from major project proposals, primarily in Pacific coastal states, British Columbia and Hawaii. This work has included supervision of interdisciplinary teams, and significant multi and inter-disciplinary analysis. I also have extensive experience assessing impacts on tribes and other aboriginal peoples.

With specific reference to energy transportation issues, significant professional involvement includes:

- Principal analyst concerning social science impacts from energy projects, for Canadian Department of Fisheries and Oceans, 1975 through 1978.

- A 1978 Environment Canada report titled: “Potential Pacific Oil Ports: A Comparative Environmental Risk Analysis” (co-author).
- Co-Leader of Canadian Fisheries Delegation to Hill Inquiry on Impacts along Canadian sections of a proposed Alaska Highway Gas Pipeline (1978).
- Analysis of Draft EIS Concerning Impacts on the Humboldt and Mendocino coasts for the Pacific Coast Federation of Fishermen’s Associations (1988).
- Invited Testimony on the Adequacy of the federal OCS SocioEconomic Impact Assessment Process with respect to proposed OCS Lease Sale 91, to The National Research Council (1989).
- Identification of infrastructure at risk along the Central California Coast, due to proposed OCS Lease Sale 119, for the counties of Sonoma, Marin, San Francisco, San Mateo, Santa Cruz and Monterey (1989).
- Evaluation of Potential Impacts of OCS Lease Sale 132 off Washington and Oregon on 16 Indian Tribes, with Central Washington University, for the US Minerals Management Service (1989-1991).
- Evaluation of Potential Impacts from a proposed Oil Port at Low Point, Washington, for the Lower Elwha Klallam Tribe (1991).

What are the principal areas that your rebuttal of Mr. Hughes’s testimony will cover?

Mr. Hughes presents a matrix-based procedure based on “expert judgement”, which he asserts produces a “quantitative comparison” of potential impacts (Hughes at 7) on natural resource “values” (Hughes at 16) from petroleum product transportation via the proposed Cascade pipeline vs. via existing barges. He concludes from this

procedure that transportation of petroleum products via the proposed Cascade pipeline is more risky for Washington than by via the existing barge-based system.

I believe, based on Mr. Hughes proffered methodology, and on information concerning this issue, readily available from published sources, that his conclusion are, in some instances, not material, and in others, erroneous.

What is the basis for your disagreement with Mr. Hughes?

First, while impact matrices based on senior expert judgement are fairly standard in impact assessment, they usually contain explicit and balanced identification of the data upon which the conclusions of each expert was based. For example, and focussing on this general region, in 1978, the Canadian Department of Fisheries and Oceans published "Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis". That report employed four risk matrices: a Navigation Risk Matrix which considered wind, visibility, currents, water depths, channel widths, course changes, shipping density and season for each geographic transport segment; a Biological Resource Matrix considering overall biological (habitat) capability, salmon escapements, other fish stocks, marine birds and mammals; an Economic Resource Matrix considering value of commercial catches along each route segment, value of fishing vessels at each home port, and the value of resident recreational craft; and a Social Impact Matrix considering native and non-native populations along each route segment. These matrices were developed by recognized experts in each identified technical field - tied to each other using explicit mathematical formula – and supported by objective data contained in extensive technical appendices.

Similarly, and considering Navigation Risks only, in 1990, the Final Report of the States/British Columbia Oil Spill Task Force developed a Transit Spills Matrix that examined data on winds, currents, visibility, channel widths and shipping densities for each route segment – again supported by an explicit and detailed procedure for integrating findings – and based on work by recognized senior experts.

The key ingredients of these matrix-based approaches, and a number of others that are similarly useful, are:

1. Consideration of a sufficiently broad range of impact variables, so that findings have relevance for decision-makers.
2. Specification of sufficient information upon which "senior experts" reached their judgements, so that others can understand the basis for their conclusions – and if they have similar qualifications, agree or differ.
3. Demonstration that the results of the matrix assessment "make common sense", when subjected to groundtruthing by both technical and lay reviewers.

How do you assess the testimony of Mr. Hughes with respect to these criteria?

The risk matrix presented by Mr. Hughes fails on all three counts.

Please explain.

First, Mr. Hughes does list a considerable number of biological variables in his assessment matrix. However, despite his use of the term "values", his assessment provides no treatment whatsoever of the relative risks to the people of the state of Washington. His procedure leaves out any discussion of impacts to economic and social values of the people of Washington State entirely. He also leaves out any

consideration of impacts on environmental values held by the state's residents.

This omission departs from the testimony of his colleague, Mr. Miller, who states on Miller, p. 5:

> Risk is the valuation of accident potential (likely frequency) and severity of potential consequences (quantities spilled, likelihood of damage by fire or explosion, environmental impacts to humans, other animals and plants). Both the likely frequency and consequences must be considered together. Risk cannot be properly valued without due consideration of both.

I agree with this statement by Mr. Miller, but Miller provides no treatment of the human "consequences" he talks of in developing the conclusions on relative risk that Mr. Hughes relies on in his analysis – and Mr. Hughes fails to deal with human consequences either.

What role does Mr. Miller's "relative spill risk analysis" play in Mr. Hughes analysis?

The conclusion from Mr. Miller, that the proposed pipeline transportation alternative is 80 percent more risky than present modes of transportation plays a major role in determining the outcome of Mr. Hughes analysis – explaining more than 50% of the difference in relative risk asserted by Mr. Hughes.

Do you consider the relative risk estimates developed by Mr. Miller, as utilized by Mr. Hughes, to be reasonable?

I leave detailed review of Mr. Miller's testimony to other experts. However, there is one aspect of Mr. Miller's ocean spill analysis that causes me particular concern – and, in my view, grossly biases his analysis in favor of maintenance of the transportation status quo.

What is that concern?

It is well known that the waters of Juan de Fuca Strait, the outside Washington Coast, and the Columbia River bar area are subject to strong currents, high wind conditions, and heavy wave action. The result of these factors is that only a limited amount of the oil or

oil products spilled into these waters can usually be contained and retrieved short of shoreline impact areas. The Nestucca barge spill and the recent New Carissa disaster provide only two examples of the difficulties in managing and containing potential spills, given wind, wave and weather conditions encountered in these off-coastal areas. On-land spills, on the other hand, have geographic boundary properties that are generally far better defined and more stable.

Mr. Miller does not factor containability into the relative risk analysis relied on by Mr. Hughes. This strongly biases the results achieved by both Mr. Miller and Mr. Hughes - and leaves the impression that ocean transport of oil products is less risky than it actually is, relative to terrestrial transport.

Moving now to Mr. Hughes' own analysis of relative risk – in contrast to the risk estimates he incorporated from Mr. Miller, does Mr. Hughes testimony provide us with sufficient information to understand how his "experts" came to their conclusions?

No. He does provide sufficient data concerning his use of testimony by Dr. Miller for us to understand how he uses Dr. Miller's "oil spill probability" data in his analysis. He is also clear with respect to the geographic regions he uses.

However, when he gets to his risk evaluation matrix, all he provides are the "risk scores" offered by his asserted expert team. He does provide a few lines of general discussion on pages 17 and 18 of his testimony – and some further general discussion in his Appendix (15). But this appended material simply describes the relevant watersheds – and provides no substantive information that would validate the "opinions" of his "expert team".

Finally, you stated that Mr. Hughes' asserted risk estimates do not appear reasonable when subject to groundtruthing. Could you first explain what you mean by groundtruthing?

Yes. Responsible science requires that when all the internal manipulations of a given analytical model have been completed and resulting estimates reported, both technical and lay reviewers need to stand back from specific examination of individual assumptions and calculations in the model, and also ask the question – "Do the model results make sense?" – in terms of what is generally known about the subject. This is termed "groundtruthing".

Did you subject Mr. Hughes results to groundtruthing?

Yes.

What did you conclude?

When compared to relatively recent broad-based findings with respect to alternative transportation modes for oil and oil products, Mr. Hughes findings appear counter-intuitive.

Please explain.

In 1989, David Anderson, then Special Advisor to the Province of British Columbia, filed a report on Oil Transportation and Oil Spills, in which he recommended consideration of a pipeline capable of carrying crude and/or refined petroleum products to mitigate against tanker spills in Juan de Fuca Strait.

In 1990, the States/British Columbia Oil Spill Task Force recommended that alternative transportation modes to tankering and barging be considered to reduce spills of petroleum and petroleum products.

The findings offered by Mr. Hughes are in conflict with these broad-based multi-party recommendations, and are counterintuitive.

You noted that Mr. Hughes analysis did not explicitly consider economic and social risk to citizens of the State of Washington in developing his "importance" ratings in his Exhibit SHE-10. If one considered those risks, what would one find?

Unquestionably, some citizens live, travel and recreate along areas of the state potentially affected by the proposed pipeline. However, the greatest portion of Washington's citizens live and recreate in areas adjacent to existing barge routes: in Puget Sound; along the south coast of the Strait of Juan de Fuca; along the full length of the outside Washington coast; and up the Columbia River, where Oregonians are at risk also.

Based on these population and recreational activity densities, there can be no question that the number of citizens at risk due to present barge traffic routes is greater than those who would be placed at risk by the proposed Cascades pipeline by several orders of magnitude.

Can you inform us with respect to some of the significant elements at risk along present barge routes for petroleum products?

Yes. There are a number of studies, primarily conducted in the late 1980s and early 1990s at the height of the off-Washington ocean oil leasing controversy, that are useful in extending our discussion beyond the obvious "people at risk" comment I have already made..

In 1989, Strickland and Chasan, of the University of Washington's Sea Grant Program, published a report entitled " Coastal Washington: A Synthesis of Information", specifically dealing with resources and peoples of the coast who could be impacted by offshore oil and gas activities and accidents.

Their analysis identified that four endangered bird species (brown pelican, Aleutian Canada goose, peregrine falcon and snowy plover) inhabited the coastal area (p.93). The bald eagle is also found there. Overall, thirty-seven dominant bird species were identified along the coast in the report (p.96-101).

Eight dominant marine mammals (river otter, sea otter, harbor seal, northern sea lion, California sea lion, northern fur seal, harbor porpoise and California gray whale) were identified (p.115), while a further eight species of whales, as well as Dall's porpoise, pacific white sided dolphin and northern elephant sea can also be seen along the coast (p.116).

Six species of salmonid; chinook, coho, chum, pink, sockeye and steelhead return to virtually every coastal river along the barging route, and groundfish are also caught in coastal waters.

The Strickland and Chasan report also identifies three important estuaries along the Washington coast: Grays Harbor, Willapa Bay and the Columbia River (p. 107-110); together with commercial razor clam operations in Willapa Bay (p.165) and on the Quinault Indian Reservation.

As a barge carrying oil product leaves Ferndale for the Columbia River, it passes through each of these areas - first sailing by relatively highly populated areas, characterized by vessels of all sizes and by high value shoreline real estate, as it moves through upper Puget Sound; past Port Townsend, the San Juan Islands and Victoria; and then along the south coast of Juan de Fuca Strait past Sequim and Port Angeles. Beyond Port Angeles, it moves into a more remote area, into the recently established National Marine Sanctuary,

past the sport fishing center at Seku; past fishing and refuge harbors at Neah Bay, and around Cape Flattery at La Push; then down the outside Washington coast past Quileute, Hoh, Queets and Quinault rivers, the ocean sands of the Long Beach area, and the shellfish areas of south coastal Washington. As it proceeds, it may also encounter concentrations of Treaty and/or non-Treaty fishing vessels – particularly in upper Puget Sound, in the western portion of the Strait of Juan de Fuca, and off Westport.

Once the barge enters the Columbia, it again encounters increased vessel and bankside activity, primarily associated with population centers at Astoria, Vancouver and Portland. Finally, a second barge takes these petroleum products up the Columbia River, into a zone of navigation locks and reservoirs – characterized in places by recreational boaters and net fishing by Treaty Indians.

As the barge passes through each of these zones, fishes, birds, mammals and human residents and visitors incur risk – that an accident may spill petroleum product into the water – and that the probability of containing such a spill prior to contact with resource, vessel, facility or shore, is low.

Is salmon fishing still important along the Washington coast?

Yes. Salmon stocks have generally declined in Washington State – and with that, salmon fishing activity as well. But Washingtonians continue to fish in significant numbers. For example, Pacific Fishery Management Council's "Review of 1997 Ocean Management Fisheries" reports the following number of sport fishing trips from Washington's outside coastal area during 1997 (p.IV-27).

Neah Bay	2,900
La Push	900
Westport	17,300
Ilwaco	6,500
Total-four coastal ports	27,600

Do you have any more information with respect to coastal infrastructure along barge routes between the refinery and eastern Washington destinations?

Yes. The US Army Corps of Engineers publishes a "Port Series" which provides information concerning particular ports in the United States (Attachment 2). This series provides information on seven ports between Bellingham and Astoria – Bellingham, Blaine, Anacortes, Port Townsend, Port Angeles, Grays Harbor and Astoria. Taken together, these ports contain 159 piers, wharves and docks. Of these, 69 serve the fishing industry and/or small craft directly – posing additional risk for their businesses.

Would reduced barge transportation of petroleum product along the Washington coast reduce risk for Indian tribes?

Yes. In 1991, Central Washington University did a study on "Potential Effects of OCS Oil and Gas Exploration and Development on Pacific Northwest Indian Tribes", for the US Minerals Management Service. Conclusions from that study include:

* Petroleum-related activity along the Washington coast have potential adverse effects on 11 Washington coastal tribes:

  :The Tulalip Tribes of Washington.

  :The Swinomish Tribes.

  :The Lummi Tribe.

:The Port Gamble S'Klallam Tribe.

:The Jamestown Klallam Tribe.

:The Lower Elwha Klallam Tribe.

:The Makah Indian Nation.

:The Quileute Indian Tribe.

:The Hoh Tribe.

:The Quinault Indian Nation.

:The Shoalwater Bay Indian Tribe.

* Adverse impacts from spills could have adverse effects where each tribe is physically located, and for many of the tribes, could extend to more distant Usual and Accustomed fishing areas.
* Each tribe is fundamentally dependent upon fish, shellfishes and other resources of the ocean and its shoreline – both materially and culturally. The right of tribal access to these resources is protected by Treaty and/or by federal tribal trust responsibility.
* The Klallam tribes of the Strait of Juan de Fuca and the Lummi Tribe near Bellingham harvested an estimated 205,000 pounds of clams from ocean beaches in 1989/90.

- The listed tribes were unanimous in their concern over potential accidents associated with petroleum-related activity in coastal waters (Attachment 3).

Additionally, existing barge traffic on the Columbia River goes through the middle of Fishing Zone 6 – the only commercial fishing area presently open for the Yakama

Indian Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Nez Perce Tribe. As with coastal tribes, disruption of these fishing activities – due to operational interference, or by oil spill – would deprive tribal members of catches that are critically needed for cultural and subsistence purposes.

What is your conclusion, in considering this information?

As I have noted, Mr. Hughes' "expert team" evidently failed to consider any of the information concerning residents of Washington listed here – in reaching their conclusions regarding the relative importance of values that might be impacted by a petroleum products spill, in his Exhibit SEH-10.

The information I have synopsized concerning geographic range of natural resources, human population and activity densities, economic infrastructure and business dependence, and circumstances and dependencies of Tribal peoples, paints a clear picture. Put simply, it is not possible to reach Hughes' conclusion that the status quo barge route for petroleum transport risks relatively less important "values" than does the proposed petroleum products pipeline, if potential impacts on human beings are considered.

And I agree with his colleague, Mr. Miller. They need to be considered.

Now, in order for Mr. Hughes to reach his final assessment of comparative impact from the pipeline vs. status quo, he multiplied his value estimates from his Exhibit SHE-10 by the relative risk estimates developed by Mr. Miller – is that what you said?

Yes.

Is there anything else you wish to comment on regarding this procedure?

Yes. The net effect of Mr. Miller's Comparative Risk Assessment (appended at Tab 3), which notes that barge capacity limits barge spill volume - and Mr. Hughes' findings that around-the-coast barging threatens less important values than does the proposed pipeline - leave the reviewer with the sense that barge spills in upper Puget Sound, across the outside Washington coast, and in the Columbia River are relatively minor in extent. Conversely, direct empirical evidence indicates that spills of petroleum product from barges and other commercial vessels do periodically occur in these waters– and that their impacts are usually significantly adverse, even though spill volumes may not represent "supertanker" sizes.

Can you provide any examples of such adverse effects?

Yes. In 1972, the troopship General M.C. Meiggs grounded 10 miles south of Cape Flattery, while under tow. Fifty-five thousand barrels of Navy Special fuel oil were spilled. Strickland and Chasan (1989) conclude:

> Oil globulates and heavily oiled debris from the ship washed up on the beach and became incorporated in the sediments. Oil was not transported offshore due to the wind direction at the time of the accident and the ship's acting as a barrier to seaward flow.
>
> Oil persisted in the intertidal area of the contaminated cove ("Wreck Cove") during a five year study period. Following the accident, exposing intertidal animals continuously. Oil hydrocarbons had been taken up by shellfish within two months of the accident, and persisted in mussels for five years after the spill. …

> (T)he abundance of barnacles and mussels declined steadily from March, 1972, to January, 1973; mussel abundance remained at an unchanging low level in 1977. Damaged purple sea urchins were found in the subtidal zone near the Meggs through July, 1973; at some locations dead urchins were observed and up to 70 percent of the survivors had lost their spines. There were no dead or abnormal urchins at any of the control (uncontaminated) sites surveyed.
>
> Although the Meggs spill was considered a minor spill in terms of the amount and type of oil released into the water, tangible evidence of pollutant uptake and of both lethal and sublethal effects was observed in intertidal organisms. This finding emphasizes the sensitivity and vulnerability of the intertidal community of the northern Washington coast to environmental stresses such as oil spills. (at p.47).

I particularly note the contrast between this last sentence from the Sea Grant report of Strickland and Chasan and the evident conclusions of Mr. Hughes “expert team”.

Can you cite any other examples?

Yes. Strickland and Chasan note a spill from the tanker Mobiloil near St. Helens, Oregon, in 1984.

> The tanker Mobiloil ran aground near St. Helens, Oregon on March 19, 1984, and spilled 170-233,000 gallons of oil into the Columbia River. Three types of oil were spilled: a heavy residual, a No. 6 low sulfur fuel oil, and an industrial fuel oil. Much of the Washington shoreline downriver of the spill site was oiled as a result. The oil moved 40 miles downriver during the first day after the spill and

> reached the Pacific Ocean within three days, with traces travelling as far as Copalis Beach 65 miles to the north. A portion of the oil remained in the river in the form of tarballs and oiled vegetation at least through August, 1984. The areas of the Columbia River oiled by the Mobiloil spill were the intertidal wetlands of Baker Bay and Grays Bay, which are feeding areas for juvenile salmon and trout. (at p.48).

Can you cite any other examples?

Yes. Strickland and Chasan cite a spill from the Arco Anchorage in Port Angeles harbor in 1985. While this was a spill of crude oil, it confirms containment difficulties associated with spills in these areas, even given favorable wind conditions – as well as the broad potential effects on shore and near-shore resources.

> The tanker Arco Anchorage ran aground in Port Angeles harbor…and spilled 239,000 gallons of Alaska North Slope crude oil into the Strait of Juan de Fuca. Since the wind was light, beach impact along Port Angeles harbor was minimal, with oil primarily affecting 70 miles of sheltered beach along the south side of Ediz Hook, the elbow of Dungeness Spit, and the east-facing beaches along Agate, Crescent and Freshwater bays. The oil penetrated into coarse-grained beach sediments within much if the intertidal zone to depths of 2-12 inches. …
>
> Contamination of the south shoreline of Ediz Hook resulted in stress to crabs and hard-shell clams, and mortalities to starfish. About 12,000 pounds of hard-shell clams were visibly oiled along their siphons and the tops of their shells, causing losses amounting to $20,000. Mussels and oysters were also contaminated

with oil. …

Surf smelt eggs collected from Dungeness Bay had a high mortality rate (73 percent compared to a normal 9 percent).

Can you cite any further examples?

Yes. In 1988, the barge Nestucca spilled 231,000 gallons of N6 fuel oil off Grays Harbor, Washington after colliding with the tug Ocean Service. The slick traveled northward – oiling beaches and associated resources at Cape Flattery, as well as Uclulet harbor, the Broken Islands group, beaches along Canada's West Coast Trail, Banjo Point, Estevan Point, Friendly Cove, Kyuquot and areas of the Brooks Peninsula – all on the west side of Vancouver Island. Damage was extensive, including substantial mortalities suffered by seabirds, and adverse effects on marine mammals, other aquatic life and beaches. Washington and British Columbia settled their claims on the Nestucca Case for $11.6 million, although inclusion of non-market damage estimates would have pushed this figure much higher.

Are there any other examples that seem particularly relevant?

Yes. In 1991, the freighter Tuo Hai collided with a Japanese fishing vessel, the Tenyo Maru, about 25 miles northwest of Cape Flattery – resulting in a spill of 354,000 gallons of Bunker C, and 97,800 gallons of diesel fuel oil. The resulting slick was driven south and east by currents and winds, affecting most of the Washington coast line. The northcoast area was heavily affected, within what is now a National Marine Sanctuary – as well as the home of the Makah Indian Nation – one of four Washington Treaty Tribes who have their reservations on the outside Washington coastline.

What is the overall significance of the examples you have provided?

First, results from theoretical models often depend principally on assumptions or calculations that are internal to the model, and may not be reasonable. As I have indicated earlier – that is the case with the estimated relative risk results offered by Mr. Hughes. Observation of real events are clearly preferable to theoretical models – and that is the utility of the real examples I have provided.

Based on these real examples, what is your overall conclusion?

First, spills of petroleum products are periodic along Washington's coastal waters, and in the Columbia River.

Second, spills that are not characterized as "large" in the vernacular of oil spill risk assessment will characteristically be spread over broad areas by wind, by ocean and river currents, and by sea conditions that too often marginalize the success of slick containment efforts.

In view of these demonstrated facts, moderate spill sizes have periodically resulted in serious damage to impacted fish, shellfish, marine mammals, birds, and the habitats upon which they depend. Similarly, they have caused significant economic damage to coastal and/or Columbia river infrastructure – and to marine and shoreline dependent human activities. They can be particularly adverse for Indian Tribes who are directly dependent upon coastal resources, including salmonids.

In sum, it is impossible to reconcile Mr. Hughes' theoretical assertions that these coastal and river resources are at relatively less risk from present oil traffic with this empirical record.

As an economist, do you conclude that substantial reductions in risk to coastal and Columbia river-side residents and their resource would actually occur if the Cascade Pipeline were built.

Yes. From an economic perspective, this is a no-brainer. Whatever risk experts conclude concerning the magnitude of reduced spills associated with removing petroleum product from barges, two things are clear.

First, the proposed pipeline is cheaper for Cascade than shipping by any other mode (Pre-filed Direct Testimony of Frank Hoff, Appendix D), so, as Cascade is economically rational, they will replace barges with the pipeline up to the capacity of the proposed pipeline to handle petroleum product.

Second, it is therefore clear that the incidence of periodic spill into the ocean and the Columbia River will be reduced – and with that, significant spill events of the type described here, will be reduced also.

If demand for petroleum products were to increase in the future, would this affect your conclusion?

No. Oil and oil products will still be transported across the Washington coast – and this traffic could conceivably increase in the future. But what we are talking about here is removal of a discrete amount of petroleum product from ocean and Columbia River shipping lanes – both now, and in the future. This removal may therefore regarded as a constant – in the sense that it is independent of the total amount of oil and oil product that may be shipped across the coast at any future point in time.

March 22, 1999

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Philip A. Meyer