2015 Vessel Traffic Risk Assessment

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Ecology Spills Program

• Mission:
  – Protect Washington’s environment, public health and safety through a comprehensive spill prevention, preparedness, and response program

• Vision:
  – Prevent, prepare for, and respond aggressively to oil spills
  – Be our best for the state of Washington
  – Our spills goal is “zero spills.”
Ecology Spills Program

• Four major activities
  – Prevent oil spills from vessels and oil handling facilities
  – Prepare for aggressive response to oil and hazardous material incidents
  – Rapidly respond to and clean up oil and hazardous material spills
  – Restore public natural resources damaged by oil spills
Ecology Spills Prevention

• Vessel screening and inspections
• Voluntary programs for tank vessels
• Oil transfer inspections
• Oil transportation risk assessments
• Facility inspections, plan review
• Technical assistance to the regulated community
• Incident Investigation
Sponsor: Ecology

Principle Investigators: George Washington University, Virginia Commonwealth University

Purpose: Provide updated information about the risks of oil spills from commercial vessel traffic in the Salish Sea
DEFINITION OF 15 WATERWAY ZONES

VTRA 2015 Waterway Zones

1. Buoy J
2. ATBA
3. WSJF
4. ESJF
5. Rosario
6. Guemes
7. Saddlebag
8. Georgia Str.
10. PS North
11. PS South
12. Tacoma
13. Sar/Skagit
14. SJ Islands
15. Southern Gulf Islands
VTRA Workgroup Membership

Chair: Captain Stephan Moreno, Puget Sound Pilots (November, 2015 – August, 2016)

Federal advisors:
• US Coast Guard District 13; Sector Puget Sound

State and tribal leads:
• Makah Tribal Council
• Washington State Department of Ecology

Core workgroup members:
• American Waterways Operators
• BP
• Marine Exchange of Puget Sound
• Mulno Cove Consulting/Friends of the San Juans
• Pacific Merchant Shipping Association
• Puget Sound Partnership
• Puget Sound Pilots
• Puget Soundkeeper
• Tesoro
• Washington Association of Counties
• Washington Public Ports Association
• Wave/Friends of the Earth
• Western States Petroleum Association
VTRA Process

- **Update the model** with 2015 vessel traffic data
- **Define and model “what-if” cases** to reflect marine terminal projects that could become operational by 2025
- **Define and model risk reduction measures** to provide information about their potential to reduce accidents and oil spill risks
Key Risk Reduction Measures Modeled

• Improvements to international and federal standards that are in the process of being implemented

• Rescue tug(s) for Haro Strait and Boundary Pass

• Tug escort for articulated tug barges (ATBs) and towed oil barges in Puget Sound

• Removal of the current size restriction (125,000 deadweight tons) on oil tankers in Puget Sound

• Escort of outbound tankers from Kinder Morgan’s Westridge Marine Terminal to the Pacific Ocean
Key Points to Consider

• Model results should be considered in context of the assumptions used in the model

• The VTRA process focused on prevention of accidents and oil spills, not oil spill trajectory, fate, or impact

• The results provide a tool to compare potential differences between the base case, what-if cases, and risk mitigation measures

• These results are not predictions of how many or what size oil spills will occur
Model Results

Oil spills from commercial vessels are “low probability/high consequence events”

- 98% of accidents did not result in oil loss for both the base case and the 1,600 vessel what-if case

- All the potential oil loss evaluated in the model was the result of less than 2% of potential accidents
Model Results
Risk Varies by Region

- For the 1,600 vessel what-if case, the largest increases in potential oil loss and potential accident frequency were at the entrance to the Strait of Juan de Fuca and in the Haro Strait/Boundary Pass waterway zone
  - Largest increase in potential oil loss by volume was in the Haro Strait/Boundary Pass waterway zone
Model Results

Risk in a complex system is best managed systemically

- The greatest overall reductions in potential oil loss came from a portfolio of five mitigation measures, rather than any single action.

- Within the five mitigation measure portfolio, the measure approximating pending improvements to vessel traffic management and safety had the greatest effect.
  - However, the model makes “maximum benefit assumptions” about the potential effect of these pending changes

- Removing the 125,000 deadweight ton restriction on oil tankers increased potential oil loss

- Tug escorts for articulated tug barges and towed oil barges reduced potential accidents by 15% and potential oil loss by 3%, compared to the 1,600 vessel what-if case
VTRA '15: Base Case  3D Risk Profile All FV  
Pot.C+G+A.Oil Loss: 100% of Base Case POL
USKMCA1600 3D Risk Profile All FV - Pot.C+G+A.Oil Loss: 184% of Base Case POL
USCAKM1600-5RMM  3D Risk Profile All FV - Pot.C+G+A.Oil Loss: 131% of Base Case POL
### VTRA 2015 Routes for What-If Case: USKMCA1600

<table>
<thead>
<tr>
<th>Description</th>
<th>VTRA 2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL WHATIF - CA PROJECTS (without Bunkering)</td>
<td>1020</td>
</tr>
<tr>
<td>TOTAL WHATIF - KM (without Bunkering)</td>
<td>348</td>
</tr>
<tr>
<td>TOTAL WHATIF - US PROJECTS (without Bunkering)</td>
<td>232</td>
</tr>
<tr>
<td>SUBTOTAL WHAT-IF (without Bunkering)</td>
<td>1600</td>
</tr>
<tr>
<td>TOTAL BUNKERING SUPPORT - CA PROJECTS</td>
<td>111</td>
</tr>
<tr>
<td>TOTAL BUNKERING SUPPORT - KM</td>
<td>17</td>
</tr>
<tr>
<td>TOTAL BUNKERING SUPPORT - US PROJECTS</td>
<td>49</td>
</tr>
<tr>
<td>SUBTOTAL Bunkering Support</td>
<td>177</td>
</tr>
<tr>
<td>TOTAL WHAT-IF FOCUS VESSELS</td>
<td>1777</td>
</tr>
</tbody>
</table>
% Base Case Pot. Oil (C + G + A) Loss - ALL_FV

- Guemes: +13.2% | x 1.82
- Haro/Boun.: +35.8% | x 3.53
- PS South: +0.0% | x 1.00
- Rosario: +2.6% | x 1.23
- Saddlebag: +6.7% | x 1.62
- PS North: +0.3% | x 1.03
- ESJF: +14.5% | x 2.64
- Sthrn. Glf. Isl.: +1.2% | x 1.19
- WSJF: +5.1% | x 2.08
- Georgia Str.: +3.2% | x 1.83
- Buoy J: +1.9% | x 4.09
- Tac. South: 0.0% | x 0.97
- SJ Islands: +0.0% | x 1.02
- Sar/Skagit: +0.0% | x 1.12
- ATBA: +0.0% | x 1.44

% Base Case Pot. Oil (C+G+A) Loss (OL) - ALL_FV

- USKMCA1600: 185% ( +84.7% | x 1.85)
- VTRA '15: Base Case: 100%
Conclusion

• 2015 VTRA final report provides:
  
  – An information source to help government, tribes, and stakeholders answer complex and location-specific risk management questions.
  
  – Valuable insight into relative changes in risk, and potential benefits that could be realized by a portfolio approach to risk reduction.

• 2015 VTRA Final Report and Ecology Focus Sheet are available here:
  
2016 Salish Sea Oil Spill Risk Mitigation Workshop Background:

**When:** October 18 -19, 2016

**Where:** Bellingham, WA

**Who:** ~ 75 representatives from US and Canadian agencies, Tribes, First Nations, Environmental Groups, Industry Groups, & Nonprofit Organizations
Workshop Goal

Develop actionable recommendations to reduce the risk of oil spills from vessel traffic in the Strait of Juan de Fuca and the Salish Sea.
# Workshop Results

<table>
<thead>
<tr>
<th>Rank</th>
<th>Risk Reduction Measure Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Escort tank vessels including oil barges and Articulated Tug Barges in Puget Sound</td>
</tr>
<tr>
<td>2</td>
<td>Create a Canada/US Transboundary Marine Safety Forum</td>
</tr>
<tr>
<td>3</td>
<td>Pre-position a multi-mission emergency response towing vessel (ERTV) for Haro Strait/Boundary Pass</td>
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<tr>
<td>4</td>
<td>Conduct a Ports and Waterways Safety Assessment (PAWSA) for Port Angeles Precautionary Area and Rosario Strait</td>
</tr>
<tr>
<td>5</td>
<td>Share transboundary marine incident data</td>
</tr>
<tr>
<td>6</td>
<td>Support implementation of pending risk reduction measures</td>
</tr>
<tr>
<td>7</td>
<td>Broaden the oil spill prevention community: “Keep it in the tank”</td>
</tr>
</tbody>
</table>
| 8    | a. Require a minimum 2-person bridge watch on tugs towing laden barges carrying pollutants in the Vessel Traffic System zone  
b. Require a minimum 2-person bridge watch on commercial vessels in reduced visibility. |
| 9    | Optimize anchorage number/ location |
Grays Harbor

• Ecology funded in 2017-2019 to conduct a vessel traffic risk assessment for Grays Harbor

• Builds on previous legislature-directed work
  – Completed an update to Puget Sound VTRA in January 2017
  – Draft report on the Columbia River Vessel Traffic Evaluation and Safety Assessment due to the legislature December 15, 2017

• Opportunity to document current baseline of oil spill prevention and preparedness; identify potential ideas for continuous improvement
Grays Harbor VTRA - Goals

• Assess baseline and changing oil spill risks
  – Identify measures that could help reduce the risks of oil spills

• Assess oil spill response preparedness
  – Identify baseline response capability
GH VTRA study approach

• Use a recognized, industry-standard framework – IMO Formal Safety Assessment - to conduct risk assessment

• Conduct a deliberative process
  – Focus on any known areas where improvements could be made
IMO Formal Safety Assessment

• References: IMO; MSC 1023/MEPC 392

• 5-step process

FSA - a risk based approach

1. Preparatory Step: Definition of Goals, Systems, Operations
2. Step 1: Hazard Identification
3. Step 2: Risk Analysis
4. Step 3: Risk Control Options
5. Step 4: Cost Benefit Assessment
6. Step 5: Recommendations for Decision Making