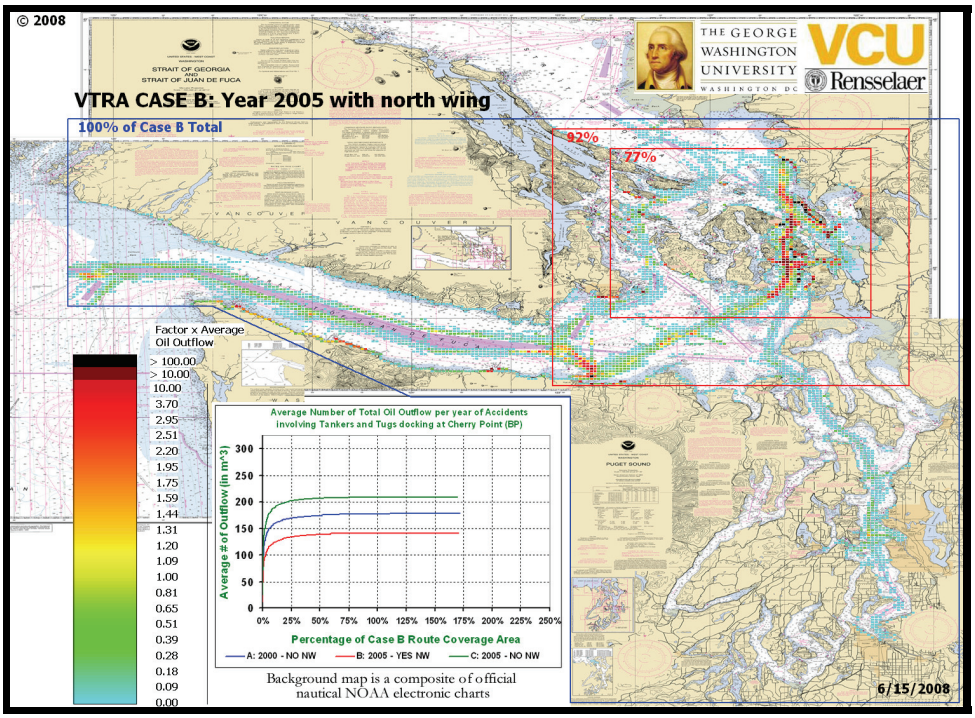
TECHNICAL APPENDIX G: GEOGRAPHIC EXPOSURE, ACCIDENT AND OIL OUTFLOW PROFILES



Assessment of Oil Spill Risk due to Potential Increased Vessel Traffic at Cherry Point, Washington

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G-1. Roadmap of Appendix G

This Appendix is a compilation of the various analysis results that were generated over the course of the VTRA project. The VTRA project studies in various levels of detail the difference cases presented in Table 1 below. The calibration case for this project was the year 2005 (VTRA Case B). For this year we are effectively replaying the movement of vessels rather than having to make use of additional probabilistic traffic arrival generators. Hence, VTRA CASE B is a natural calibration scenario. Also please note that in VTRA CASE B the north wing of the Cherry Point dock is in operation. VTRA CASE C runs the same traffic but without this north wing in operation. A more detailed description of the various cases is provided in the main report. Within the main report we have distilled the various general trends within the analysis results across the different VTRA Cases. Appendix G and its presentations allow a reader of the report to study the analysis results and comparisons discussed in the main report in more detail.

Table G-1. The 15 VTRA Cases

	Case	CP Traffic	Other Traffic	North Wing?	Saddlebags?	Extend Escorting?	Neah Bay?	Gate Way?
1	A	2000	2000	No	Yes	No	Yes	No
2	B	2005	2005	Yes	Yes	No	Yes	No
3	C	2005	2005	No	Yes	No	Yes	No
4	D	2025 Low	2025 Low	Yes	Yes	No	Yes	Yes
5	E	2025 Low	2025 Low	No	Yes	No	Yes	Yes
6	F	2025 Medium	2025 Medium	Yes	Yes	No	Yes	Yes
7	G	2025 Medium	2025 Medium	No	Yes	No	Yes	Yes
8	H	2025 High	2025 High	Yes	Yes	No	Yes	Yes
9	I	2025 High	2025 High	No	Yes	No	Yes	Yes
10	J	2005	2005	Yes	No	No	Yes	No
11	K	2025 High	2025 High	Yes	No	No	Yes	Yes
12	L	2005	2005	Yes	Yes	Yes	Yes	No
13	M	2025 High	2025 High	Yes	Yes	Yes	Yes	Yes
14	N	2005	2005	Yes	Yes	No	No	No
15	O	2025 High	2025 High	Yes	Yes	No	No	Yes

Our study was limited to those vessels that dock at the BP Cherry Point dock. These vessels involve both tankers, articulated tug barges (ATB) and integrated tug barges (ITB) docking at BP Cherry Point. This class of vessels are here an in the various appendices and main report referred to as the BPCHPT vessels.

The summary aggregate results presentation provides a quick overview of aggregate results across all the cases in Table 1 in terms of interactions (i.e. exposure), accident frequency and oil outflow. If a one is intrigued by a particular comparison as a result of this aggregate result presentation, one can further study this comparison using one of the comparison

presentations. Each presentation is a power point file with in it various geographic profiles from an exposure, accident frequency and oil outflow perspective. Separate presentations are provided that compare oil outflow by:

- Persistent oil outflow from BPCHPT vessels (specifically crude oil and heavy fuel),
- Non-persistent oil outflow from BPCHPT vessels (specifically refined products and diesel fuel).
- Persistent oil outflow from interacting vessels (specifically crude oil and heavy fuel) involved in a potential collision with a BPCHPT vessel,
- Non-persistent oil outflow from interacting vessels (specifically refined products and diesel fuel) involved in a potential collision with a BPCHPT vessel.

For the VTRA CASE B we analyzed a total annual average oil outflow of about 141 cubic meters. Of this total, 122.1 cubic meters was average persistent oil outflow from BPCHPT Vessels and 15.3 cubic meters was non-persistent oil outflow from BPCHPT vessels. Summarizing, of the total annual average oil outflow analyzed only about 2.5% can be attributed to an oil outflow from interacting vessel involved in a potential collision with a BPCHPT vessel.

The first presentation in the table of contents of Appendix G provides a system context for the traffic that we were tasked to investigate. From the systems context presentation one observes immediately the following very interesting results for the calibration VTRA CASE B:

- Of the total simulated traffic, the CHPT vessel traffic only constitutes 1.1%.
- Of the total simulated traffic, all tankers, ATB's and ITB's only constitutes 3%.
- Of the total simulated deep draft traffic, the CHPT vessel traffic only constitutes 7%.
- Of the total simulated deep draft traffic, all tankers, ATB's and ITB's only constitutes 16%.

As a result a disclaimer is in order: One should tread extremely cautiously when deriving recommendations from any study that only evaluated 1.1% of the total traffic. One primary limitation of the VTRA study is that, due to scoping constraints, the results reflect only on a small percentage of the vessel traffic described in the maritime simulation. If risk interventions have an appreciable effect beyond the BPCHPT vessels analyzed in this study, they should also be tested against this larger class of vessels to determine their effects on

system wide accident frequencies and oil outflows. For example, a risk intervention that reduces accident frequency and or oil outflow of BP Cherry Point vessels, but results in a larger potential increase of accident frequency and/or oil outflows from the other traffic should not be implemented. Conversely, risk mitigation measures that have little or no impact on the BP Cherry Point vessels accident frequency or oil outflow may in fact significantly reduce risk to other vessels.

From our oil outflow analysis it followed that in VTRA CASE B 97.5% of the total annual average oil outflow originated from BP Cherry Point vessels and only 2.5% from interacting vessels involved in a potential collision with a BP Cherry Point vessels. This class of interacting vessels also included tank vessels that do not dock at Cherry Point. Hence, we may cautiously infer that of the total average oil outflow that we analyzed for VTRA CASE B only a small percentage can be attributed to diesel fuel of heavy fuel losses and the dominant part results from cargo losses. With the observations above, one could argue that any risk interventions to reduce oil outflow potential that are in place or being considered for implementation (now or in the future) should first be tested at a minimum for annual average oil outflow reduction effectiveness from all tank vessels. It should be noted that this study did not analyze the oil outflow of tank vessels of those accidents that do not involve BPCHPT vessels.