Doubling Down on Disaster

Transporting tar sands bitumen threatens Lac Saint-Pierre and the St. Lawrence River

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Preface

Although we must recognize from the start that oil is essential for the operation of our high energy consuming economies, and that the situation is not going to change in any way in the short term, the transporting and storing of crude oil and its refined products create thorny environmental problems. The environmental consequences on both the land and the water associated with tanker accidents are usually catastrophic for the directly affected ecosystems. Cleanup and remediation efforts are always very expensive and often ineffective.

Above all, prevention along with a good dose of coercion must be used to guide our public decision-makers and petroleum industry managers to minimize the environmental risks associated with the exploitation and use of oil in all its forms. Several of them say they are well aware of the problems, but hesitate to act for often purely economic reasons. Therefore, it is up to all the rest of us, workers, poets and scientists, to mobilize and influence our elected officials and intellectual elite to guarantee that our water and land ecosystems are protected. The risks involved in tanker transport on the St. Lawrence River and, in particular, on Lac Saint-Pierre, make that abundantly clear.

The risks related to transporting oil on the St. Lawrence River, and in particular on Lac Saint-Pierre, illustrate this idea well. The Basic Oil Spill Costs-Estimation Model (BOSCEM) used in this report is a promising tool that allows us to establish a tangible link between the given quantity of petroleum spilled and its economic consequences. In taking into account the numerous environmental and socioeconomic factors, this model allows ecological groups and the general public to better estimate the magnitude of a petroleum accident on a given site.

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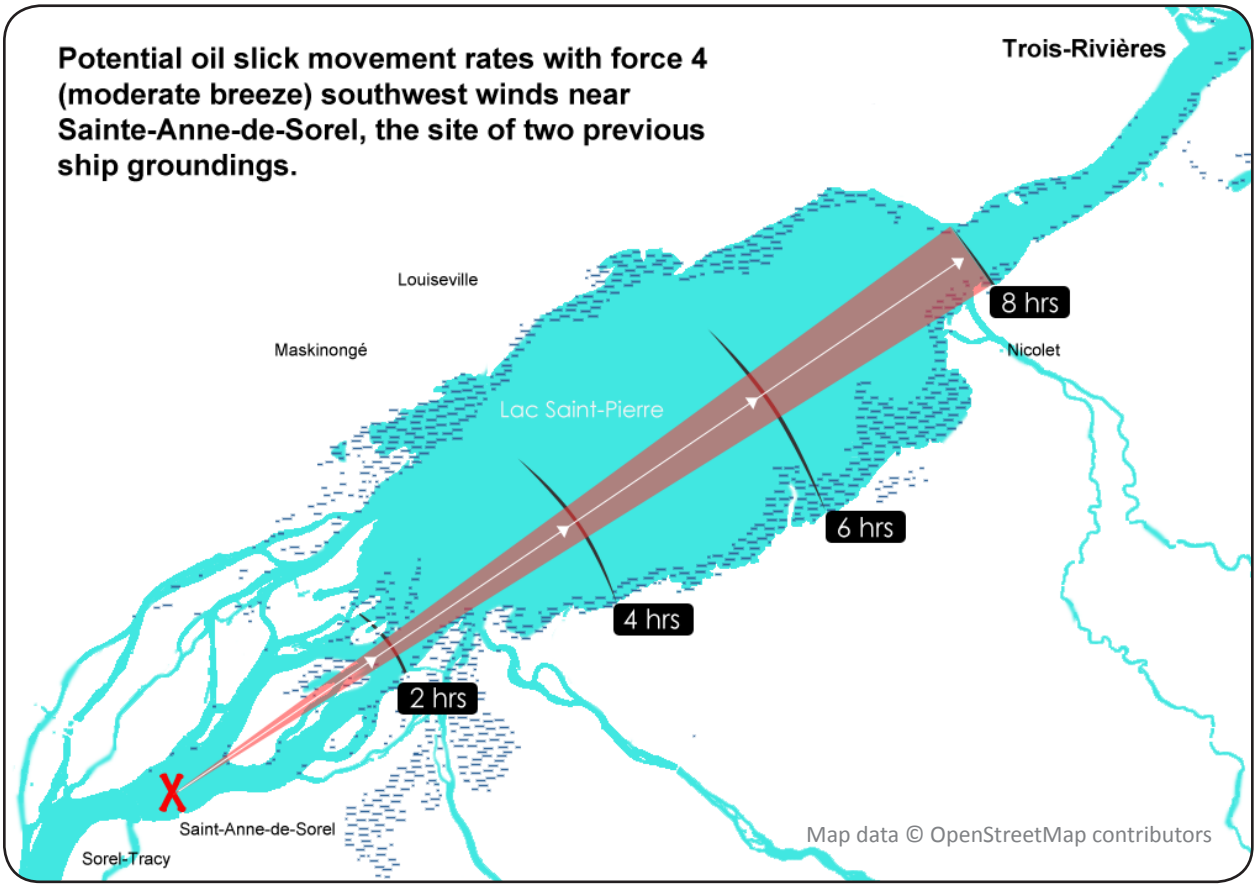
Photo by Normand Gariépy

Lac Saint-Pierre (Lake Saint Pierre): a UNESCO Biosphere Reserve

- Lac-Saint-Pierre is a lake in Quebec created by a widening of the St. Lawrence River between Sorel-Tracy and Trois-Rivières.
- Ninety per cent of the territory is in its natural state.
- It is the most important archipelago of 103 islands on the St. Lawrence River.
- It holds 20 per cent of all the marshes of the St. Lawrence River.
- It holds 50 per cent of the wetlands of the St. Lawrence River.
- There are 27 species of rare plants.
- There are 79 species of fish, two of which are endangered.
- It is a migratory resting place for 288 water-fowl species, 116 of them are nesting and 12 are endangered.
- It is the first migratory staging point for the snow goose.
- It is the largest heron nesting ground in North America.
- It is a RAMSAR Convention site on List of Wetlands of International Importance.

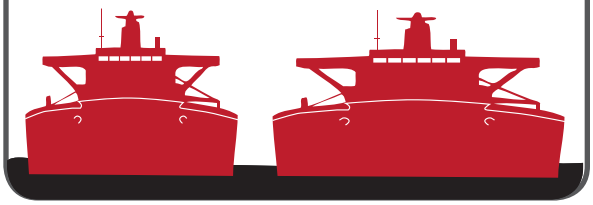
Photo by Normand Gariépy



Reckless expansion

There is a growing danger of a catastrophic marine oil spill in the St. Lawrence River with bigger supertankers taking more trips, carrying larger and more dangerous cargos than ever before. Emergency spill response capabilities are vastly under resourced for large spills and cannot recover oil when ice is present, which occurs usually three to four months of the year on the St. Lawrence River.

Maximum cargo capacity of tankers on the St. Lawrence River doubled in December 2013 when regulation changes increased the allowable breadth of ships from 32 to 44 metres.

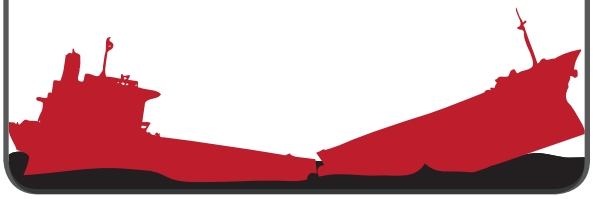


In this report, an oil spill model is used to estimate the possible costs and damages of a supertanker spill in Lac Saint-Pierre. The data used for the estimate included a 10 million litre heavy oil spill in wetlands with very high social, economic and cultural value (UNESCO World Biosphere Reserve) and sources of drinking water. The model found that a spill of this nature, even though it would be less than 10 per cent of a typical supertanker cargo, could result in costs and damages of over $2 billion – greatly exceeding the $1.4 billion liability limit under Canadian law. (See the Appendix for full calculations.)

In September 2014, Suncor Energy sent the largest oil supertanker ever to sail on the St. Lawrence River from the Port of Sorel-Tracy through Lac Saint-Pierre and on to Sardinia, Italy. The supertanker, known as the Minerva-Gloria, was 249 metres long and 44 metres wide. It was the first tanker to transport bitumen in the Great Lakes-St. Lawrence River Basin, carrying an estimated 110 million litres of diluted bitumen from the Alberta tar sands. A second supertanker, the Genmar Daphne, transported 120 million litres of diluted bitumen to the Gulf of Mexico one month later. Suncor has announced plans for up to 30 similar shipments every year. These unprecedented shipments pose an extraordinary risk to the entire St. Lawrence watershed, but especially to Lac Saint-Pierre, home to a UNESCO Biosphere Reserve and a critical habitat for migratory birds like the snow goose.

TransCanada Corporation's Energy East pipeline proposal is expected to export more than 150 million litres of unrefined crude per day from ports on the St. Lawrence and the Bay of Fundy. This could add another 200-300 supertankers to the St. Lawrence's shipping lane. A recent report produced by the Eastern Canada Response Corporation (ECRC), the company charged with cleaning up oil spills in the river, estimated that a spill of 20,000 tonnes from a supertanker near Cacouna could travel 50 to 90 kilometres downstream within five days and coat the entire southern shore of the river along the way.

On September 26, 2005, the petroleum tanker Hyde Park collided with the container vessel Cast Prosperity in the dredged channel in Lac Saint-Pierre. The Hyde Park sustained substantial damage to its port side next to the superstructure and three cargo tanks. Although no tanks were reported breached, the smell of gasoline could be detected on deck. The Cast Prosperity sustained damage to almost the entire length of the starboard side, including a hole measuring 1.5 by 6 metres. The deck plating and web frames buckled in several spots.[i]



Diluted bitumen

Both Suncor and TransCanada plan to ship diluted bitumen on the St. Lawrence River. Calumet Specialty Products also plans to ship diluted bitumen through the Great Lakes. Diluted bitumen is created by diluting thick bitumen from the tar sands with various toxic and explosive chemicals to make it thin enough to transport. In July 2010, an Enbridge pipeline ruptured in Michigan, spilling 3.2 million litres of diluted bitumen into the Kalamazoo River.[ii]

Unlike conventional crude, which floats on water, much of the diluted bitumen sank to the bottom, making cleanup efforts far more difficult. Four years and $1.2 billion later, approximately 20 per cent of the diluted bitumen still remains at the bottom of the river.

On November 28, 2012, the bulk carrier Tundra ran aground just outside of the shipping channel near Sainte-Anne-de-Sorel at the southwestern end of Lac Saint-Pierre. The vessel was refloated on December 5, 2012. The pilot had twice previously been convicted of driving an automobile under the influence of alcohol. In 2004, the same pilot ran the container ship Horizon aground in the same location.[iii]

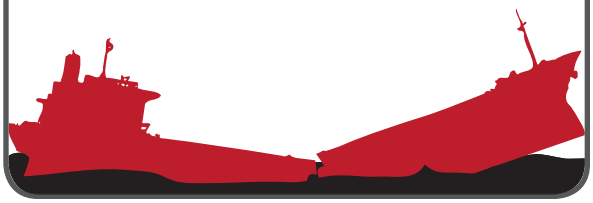
Inadequate Spill Response Capacity

Emergency oil spill response capabilities in Eastern Canada are vastly under-resourced for all but the smallest of spills. Under the *Canada Shipping Act*, anyone moving large quantities of petroleum products must have an "arrangement" with a certified Response Organization to provide marine oil spill response services in designated shipping regions. The ECRC is the only certified Response Organization for the St. Lawrence River. The ECRC is a private company, owned by Imperial Oil, Ultramar, Shell, and Suncor.

The ECRC has only 13 employees in their three Quebec "response centres" at Sept-Îles, Quebec City, and Verchères. The company operates on an annual budget of just $7 million.[iv] The ECRC would be the primary responder to any marine-based oil spill, drawing on support from other response organizations and previously trained local contractors.

The size of the spill modeled for this report is limited to 10 million litres, which is the maximum spill response capacity required by law in Canada. This is less than 10 per cent of the typical Aframax-class supertanker load of 120 million litres.

On July 24, 2004, the loaded container vessel Horizon ran aground off Saint-Anne-de-Sorel at the southwestern end of Lac Saint-Pierre. The vessel failed to alter course at the appropriate time and grounded along its entire length.[v]



Spill response time is a critical factor in limiting the extent of a marine oil spill. Certified response organizations are required to be able to respond to certain sized spills within set time frames. While the largest spill size considered for certification is 10,000 tonnes (approximately 10 million litres), full response capacity is not required of a single Response Organization for this size spill. Capacity can be "cascaded in" from other Response Organizations through mutual aid agreements. The ECRC has agreements with two smaller Response Organizations: ALERT (based in Halifax, Nova Scotia) and PTMS (based in Port Tupper, Nova Scotia). Regulations allow Response Organizations 72 hours to get the needed equipment on site. In its Energy East report, the ECRC estimates its operations at the scene of the spill would not commence until 12 hours after the accident.

Regulations only require equipment to be capable of working in winds up to Beaufort force 4, classified as a "moderate breeze" of 20-30 kilometres an hour.

Lac Saint-Pierre is a popular sailing and kite surfing location that averages 10 days per month of winds in excess of Beaufort force 4.[vi] The prevailing wind direction is from the southwest, blowing in the direction of the river's flow. The current in Lac Saint-Pierre varies from 1-2 knots.[vii] Oil slicks move with currents and their direction and speed are also affected by wind speed at a rate of about three per cent. Therefore, an oil slick could be expected to move downstream on Lac Saint-Pierre at a rate of four kilometres per hour, traversing the entire 32-kilometre lake in as little as eight hours.

Conclusion

Current oil spill response capacity is not sufficient for the approximately 300 shipments of conventional crude oil currently delivered on the St. Lawrence River every year. The ECRC admits it is not able to effectively contain or cleanup spills when there is ice in the river.[viii] Proposed export shipments from Energy East and Suncor could double the number of shipments and double the size of the shipments on the St. Lawrence. The predominant cargo is expected to be diluted bitumen, a product that is exceedingly difficult – if not impossible – to clean up when spilled. Lac Saint-Pierre, and the nearby stretches of the St. Lawrence River, have already seen many collisions and groundings of large vessels. While the chances of an oil spill happening are small, the consequences are so extreme that steps must be taken to reduce the likelihood and impact of an eventual spill.

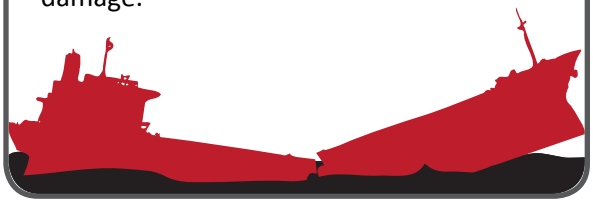
Recommendations

The federal government should immediately make legislative changes to remove liability limits for oil spills in Canadian waters. In its 2013 report, *A Review of Canada's Ship-Source Oil Spill Preparedness and Response Regime*, the Tanker Safety Expert Panel stressed that taxpayers should not bear any of the costs for oil spills in Canadian waters. One of the panel's recommendations was to abolish "the current limit of liability per incident with the Ship-source Oil Pollution Fund." In keeping with the polluter pays principle, the shipper (in this case Suncor and/or TransCanada) should share full liability for the cost of any spill with the shipping company.

Given the high environmental price of a spill, shipments of diluted bitumen should not be permitted on the St. Lawrence River.

Emergency equipment such as spill containment booms should be permanently kept near ecologically sensitive areas, ready to be immediately deployed. This strategy is already used to protect sensitive areas in the Port of Vancouver. Both the 2010 *Report of the Commissioner of the Environment and Sustainable Development on Oil Spills from Ships* and the Tanker Safety Expert Panel pointed to the gap in information on risks of ship-source oil spills. Sufficient emergency equipment, personnel and training should be available based on up-to-date risk assessments, including for worst-case spill scenarios.

On April 12, 1995, the bulk carrier Ziemia Zamojska collided with the cargo ship Cicéro in Lac Saint-Pierre when the Ziemia Zamojska strayed beyond the heading ordered by the pilot. Both vessels sustained damage.[ix]



Restrictions on vessel breadth should be reinstated in order to limit the likelihood and consequences of eventual accidents.

Appendix

Accuracy of the Basic Oil Spill Cost Estimation Model (BOSCEM)

The model used for this report was created based on a data set that included 42,860 spills of at least 50 gallons that occurred during the years 1980 through 2002 in the United States and is specific to freshwater oil spills. Its relative accuracy is shown through comparison with known per litre costs from the 2010 Kalamazoo spill and the 1988 Exxon Valdez disaster.[1]

Using the BOSCEM, if there was an accident in Lac Saint-Pierre rupturing only one of the Genmar Daphne's three storage tanks and spilling 10 million litres, or just nine per cent of the total shipment, the total cleanup, socioeconomic, and environmental cost would be $2.14 billion. The calculated cost per litre of such a spill is lower than the known cost per litre of the Enbridge pipeline spill in Kalamazoo, Michigan. This discrepancy is, in part, predicted by the BOSCEM, which stipulates higher per litre cleanup costs for smaller spills. Similarly, the BOSCEM predicts a lower cost per litre for larger spills, such as the 35 million litre Exxon Valdez spill.

	Spill size in litres	Costs	Cost per litre
Enbridge - Kalamazoo River	3.2 million	$1.35 billion	$422
Exxon Valdez	35 million	$3.8 billion	$109
BOSCEM model - Lac Saint-Pierre	10 million	$2.14 billion	$214

Description of BOSCEM

"[The] Basic Oil Spill Cost Estimation Model (BOSCEM) was developed to provide [...] a methodology for estimating oil spill costs, including response costs and environmental and socioeconomic damages, for actual or hypothetical spills. The model can quantify *relative* damage and cost for different spill types for regulatory impact evaluation, contingency planning, and assessing the value of spill prevention and reduction measures. [The] BOSCEM incorporates spill-specific factors that influence costs – spill amount, oil type, response methodology and effectiveness, impacted medium, location-specific socioeconomic value, freshwater vulnerability, habitat/wildlife sensitivity, and location type. Including these spill-specific factors to develop cost estimates provides greater accuracy in estimating oil spill costs than universal per-gallon figures used elsewhere. The model's basic structure allows for specification of response methodologies, including dispersants and *in situ* burning, which may have future applications in freshwater and inland settings. Response effectiveness can also be specified, allowing for analysis of potential benefits of response improvements."[x]

1 Direct cost comparisons between a spill in Lac Saint-Pierre and the Exxon Valdez disaster are limited because of differences in oil type and in marine location (coastal salt water versus inland freshwater). However, as the second largest marine oil spill in U.S. history, the Exxon Valdez spill provides a familiar reference point to illustrate the potential financial and environmental consequences of a major marine oil spill.

Steps in modeling process

The following steps are drawn from the BOSCEM and correspond to the chart on page 8 of this report. Tables referred to in parentheses below can be found in the document, *Modeling Oil Spill Response and Damage Costs.*[xi]

1. Specify amount of oil spilled (in gallons): 2,641,720 (10,000,000 litres)
2. Specify basic oil type category (as in Tables 1 – 3): Heavy Oil
3. Specify primary response methodology and effectiveness (as in Table 1): Mechanical 0% remaining (1.15 x modifying factor)
4. Specify medium type of spill location (as in Table 4): Wetland (1.6 x)
5. Specify socioeconomic and cultural value of spill location (as in Table 5): Very High - UNESCO Biosphere Reserve (1.7 x)
6. Specify freshwater vulnerability category of spill location (as in Table 7): Drinking Water (1.6 x)
7. Specify habitat and wildlife sensitivity category of spill location (as in Table 8): Wetland/Lake (3.9 x)

Total spill cost = spill response cost + socioeconomic cost + environmental cost

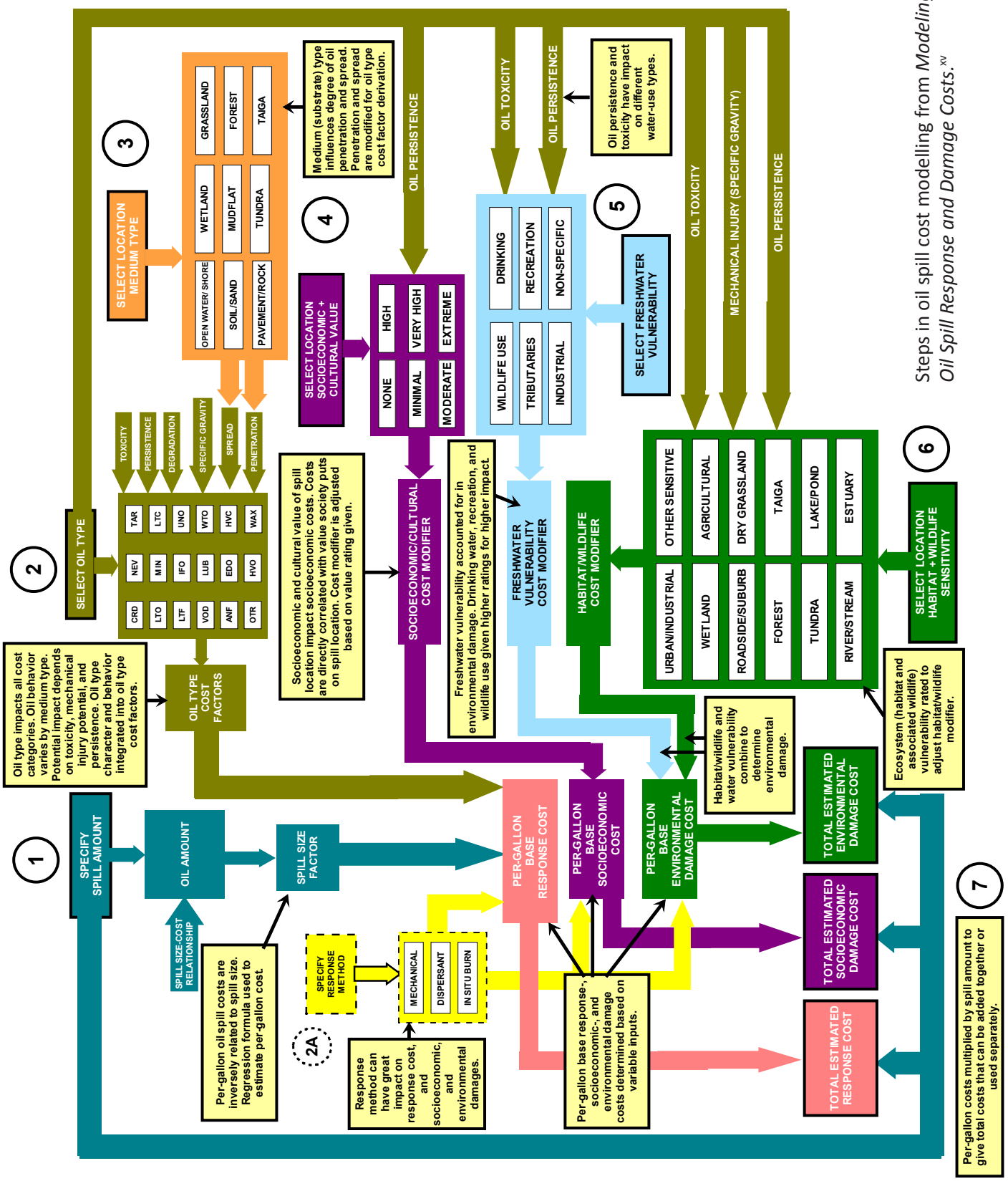
Spill response cost	**Socioeconomic cost**	**Environmental cost**
The per-gallon response cost ($87*) X medium modifier (1.6) X spill amount (2,641,720 gallons)	The per-gallon socioeconomic cost ($175*) X socioeconomic cost modifier (1.7) X spill amount (2,641,720 gallons)	The per-gallon environmental cost ($35*) X 0.5 (freshwater modifier (1.6) + wildlife modifier (3.8)) X spill amount (2,641,720 gallons)
Total response cost $367,727,500	**Total socioeconomic damage cost** $785,912,000	**Total environmental damage cost** $254,265,600

Response cost	$367,727,500
Socio-economic cost	$785,912,000
Environmental cost	$254,265,600
Total spill cost	$1,407,905,000
Adjusted to 2014 USD**	$1,848,579,265
Converted to CAD* **	**$2,144,536,805 or $214/litre**

* Per-gallon response, socioeconomic and environmental costs are based on model values set in 2002.[xii]

** Adjusted for inflation of 31.3% based on statistics from the US Dept. of Labor.[xiii]

*** Based on the closing exchange rate from Dec. 31, 2014 of 1 USD = 1.1601 CAD.[xiv]



Steps in oil spill cost modelling from *Modeling Oil Spill Response and Damage Costs.*[xv]

Endnotes

i. "Marine Investigation Report M05L0205." Government of Canada, Transportation Safety Board of Canada. Web. 13 Jan. 2015. <http://www.tsb.gc.ca/eng/rapports-reports/marine/2005/m05l0205/m05l0205.asp>.

ii. "EPA Response to Enbridge Spill in Michigan." EPA. Environmental Protection Agency, n.d. Web. Dec. 17, 2014.

iii. "Marine Investigation Report M12L0147." Government of Canada, Transportation Safety Board of Canada. Web. 13 Jan. 2015. <http://www.tsb.gc.ca/eng/rapports-reports/marine/2012/m12l0147/m12l0147.asp>.

iv. "EPA Response to Enbridge Spill in Michigan." EPA. Environmental Protection Agency, n.d. Web. Dec. 17, 2014.

v. "Marine Investigation Report M04L0092." Government of Canada, Transportation Safety Board of Canada. Web. 13 Jan. 2015. <http://www.tsb.gc.ca/eng/rapports-reports/marine/2004/m04l0092/m04l0092.asp>.

vi. "Lac St-Pierre | Wind, Weather & Forecast." IKitesurf. Web. 18 Dec. 2014. <http://wx.ikitesurf.com/spot/1603?&activity=Kite&units_wind=mph&name=See this Station on new iKitesurf&utm_medium=widget&utm_source=ikitesurf.com&utm_campaign=widgetWindStats>.

vii. "Information - Tides, Currents, and Water Levels." Government of Canada, Fisheries and Oceans Canada, Science. N.p., n.d. Web.Dec. 18, 2014.

viii. Shields, Alexandre. "Scénarios Du Pire." Le Devoir, 29 Nov. 2014. Web. 13 Jan. 2015. <http://www.ledevoir.com/environnement/actualites-sur-l-environnement/425362/projet-energie-est-scenarios-du-pire>.

ix. "Marine Investigation Report M95L0008." Government of Canada, Transportation Safety Board of Canada. Web. 13 Jan. 2015. <http://www.tsb.gc.ca/eng/rapports-reports/marine/1995/m95l0008/m95l0008.asp>.

x. Etkin, Dagmar. "Modeling Oil Spill Response and Damage Costs." Environmental Research Consulting, 2004. Web. 21 Jan. 2015. <http://www.environmental-research.com/erc_papers/ERC_paper_6.pdf>.

xi. Etkin, Dagmar. "Modeling Oil Spill Response and Damage Costs." Environmental Research Consulting, 2004. Web. 21 Jan. 2015. <http://www.environmental-research.com/erc_papers/ERC_paper_6.pdf>.

xii. Etkin, Dagmar. "Modeling Oil Spill Response and Damage Costs." Environmental Research Consulting, 2004. Web. 21 Jan. 2015. <http://www.environmental-research.com/erc_papers/ERC_paper_6.pdf>.

xiii. "CPI Inflation Calculator." US Department of Labour. Web. 8 Jan. 2015. <http://www.bls.gov/data/inflation_calculator.htm>.

xiv. "Daily Noon Exchange Rates: 10-Year Lookup" Bank of Canada. Web. 8 Jan. 2015. <http://www.bankofcanada.ca/rates/exchange/10-year-lookup/>.

xv. Etkin, Dagmar. "Modeling Oil Spill Response and Damage Costs." Environmental Research Consulting, 2004. Web. 21 Jan. 2015. <http://www.environmental-research.com/erc_papers/ERC_paper_6.pdf>.

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