

APPENDIX 1

Oil Spill Incidents in Harbours and Restricted Waters Comparable to Port Metro Vancouver

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May 20, 2015**

This report summarizes major oil spill incidents from 1990 to 2015 in harbours and restricted waters comparable to Port Metro Vancouver. It was prepared as part of North Shore NOPE's (No Pipeline Expansion) submission as intervenors to the National Energy Board hearings on the proposed Trans Mountain Expansion Project (TMEP). This is by no means an exhaustive list of all oil spills that have occurred in harbours and restricted waters over the past twenty-five years. Instead examples have been chosen to demonstrate what could happen in Port Metro Vancouver waters if the proposed expansion of the Trans Mountain pipeline is approved.

Readers are directed to the International Tanker Owners Pollution Federation 2014 Statistics Report (1), to the European Maritime Safety Agency (EMSA) annual Maritime Accident Reviews (56), to the Transportation Safety Board of Canada Marine Investigation Reports (57) to the Centre for Tankship Excellence (58) and to the List of Oil Spills from Wikipedia (59) for further examples of marine oil spills.

The International Tanker Owners Pollution Federation (ITOPF) uses the term Inland/Restricted Waters to refer to oil spill incidents in ports or harbours, as opposed to Open Water. The ITOPF 2014 Statistics Report summarizes worldwide oil tanker spill incidents from 1970-2014. (1)

Port Metro Vancouver (PMV) is the largest port in Canada and is the fourth largest tonnage port in North America. See Figure 1 for a map of areas under PMV jurisdiction. PMV describes their port as being “...*recognized internationally as a beautiful and clean port, home to hundreds of species of fish, birds and marine mammals and more than 2.3 million people in the surrounding metropolitan area.*” (2)

The TMEP would increase the number of oil tankers in the PMV from the current 60 to 408 per year, making 816 transits of the harbour, to get to and from Westridge Marine Terminal (WMT).



Figure 1: Jurisdictional Map of Port Metro Vancouver (2)

WMT is located east of the Second Narrows Bridge. Aframax tankers, 245 m long, 44 m across the beam and with a draft of 11.6 m, would be used to transport diluted bitumen (dilbit) from WMT to ports in Asia and the US. The volume of dilbit transported would increase from the current 300,000 barrels per day to 890,000 barrels per day. (64)

According to the Canadian Energy Pipeline Association (CEPA) *“Bitumen is a thick, molasses-type product that is found in regions around the world, but more locally in the oil sands regions of northern Alberta, Canada.”* (65) Bitumen is too thick to flow through a pipeline so it is thinned with a product called a diluent, *“...typically either light crude, such as ‘synthetic crude’, or ‘condensate’, which is extracted from the ground along with natural gas.”* (65)

The Concerned Professional Engineers (CPE), an independent group of registered professional engineers, describe condensate in their webpage About Dilbit: *“Condensate is composed of hydrocarbons such as propane, butane, pentane or other hydrocarbons with additional carbon atoms. The condensate may contain additional impurities such as hydrogen sulphide (which is very corrosive), methyl, ethyl, as well as aromatics like benzene toluene and ethylbenzene. Some of these components, like benzene, are known carcinogens.”* (66)

CPE reviewed publications on hazards posed by condensate and summarized that condensate is *“Toxic, with possible long- term effects to the aquatic environment and wildlife. Toxic to humans, with recommendations to avoid exposure, skin contact and not breathing the vapors; cause of eye damage, nausea, dizziness and headaches”* (66)

Oil tankers in transit to and from WMT must pass beneath 2 bridges at the Second Narrows, which forms *“...a natural bottleneck of water in Burrard Inlet, between the main port area of Vancouver to the west and the Central portion of Vancouver harbour to the east.”* (3) Both bridges, the Ironworker’s Memorial and the CN Railway Bridge have height, width and draft restrictions for vessels transiting them. They were built in 1968 and 1969 respectively.

The following tables are organized to provide examples of oil tanker incidents that have occurred internationally under categories as relevant as possible to Port Metro Vancouver. The original units used for the volume of oil spilled have been maintained in this document rather than converting them to cubic metres.

Table 1: Tanker Incidents in Harbours and Restricted Waters:

SPILL	YEAR	REGION	VOLUME	CAUSE/IMPACT
<p>Eagle Otome</p> <p>Double Hulled Oil Tanker 264 meters</p> <p>References: 4, 5 Figure 2, 3</p>	January 2010	Port Arthur Texas (Sabine Neches Waterway)	450,000 gallons Light crude	<p>Tanker lost power, pilot could not steer and collided with towing vessel and the two barges it was pushing.</p> <p>15' by 8' (2.4 m) hole in Eagle Otome's starboard cargo tank.</p> <p>Waterway closed for 4 days. Workers in and around port & residents for 28 blocks evacuated due to reports of noxious fumes, thought initially to be hydrogen sulphide. Evacuation order lifted at 6pm, 8.5 hours after incident</p> <p>12 km of shoreline along waterway oiled; Keith Lake wetland bird preserve oiled 25 day clean up. Only 32% of oil recovered;</p> <p>\$3.2 M cleanup costs</p>
<p>Tasman Spirit</p> <p>Oil Tanker Single hull</p> <p>References: 6, 7</p>	July 2003	Karachi Harbour, Pakistan	27,000 tonnes crude oil	<p>Oil tanker grounded in the access channel to Karachi harbour. Hull was perforated. Most of cargo tanks ruptured.</p> <p>27,000 tonnes of crude oil were spilled; 13,000 tonnes were recovered then vessel split in two due to swells.</p> <p>Reports of nausea, headaches, dizziness. 17 schools closed for 1 week</p> <p>Severe pollution of 14 km of Clifton Beach, main tourist beach</p> <p>Dead fish as well as finless porpoises found on the beach. Green turtle nesting sites disturbed.</p>
<p>Sea Empress</p> <p>Oil Tanker Single hull 274 m</p> <p>References: 8, 9, 10</p>	Feb 1996	Milford Haven Passage, Wales	72,000 tonnes light crude oil	<p>Oil tanker grounded on rocks at entrance to harbour</p> <p>Human error cited: misjudgment of tidal currents; communication breakdown between pilot and commanding officer.</p> <p>5-7% of the oil reached the shore and spread over a 200 km shoreline</p> <p>Over 1000 workers involved in clean-up not counting those trying to save wildlife</p> <p>5000 of the 15,000 population of Common Scoter Ducks in the area were killed</p>

				The total cost of the cleanup operation was approximately £60M
Carla Maersk Chemical tanker 200 m Reference: 21	March 2015	Houston Ship Channel	Unknown volume. Was carrying 216,000 barrels of MTBE Gas additive	Collision with 623 ft bulk carrier in heavy fog. Residents warned to shelter in place indoors. MTBE can make drinking water unusable. (2nd crash in a week in Houston ship channel: 445 ft tanker collided with 892 ft container ship 5 days earlier.)
Hebei Spirit VLCC Single hull 322 m References: 11, 12 Figure 4	Dec 2007	Taeon, South Korea	11,000 tons Crude oil	Runaway barge struck super tanker moored offshore. 120 tourist beaches oiled. 1000 salt water farms for oysters, abalone and kelp ruined. Tourism dropped 86%. Only 30% of fishermen are back to work Lengthy delays in compensation to 126,000 victims have led to at least 1 suicide. Scientists say ecosystem will take at least 20 years to heal \$2.8 Billion sought in compensation
Kirby Barge Oil tank barge References: 22, 23	March 2014	Texas City Galveston Bay, Texas	170,000 gallons Marine Fuel	Barge struck by 585 ft bulk carrier. One of the barge's six fuel tanks was breached. Oil spread 12 miles coating shoreline with traces found 200 miles down coast on North Padre Island. 100 vessels stranded. Channel not reopened for 5 days. Cost \$7M/day. Cruise ship passengers stranded at port or at sea. Fishing banned, 129 birds, 32 reptiles, 16 mammals died Failure to wait for fog to pass and poor communication among other causes were cited.



Figure 2: Workers onboard the Eagle Otome after collision with a barge, Photo by Dave Ryan/Associated Press, Houston Chronicle, January 26, 2010.



Figure 3: Eagle Otome double hull tanker punctured by a barge
2010 Port Arthur Spill, Wikipedia, en.wikipedia.org



Figure 4: Workers cleaning up Hebei Spirit oil spill December 2007, Taean, South Korea sbmotorparts.com/oxdhyii/Hebei-Spirit

Table 2: Tanker Incidents Due to Human Error

A 2006 report by Elise deCola and Sierra Fletcher from Nuka Research and Planning Group outlines the risks of oil spills due to human error (61). In the executive summary they state: “*Human Factors- either individual errors or organizational failures- have been reported to cause as much as 80% of oil spills and marine accidents.*” They note that, despite improved technologies, oil spills and accidents still occur due in part to human and organizational errors.

Fatigue was found to be one of the top three causes of marine accidents by R. Gordon in his 1998 study: The contribution of human factors to accidents in the offshore oil industry (62)

DeCola and Fletcher reviewed published studies that suggest: “*In fact, technological improvements may increase accident rates due to increased complexity of the system, skills- or knowledge based lapses in operator abilities, or risk compensation behavior at the individual or organizational level. Increased automation often leads to reduced manning levels, which can increase*

the number and complexity of job tasks assigned to each operator while simultaneously removing or reducing the operator’s ability to bypass or override automated systems in an emergency.”(60)

Here are two examples of oil spills due to human error:

<p>Cosco Busan Container ship 274 m</p> <p>References: 13, 14, 15, 16</p> <p>Figures 6, 7</p>	<p>Nov 2007</p>	<p>San Francisco Bay</p>	<p>53,000 gallons Fuel oil</p>	<p>Container ship <i>under conduct of a pilot struck</i> one of the towers of the San Francisco-Oakland Bay Bridge. Impact tore a 150 ft long by 12 ft high gash in the hull of the vessel.</p> <p>Oil spread along 26 miles of shoreline and beaches in Marin and San Mateo counties. More than 6,800 birds killed. Herring eggs collected from spill location were later found to be dead or deformed.</p> <p>\$44.4 M settlement plus \$3.6 M to Bay Area fishing community Pilot sentenced to 10 months in prison. Fleet Management Ltd ordered to pay \$10 M for causing the oil discharge and a subsequent cover-up. In 2013 US District Court Judge refused to reinstate pilot’s license. Investigators found that he was going too fast in foggy conditions and was under the influence of prescription drugs.</p>
<p>Aegean Sea Oil Tanker Double-bottom</p> <p>References: 17</p> <p>Figure 5</p>	<p>Dec 1992</p>	<p>A Coruña, Spain</p>	<p>67,000 tonnes light crude</p>	<p>Ship ordered into port after being anchored offshore due to heavy storm. Storm pushed ship off course and she ran aground, caught on fire and exploded. 300 km of coastline were affected Fishing was banned and \$3.53M claimed by fishermen. The captain and the pilot were found criminally liable for negligence and for failing to follow regulations.</p>



Figure 5: The Aegean Sea, double-hull oil tanker, after running aground, Dec 1992

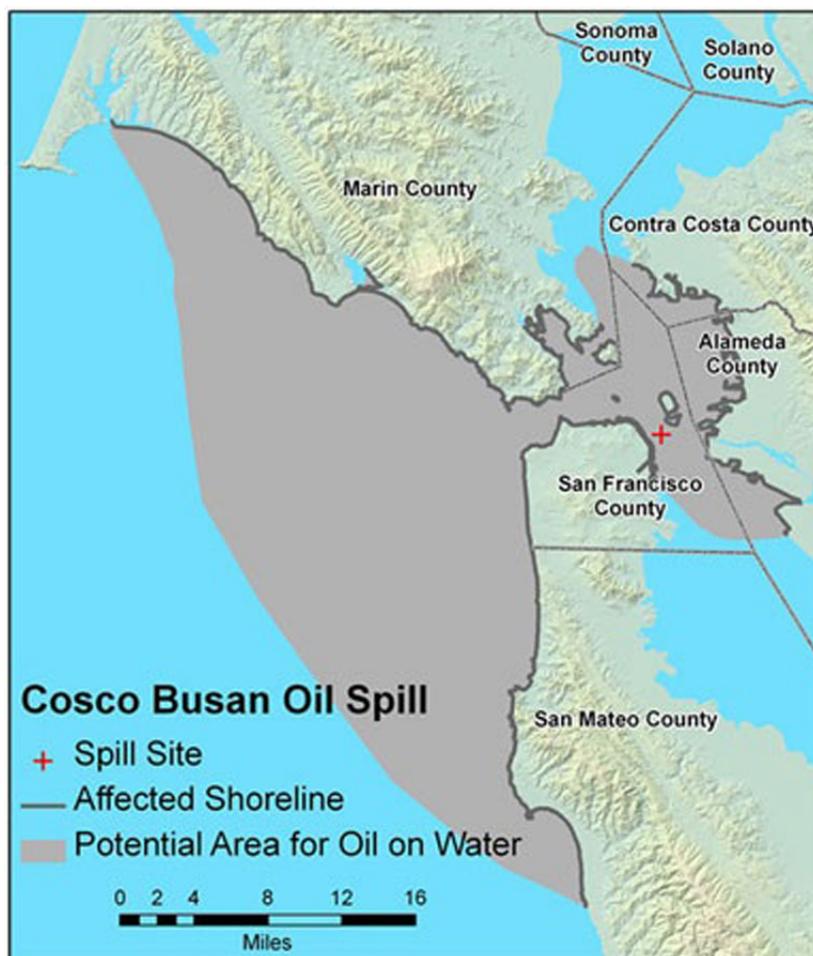


Figure 6: Graphic California map showing the locations of Cosco Busan spill

www.wildlife.ca.gov.

Table 3: Tanker Incidents Involving Bridges or other Structures:

Oil tankers in transit to and from WMT must pass beneath 2 bridges at the Second Narrows, which forms “...a natural bottleneck of water in Burrard Inlet, between the main port area of Vancouver to the west and the Central portion of Vancouver harbour to the east.”(3)

Tankers exiting the Kinder Morgan Westridge Terminal in Burnaby must transit the narrow spans of the CN Railway Bridge in Second Narrows only at the highest tides and during daylight hours. The navigable channel here is only 121 m across and as little as 12 m deep at zero tide. (18)

In May 2009, Port Metro Vancouver increased the allowable draft for Second Narrows Bridge transits from the previous 12.5m limit to 13.5 m thus enabling Aframax tankers to carry 10% more cargo, i.e. an additional 10,000 metric tonnes of oil per trip. (63) Pilots are now being trained on simulators to navigate the Second Narrows bridges with these new draft limits.

In October 1978, in fog, the freighter Japan *Erica* struck one of the piers of the CN Railway Bridge “...shutting down rail traffic to the North Shore for several months. This vessel was one fifth the size of tankers now plying Second Narrows, and had a marine pilot on board at the time.” (18)

The Cosco Busan striking the San Francisco-Oakland Bay Bridge described in Table 2 was a dramatic example of an oil spill from a bridge strike. Here are three other examples of bridge strikes:

Overseas Reyamar Oil tanker 229 m References: 19, 20	Jan 2013	San Francisco Bay	n/a Tanker was empty	Tanker <i>under conduct of a pilot</i> struck San Francisco-Oakland Bay bridge in heavy fog causing \$1.6M in damage to bridge fender and ship Pilot had license suspended, was put on probation for 2 years and was required to take training courses. Cosco Busan struck bridge in 2007
Cape Apricot Bulk carrier References: 26	Dec 2012	Roberts Bank, B.C.	Minor pollution	<i>While under conduct of a pilot and assisted by 2 tugs</i> , carrier struck causeway and conveyor system at Roberts Bank terminal. Causeway and conveyor system fell into water. Direct approach and ineffective communication cited as cause.
Le Brave Oil Tanker	Sept 1996	Sorel, Quebec	n/a	While manoeuvring to let another tanker out and in a stiff wind, Le Brave struck the Turcotte bridge on

126 m				Richelieu River in Port. Vessel and bridge damaged.
References: 27				
MV Harbour Feature Oil tanker 144 m	April 2013	Portsmouth New Hampshire	n/a	Tanker broke free of moorings. \$1.3M damage to bridge. #1M damage to tanker
Reference:				

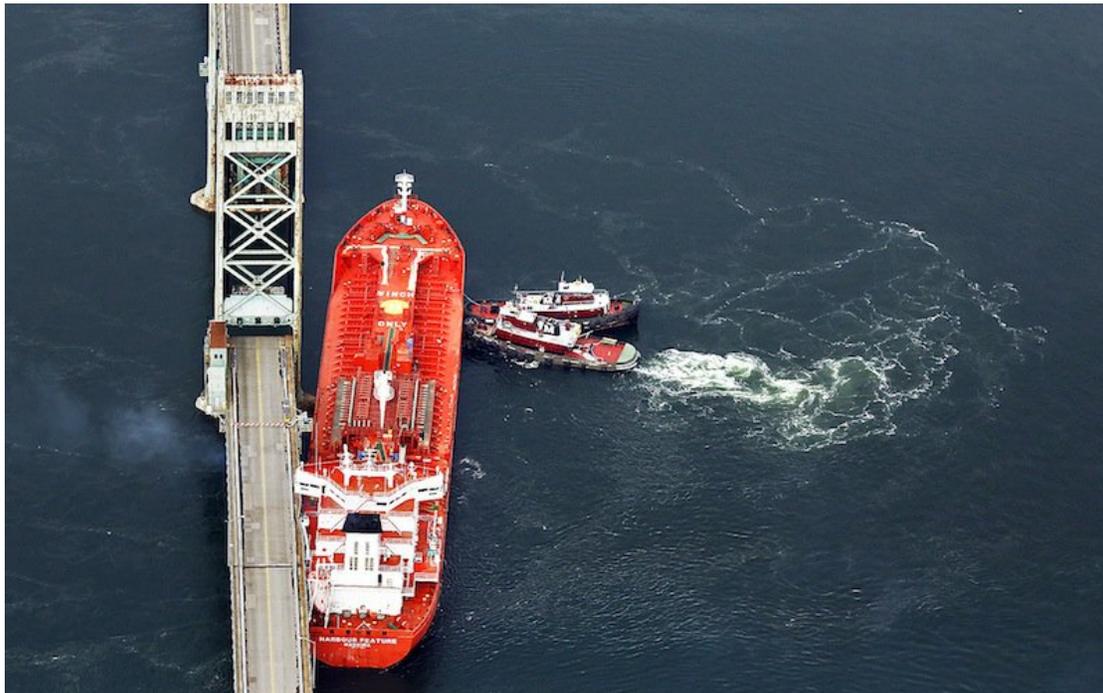


Figure 7: Oil tanker MV Harbour Feature after striking the Sarah Long Bridge, which connects New Hampshire and Maine, April 1, 2013
<http://www.seacoastonline.com/article/20150402/NEWS/150409819/0/wap&template=wapart> www.pressherald.com

Table 4: Oil Spills from Double Hulled Tankers

In addition to the **Eagle Otome** oil spill incident outlined in Table 1, there have been many other spills from double-hulled tankers. After the 1989 Exxon Valdez oil spill, the United States and the International Maritime Organization enacted policies requiring all new tankers to be constructed with double hulls. They also set schedules to phase-out single-hull vessels by 2010.

A 2011 report by Living Oceans Society (LOS) documents the limitations of double hulls: *Tanker Technology: Limitations of Double Hulls*. (24) The authors state that in certain situations double hull vessels will fare no better than single-hull vessels. As well, the LOS report summarizes design, maintenance and operation issues that may actually increase the likelihood of an accident and spill.

Elise DeCola from Nuka Research & Planning Group reported similar concerns in her 2009 report *A Review of Double Hull Tanker Oil Spill Prevention Considerations*. (25) She cites a 2003 report by the Oil Companies International Marine Forum (OCIMF) that cautions “...*the complex design and structure of double hull tankers can make them more susceptible to maintenance and operations problems. Like all vessels, double hull tankers can still be prone to catastrophic structural failures, particularly if they are not maintained and operated to high standards.*”

Here are some examples of oil spills from double-hulled tankers other than the Eagle Otome described in Table 1:

Bunga Kelana 3 Double hull oil tanker Reference: 28 Figure 8	May 2010	Strait of Singapore, 13 km W of Singapore	2500 tonnes Light Crude oil & condensate	Collision with bulk carrier caused 10 m tear in tanker. 7 km of coastline and beaches closed. National Sailing center closed.
Krymsk Double hull oil tanker Reference: 29	Oct 2009	SE of Galveston Texas	18,000 gallons crude oil	Collision with fuel loading service vessel pierced one of Krymsk’s fuel tanks
Mindoro Double hull tanker Reference: 30	Oct 2010	Schevenigen 20 miles off Dutch Coast	7000 tonnes of highly flammable kerosene	Tanker collided with container ship. 5X6 m hole was torn in side of Mindoro. Kerosene leaked into North Sea.



Figure 8: Bunga Kelana 3 double-hull tanker after collision with a bulk carrier, Straits of Singapore, May 2010, www.thehindu.com (28)

Table 5: Tanker Incidents With Passenger Vessels or Pleasure Boats

Although fortunately rare, there have been incidents of oil tankers or other large vessels colliding with passenger vessels. Here are some examples:

Maria Desgagnes Product Tanker 120 m Reference: 31	Sept 2005	Off Ile D’Orleans, St Lawrence River Quebec	No spill	Collision with 9m sailboat El Tio under power. Sailboat damaged, captain survived
Canada Senator Container ship 202 m Reference: 32	Aug 2004	Off Saint Nicolas, Quebec	No spill	Container, <i>under conduct of a pilot</i> , collided with 18 m ferro cement pleasure craft 2 persons died
Queen of Alberni ferry and Shinwa Maru, Bulk carrier Reference: 34	March 1992	1 mile SW of Tsawwassen ferry terminal	No spill	Collision with bulk carrier Shinwa Maru in dense fog. Human error. All means were not used to assess risk and avert collision. The 290 m bulk carrier was <i>under the conduct of BC Coast pilot</i> .

Table 6: Oil Spills During Loading and Unloading Procedures and from Pipeline Ruptures

The ITOPF 2014 Statistics Report referenced earlier (1) states that from 1970-2014, 40% of small oil spills (less than 7 tonnes) and 29% of medium spills (7-700 tonnes) occurred during loading and discharging operations. Equipment and hull failures account for 46% of these incidents for both size categories.

NSNOPE members are very concerned about a potential spill of diluted bitumen during loading onto oil tankers at Westridge Marine Terminal (WMT). The harbour is very narrow at this point. Only 800m would separate the end of a loaded tanker docked at one of the WMT berths and Cates Park, a popular family destination for boating, picnics and swimming.

In IR#2, 2.06a(a)DNV, Trans Mountain responded to the District of North Vancouver's question about potential oiling of Cates Park and Maplewood Flats, a popular bird sanctuary just north east of the Second Narrows bridge. Here is an excerpt from their response in A4J7L6-
Chart_for_Motion_re_Adequacy_of_Trans_Mtn_s_Responses_to_IR#2:

“Maps included in Appendix D of the Westridge ERA (Filing ID A3S4X1) based on this modelling show that the probability that Cates Park would be oiled is less than 50% in all seasons, while probability that the Conservation Area at Maplewood Flats would be oiled is greater than 50% during summer, but less than 50% in all other seasons. The response from Trans Mountain also states that “...shorelines contacted by oil or affected by subsequent clean-up activities would recover within two to five years.”

There will reportedly be a containment boom around a tanker during all loading procedures. In Vol. 7 Chap. 8, p. 7-157, an *estimated* credible worst case oil spill at Westridge Marine Terminal (WMT) would be 103 cubic metres (103,000 litres or 27,210 US gallons) and an *assumed* credible worst-case oil spill would be 160 cubic metres (160,000 litres or 42,268 US gallons)

Here are some examples of oil spills into the ocean that have occurred during loading or due to a pipeline rupture:

Foss Maritime Barge 248-P2 Reference: 35	Dec 2003	Shoreline Washington	4700 gallons Heavy Fuel Oil	Crew loading tank barge at Point Wells Chevron Texaco Terminal miscalculated flow rate and overfilled barge's cargo tanks. Alarm and detector failed. Oil coated 1.5 miles of beach, fouled critical saltwater marsh fish habitat. Shellfish harvesting disrupted. Seabirds, seal pup killed \$577,000 in State penalties plus \$1M to Suquamish Tribe and \$4.5 M cleanup costs
Good Hope Double hull Oil Tanker Reference 36	Nov 2004	Alexandria Egypt	1000 tonnes Light Crude	Spill while loading at the Sidi Kerir terminal
Venture Product tanker Reference 36	Sept 2003	Milford Haven, Wales	1.8 tonnes Diesel	Cargo tank overflow through ventilator pipes 15,000 pound fine imposed
Minerva Helen Crude tanker Reference 36	Jan 2008	Copenhagen	200 tonnes	Hose break/leak during loading
Nordic Marita Crude tanker Reference 36	June 2003	Sao Sebastiao, Brazil	27,000 litres	Failure in terminal's hydraulic system
Qingdao, China Crude Oil Pipeline Rupture Reference 37	Nov 2013	Qingdao, China	Unknown volume Crude	Crude spilled from a Sinopec pipeline, entered storm sewers, led to several explosions. 62 dead, 136 injured. Roads ripped up, cars overturned, widespread property damage. Oil spread to sea over 3000 square metres & contaminated sea, killed marine life. \$124 M in damages, not including compensation to victims and families
Trans Mountain Pipeline Rupture Reference 38 Figure 9	July 2007	Burnaby BC	234,000 litres Crude oil	Pipeline punctured by construction crew. Oil flowed into Burrard Inlet via storm sewer system. 250 residents evacuated; 1200 m of shoreline affected Oil reached Cates Park
Rayong Pipeline Spill	July 2013	Off Ko Samet and Map Ta	50,000-190,000	Pipeline burst while oil was being transferred

<p>Reference 39</p> <p>Figure 10</p>		<p>Phut Thailand</p>	<p>litres Crude oil</p>	<p>from an undersea well to a tanker.</p> <p>Two popular tourist beaches closed due to water toxicity. Spill spread 1 km along bay. Mercury levels found to be 29 times higher than allowed off Ao Phrao beach. Dispersant used. People reported dizziness & feeling unwell after swimming near Ko Samet.</p> <p>Metal contamination found in seafood at local fish markets</p>
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Figure 9: Oil covers Inlet Drive after the July 24, 2007 oil spill. (Photograph by: Gerry Kahrman, Province)
<http://www.sqwalk.com/q/kinder-morgan-ordered-pay-150000-burnaby-oil-spill>



Figure 10: About 500 clean-up crew swarm Ao Phrao of Koh Samet in Rayong province after the oil spill reached the tourist attraction.

<http://www.bangkokpost.com/lite/news/362094/favicon.ico>

Table 7: Tanker Incidents Where Vessels Sank

In addition to the Tasman Spirit that sank off Karachi Pakistan (Table 1), and the Aegean that sank off A Coruna, Spain (Table 2), here are some other examples of tankers sinking:

<p>The Haven Very Large Crude Carrier</p> <p>Reference 40</p> <p>Figure 12</p>	<p>Apr 1991</p>	<p>Genoa, Italy</p>	<p>144,000 tonnes Crude Oil</p>	<p>Tanker anchored off coast caught fire, exploded and broke into three parts that all sank. 5 crewmembers died.</p> <p>Oil slick 12,000m long and 4,000m wide drifted towards French Riviera. 110 km of coastline had to be cleaned.</p> <p>43% reduction in fish populations reported in some areas.</p>
<p>Prestige Oil tanker</p> <p>Reference 41</p>	<p>Nov 2002</p>	<p>Galicia, NW Spain</p>	<p>20 million US gallons Heavy Fuel oil</p>	<p>One of 12 cargo tanks burst during a storm. Ship split in half and sank. After sinking, wreck continued leaking 125 tonnes of oil/day polluting the seabed and contaminating the coastline. Offshore fishing</p>

Figure 11				was suspended for 6 months. Study done five years later showed that volunteers doing cleanup experienced several health problems including pulmonary, cardiovascular and chromosomal diseases.
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Figure 11: Prestige Oil Tanker Sinking off Spain, November 2002
<http://www.safety4sea.com/prestige-oil-spill-trial-has-started-in-spain-13630>



Figure 12: The “Haven” taken at actual moment of sinking www.scmncamogli.org

Table 8: Tanker Incidents Involving Fires and or Explosions:

In addition to the **Haven** incident reported in Table 7, and the **Aegean Sea** in Table 2, here are two Canadian examples of fires and explosions involving tankers

Petrolab Petroleum Tanker Reference 42	July 1997	St. Barbe Nfld Canada	n/a	Explosion and fire occurred on board tanker while crew was washing cargo oil tanks to prepare for loading. Two people killed, two injured. Government wharf destroyed.
Kometik Shuttle tanker 271 m Reference 43	April 2006	Conception Bay South, Nfld	n/a	Shuttle in ballast condition was at anchor. A welder and crew were performing repairs when an explosive vapour mixture was ignited in the cargo tanks. One crew member died; the welder was seriously injured

Table 9: Tanker Incidents with Pilot and/or Tug(s) Assisting:

The Port Metro Vancouver Second Narrows Movement Restriction Area Procedures (Ref 16) specify that oil tankers must be under conduct of a Pilot and assisted by up to three escort tugs or tethered tractor tugs while transiting PMV waters.

Despite these precautions, accidents can and do still occur even with a Pilot and/or Tug(s) assisting. For example, the **Cosco Busan** and **Overseas Reyamar** that struck the San Francisco-Oakland Bay bridge, and the Cape Apricot that struck the Roberts Bank Causeway were under the conduct of a pilot (Tables 2 and 3) as were the **Canada Senator** and **Shinwa Maru** (Table 5). Here are some other examples:

Pacific Dolphin Bulk Carrier 190 m Reference 44	Feb 1998	Port Moody BC	n/a	<i>Carrier under conduct of a BC Coast pilot and assisted by two tugs was moving from anchorage in Indian Arm to terminal in Port Moody. Tug and vessel both made contact with bottom as vessel attempted to round Admiralty Point</i>
Westwood Anette, Reference 45	Aug 2006	Squamish BC	50 tonnes Bunker fuel	Vessel backed out of berth, <i>under tow</i> in high winds and struck a fuel tank on a metal piling. Squamish Estuary marshes heavily contaminated.
Utviken Bulk Carrier Hamilton Energy and Provmar Terminal Tankers Reference 46	April 2001	Hamilton Ontario	Minor	Bulk carrier <i>with a pilot on board and a tug escort</i> struck the 2 tankers, Hamilton Energy, 59 m and Provmar Terminal, 122 m. Prior occurrence at same location, same 2 tankers struck when bulk carrier attempted to turn while berthing, assisted by 3 untethered tugs. Mechanical error, main engine failed to reverse. Speed of Utviken left no room for error or mechanical failure
Mandarin Arrow Bulk Carrier 200 m Reference 47	Aug 1999	Duncan BC	n/a	<i>Under conduct of BC coast pilot and with 2 tugboats assisting, vessel grounded 25 m from shore while approaching the wharf</i>
HMCS Winnipeg Canadian Forces Patrol Frigate 134 m	April 2013	Esquimalt BC	n/a	Fishing vessel American Dynasty, 83m, <i>under conduct of a docking pilot and assisted by 2 tugs</i> experienced a complete loss of electrical power and struck HMCS. Extensive damage to both vessels; minor injuries to 6 shipyard

Summary

This report attempts to demonstrate that accidents involving oil tankers and other large vessels can and still do happen in harbours similar to Port Metro Vancouver, despite improved technologies and other safeguards put in place. To date, fortunately, Vancouver has experienced only minor spill episodes.

In September 1973, two freighters collided in English Bay ripping a 3m hole in one of them and rupturing its fuel tanks. “The tide was “black with oil” when it came into Ambleside beach in West Vancouver. (49)

On July 4, 2006, the MV Andre, a bulk carrier anchored in Vancouver harbour, spilled 7,500 litres of fuel oil while bunkering. The vessel was assessed an \$80,000 penalty. (50)

In October 2014, the 135 m cargo ship Simushir, laden with hundreds of tonnes of bunker and diesel fuel, went adrift after losing power in gale force winds near the coast of Haida Gwaii, a pristine archipelago of islands and a marine sanctuary holding great cultural significance for the Haida Nation. (51)

The Canadian Coast Guard vessel Gordon Reid was able to reach the Simushir after 20 hours and secured a towline with great difficulty in the high winds and seas. It took almost two days for an ocean-going rescue tugboat, the Barbara Foss from Washington State (that by luck was in Prince Rupert, BC), to reach the Simushir. BC does not have a dedicated rescue tug stationed along the coast.

On April 9, 2015 the grain ship MV Marathassa spilled 2,800 litres of bunker fuel into English Bay. The response to this relatively small spill was far from encouraging: it took anywhere from 6-12 hours, depending on which report you credit, from the time the spill was reported until booms were secured around the vessel. (52, 53) The City of Vancouver was not notified that the spill had occurred for 12 hours.

Beaches were closed as globs of heavy bunker fuel washed up onto the shores of English Bay, Stanley Park and as far away as West Vancouver. Fishing was banned and sea birds were oiled. Much controversy continues

to surround the February 2013 closure of the Coast Guard base at nearby Kitsilano Beach. Fred Moxey, the former Kitsilano base commander, noted: *“..for the past two years, the pollution-response vessel that the Coast Guard used to deploy for spills in Vancouver’s harbour has been up on blocks. The 47-foot ship, named 701, was equipped with oil-recovery tanks, skimmers, a boom – everything that would have been needed to quickly slap a Band-Aid on the bunker fuel leaking from the cargo ship Marathassa in English Bay.*

“The crew was trained and the ship was ready around the clock for a first attack,” Captain Moxey said. “Had the base been open and the crew on duty, they would have been out into English Bay in a matter of minutes.” (54)

The harbourmaster in the nearby Port of Bellingham in Washington State stated that he *“..would immediately attempt to seal the leak on the vessel, call in response agencies and have a boom in place within the hour.”* (55)

In May 2015, the Federal Government closed the Vancouver Marine Communications and Traffic Services Centre MCTS and the Regional Marine Information Centre. Ship movements in Vancouver harbour are now coordinated from the Victoria MCTS, with no direct eyes on Vancouver harbour. As part of the federal government’s 2012 deficit reduction plan according to Allan Hughes, Regional Director for Unifor Local 2182 representing Coast Guard employees, *“Over the past three years, front-line (Coast Guard) staff in B.C. have been cut by 25% and there will no longer be a single Coast Guard employee in Canada’s biggest port.”*(54)



Figure 13: Oiled Bird after Marathassa Spill in English Bay

<http://marineoutlook.com/news/vancouver-oil-spill-clean-up-intensifies-in-english-bay-and-stanley-park/>

The Marathassa spill was minuscule in comparison to a potential spill from an Aframax tanker loaded with up to 120,000 tonnes of diluted bitumen.

A May 2015 report by Genwest Systems in Edmonds, Washington, (60) modeled oil spill trajectories for 4 potential spill volumes deemed reasonable worst -case scenarios:

“We modeled oil spill trajectories from four oil spill scenarios in Burrard Inlet: (i) an oil spill of 8,000 m³ at the Terminal; (ii) an oil spill of 16,000 m³ at Second Narrows under the Canadian National Railway Bridge; (iii) an oil spill of 16,000 m³ at First Narrows; and (iv) an oil spill of 16,000 m³ in the Outer Harbour at Anchorage #8. In another expert report prepared for Tsleil-Waututh Nation and the City of Vancouver, Nuka Research determined that the above-noted spill volumes represent reasonable worst case scenarios for oil spills at the four sites.”

In the Executive Summary, the authors conclude, in part, that:

“Based on the four scenarios evaluated in this report, we conclude that:

(a) Oil spreads quickly in the confined geophysical setting in Burrard Inlet. The combined results of all the scenarios demonstrate that oil has the potential to spread throughout Burrard Inlet, from the Indian and Port Moody Arms to the Outer Harbour and beyond.”

In section 1.4 of the report entitled Use of the Burrard Inlet Models and the Regional Model to Model Oil Spill Trajectory in Burrard Inlet they conclude:

“Our stochastic modeling also shows that: (i) a significant portion of Burrard Inlet is potentially threatened by oil spills at the Terminal, Second Narrows, and First Narrows (we did not use the stochastic modeling approach at the Outer Harbour site); (ii) a substantial amount of oil was beached; and (iii) the highest probability regions for floating oil disappear relatively quickly (because most of the oil is at least temporarily on beaches) but that oil in areas subject to lower, but still significant, percentages of the spill tends to spread covering many tens of square kilometers.”

As noted in the introduction, Port Metro Vancouver prides itself on being “...recognized internationally as a beautiful and clean port, home to hundreds of species of fish, birds and marine mammals and more than 2.3 million people in the surrounding metropolitan area.” (2)

It is the opinion of North Shore NOPE’s members that the proposed Trans Mountain Expansion Project, and the resulting increase to 408 Aframax oil tankers per year travelling through Port Metro Vancouver waters, poses an unacceptable risk to the health of our citizens and the marine environment.

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