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As a result, there has been increased public scrutiny of the safety of the marine oil transportation components of these projects. Here are the facts on marine transport of oil in Canadian waters.

MOVING OIL BY TANKER IN CANADA: THE FACTS

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Evidence over ideology.

MOVING OIL BY TANKER IN CANADA: THE FACTS

by Robert Lyman

"According to the International Energy Agency, in 2015 oil provided the largest single share (36.1%) of the primary energy supply of the developed countries that comprise the OECD. Yet, the ten largest and fastest growing oil importers were in Asia and Europe. Increasingly, North American oil producers must find a way to deliver their production to the growing markets." ¹

Recently, there have been three high-profile proposals for the construction of pipelines to transport crude oil from western Canada to east and west coasts for tanker shipment to foreign markets. These include the Northern Gateway Project to the port of Kitimat, British Columbia, the Trans Mountain Expansion Project in the lower British Columbia mainland, and the Energy East Project from Alberta to Nova Scotia. As a result, there has been increased public scrutiny of the safety of the marine oil transportation components of these projects. The projects' opponents claim that increased oil tanker movement will lead to unacceptably high risks of oil spills that will have major environmental effects.

This paper has three purposes:

- To review the experience of the maritime industry in moving oil by tankers;
- To describe the current government and industry systems in place in Canada to prevent spills from tankers, to minimize their effects if they occur, and to assign responsibility for liability and compensation; and
- To summarize the results of recent studies that assessed the risks associated with oil tanker movement in Canada, including those specifically related to the Northern Gateway and Trans Mountain Expansion projects in British Columbia.

Oil Movement by Tanker – the Current Situation

In 2014, world oil production was around 91 million barrels per day. Tankers, moving on fixed maritime routes, move over half of this production. The global fleet of oil tankers now numbers about 3,500. Though these vessels are of widely varying size and quality, the consistent trend throughout the 130-year history of the

¹ <https://www.iea.org/publications/freepublications/publication/KeyWorld2016.pdf>

business has been the movement towards larger and larger vessels for long-distance transport, although smaller vessels are often used in regional and coastal trade.

The tanker is the most cost-effective way to move oil. The cost of transportation by tanker from the Middle East to Canada's east coast amounts to only half a cent per litre at the pump.

Frequency of Tanker Spills

The International Tanker Owners Pollution Federation (ITOPF) maintains a database of oil spills from tankers, combined carriers and barges worldwide. The data held includes the type of oil spilt, the spill amount, the cause and the location of the incident and the vessel involved. The most recent ITOPF annual report can be found here:

<http://www.itopf.com/knowledge-resources/data-statistics/statistics/>

The incidence of large oil spills (defined as those over 700 tonnes) from tankers is extremely low. Further, the number of spills has been decreasing sharply over the past five decades. In the decade of the 1970's, there were 245 spills, an average of 24.5 per year; in the 1980's, there were 94 spills, or 9.4 per year; in the 1990's, there were 77 spills, or 7.7 per year; in the 2000 decade, there were 35 spills, or 3.5 per year; there were eight large spills in the four-year period 2010 to 2013 inclusive, or an average of two per year. The number of smaller spills (from 7 to 700 tonnes) similarly has declined from 543 in the 1970's to 147 in the 2000 decade and 20 in the 2010 to 2013 period.

The quantities of oil spilled have declined far faster. In the 1970's, 3.2 million tonnes of oil were spilled. That figure dropped to 1.2 million tonnes in the 1980's, 1.1 million tonnes in the 1990's, 0.2 million tonnes in the 2000 decade, and only 22,000 tonnes in the 2010-2013 period. In other words, the volume of oil spilled annually in the current decade represents about one one-thousandth of the annual volume spilled in the 1970's.

This has occurred at a time of fluctuating volumes of oil being transported by marine carriers. The volume of oil transported by tanker rose rapidly during the

1970's to a peak of almost 12 trillion tonne-miles, according to Lloyds of London. The volumes moved by tanker then declined to a low of about 6 trillion tonne-miles in 1985, before gradually and steadily increasing back to about 11 trillion tonne-miles today.

Each year, 80 million tonnes of oil are shipped off Canada's east and west coasts. On any given day, there are 180 vessels over 500 tonnes operating within Canada's Exclusive Economic Zone (up to 200 nautical miles from shore). Transport Canada estimates that there are approximately 20,000 oil tanker movements off the coast of Canada each year. Of these, approximately 17,000 (85%) are on the east coast.

Major oil spills from tankers or other vessels are very rare in Canada. In August 2013, the Senate Committee on Energy, the Environment and Natural Resources reported on a study that it did concerning the safe transportation of hydrocarbons by all transport modes. The report can be seen here:

<http://www.parl.gc.ca/Content/SEN/Committee/411/enev/rep/rep12aug13-e.pdf>

The Senate Committee report included a list of the major oil spills in Canada since 1970. Here is a list:

<u>Year</u>	<u>Ship</u>	<u>Location</u>	<u>Spill Size in Tonnes</u>
1970	Arrow	Nova Scotia	10,000
1974	Golden Robin	Quebec	400
1979	Kurdistan	Nova Scotia	8,000
1988	Nestucca	British Columbia	1,000
2006	Queen of the North	British Columbia	240

It is notable that the largest spill over this period was 10,000 tonnes and that it occurred 46 years ago.

Government and Industry Systems in Place to Prevent Spills

The Legal Framework

Governments at both the international and national levels strictly regulate oil tanker movement. The International Maritime Organization (IMO) is the agency of the United Nations that provides the international forum for the development of internationally agreed standards for safety, security and environmental performance of international shipping. Canada is one of 171 countries that are members of the IMO. When an agreement has been reached, it is embodied in a convention. After they have ratified the convention, member countries must then create regulatory frameworks for the shipping industry consistent with the convention. This is done through legislation such as the *Canada Shipping Act, 2001*. Canadian maritime laws apply to all vessels operating in Canadian waters ("Canadian waters" is a term used to refer to the Territorial Sea, the belt of water from the maritime baseline out to 12 nautical miles) and to Canadian vessels worldwide.

The International Maritime Organization has enacted tougher and tougher standards for vessel construction. Well over half the tankers in the world are double-hulled and the percentage increases every year. Within North America, the use of single-hulled oil tankers was phased out entirely in 2015.

Some of the major IMO conventions include the following:

- The *International Convention for the Safety of Life at Sea (SOLAS)* sets out how a vessel is constructed, its required safety equipment and its required security precautions.
- The *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW)* sets out the competencies of a vessel's crew.
- The *International Convention for the Prevention of Pollution from Ships (MARPOL)* sets limits on a vessel's operational discharges and sets detailed technical standards.

- The *International Convention on Oil Pollution Preparedness, Response and Cooperation* (OPRC) provides a framework for measures for dealing with pollution incidents, either nationally or in cooperation with other countries.

In addition, the 1982 *United Nations Convention on the Law of the Sea* (UNCLOS) provides a global framework for the oceans to protect the marine environment, delimit ocean boundaries, and establish navigation rights and responsibilities.

Within Canada, the *Constitution Act, 1867*, grants the federal government exclusive jurisdiction over navigation and shipping, coastal fisheries and aids to navigation such as beacons, buoys and lighthouses.

The *Canada Shipping Act, 2001* (CSA 2001), and associated regulations, is the principal statute that governs safety in marine transportation and protects the marine environment. The CSA 2001 and its regulations provide the authority to investigate and prosecute pollution incidents, including ship-source oil spills. Transport Canada has developed the Compliance and Enforcement Policy to monitor compliance within the marine community with respect to the requirements of the CSA 2001 and its regulations. The Act provides, among other things, the enabling authority (Transport Canada) to make regulations designating violations and fixing penalties. It authorizes enforcement action such as suspension, cancellation or refusal to renew Canadian maritime documents. It confers powers of inspection on authorized persons or organizations. It provides powers of search and seizure, powers to detain and/or direct vessels, as well as to enter into an assurance of compliance and to issue a notice of violation. For most offences, Transport Canada has a choice of administrative penalties or prosecution. It is authorized to gradually escalate the severity of enforcement responses. Under section 189, the Act authorizes the Minister of Transport, if he or she believes that a vessel may discharge a pollutant, to direct the vessel to follow a specific route, to proceed to a specific place, to unload the pollutant, or to remain in place for as long as necessary.

All oil tankers, gas carriers and other large cargo vessels must comply with an International Safety Management (ISM) Code. This is a requirement outlined in the *Safety Management Regulations* under the *Canada Shipping Act, 2001*. This means that ships must develop a safety management system that prevents and responds to spills and other emergencies. The system requires regular internal audits and safety management reviews, and it is subject to Transport Canada inspection.

Safety in marine transportation is protected through a multi-layered system involving many components such as the ship, equipment, crew, ship management and operations, inspections and enforcement, marine communications and services, tugs, local pilotage programs and icebreaking services. There are also safety systems including response equipment and personnel at both load and discharge ports.

The authorities granted to Ministers under the CSA, 2001 overlap with some Acts administered by Environment Canada, including the *Canadian Environmental Protection Act, 1999* (CEPA), the *Migratory Birds Convention Act* and section 36(3) of the *Fisheries Act*.

In addition to the CSA, 2001, there are many other Acts of Parliament that provide authorities relating to emergency preparedness, marine safety and security, and environmental protection that affect the ship-source spill system. Notably, the *Emergency Management Act* administered by Public Safety Canada requires that all federal ministers prepare, maintain and test plans to prevent, prepare for, respond to and recover from emergency incidents. This department also provides guidance on emergency planning and attempts to coordinate a government-wide approach in major emergencies.

Spills from ships that occur outside Canadian waters are subject to the provisions of international agreements, which define the roles and responsibilities of vessel owners and operators and of the countries under whose flags the vessel sail. Most of the ships that come to Canada from other parts of the world sail under the flags of other countries, and those countries, subject to international law and agreements, are responsible to govern the precautions that such ships should take to avoid spills. Canada has certain rights, however, as the “port state” to ensure that vessels operate properly. If a spill occurs outside of Canadian waters but the pollutants enter Canadian waters, the federal government has the responsibility to take action. Similarly, if a spill occurs on land within the jurisdiction of a Canadian province, the province has the jurisdictional authority and first responsibility to deal with it.

Canada has in place a multi-part National Oil Spill Preparedness and Response Regime based on three pillars: preventing spills from happening; preparing for and responding to spills quickly and effectively; and ensuring that the polluter pays for

any damage caused. The Regime ensures that Canada is prepared to respond to a marine oil spill of up to 10,000 tonnes.

This regime also includes mandatory pilotage zones and escort tugs. Tankers are not permitted to move through Canadian harbours or designated waterways without a professional pilot (in some cases two pilots are required) who has extensive knowledge of the local navigation route, including currents, subsurface features and marine infrastructure. Local pilots board tankers to guide them to their destinations safely. In addition, loaded tankers must be escorted by tugs through designated Canadian waters. The number of tugs required depends on specific circumstances and the requirements of a regional or local port authority.

How the Regime Works in Practice

The Government of Canada is well prepared for and ready to respond to marine accidents from ships in Canadian waters. Ship-source oil spill prevention, preparedness, response and recovery are undertaken in a collaborative “whole-of-government” approach. Key federal departments work with private industry, as well as provincial and municipal governments, to ensure an incident is responded to in a coordinated manner.

This regime involves cooperative actions by several different organizations in accordance with their legal responsibilities and their capabilities to help. The system is based upon shared responsibility between the ship owners and operators on the one hand and government organizations on the other. In the first instance, the operator of any ship that causes a spill is responsible to take immediate action to begin containing it and cleaning it up, as well as to notify the Canadian Coast Guard that a spill has occurred. Ship owners and operators must, by law, have an arrangement (i.e. a contract) with a private Response Organization that has the equipment and staff qualified to contain and clean up a spill. The most important of the Canadian federal government organizations involved are Transport Canada, the Canadian Coast Guard, Canadian Port Authorities, and Environment Canada, although other federal departments and agencies often play important support roles. The fact that there are many organizations involved sometimes leads to the criticism that the system is difficult to understand; in fact, it reflects the fact that many different sources of expertise are needed to deal with sometimes complex and rapidly-evolving situations following a spill.

Roles and responsibilities are clearly defined:

- The polluter is first and foremost responsible to avoid spills, to take action when they occur, and to pay for the costs of cleanup;
- Transport Canada is responsible for preparedness, including establishing requirements with which ship owners and Response Organizations must comply;
- The Canadian Coast Guard is the operational arm of the Canadian government responsible for ensuring an appropriate response to ship-source or mystery-source pollution incidents in Canadian waters. It monitors the polluter's response and will assist if asked, but also stands ready to step in and manage the response itself if it considers that the polluter is unable or unwilling to respond properly.
- The *Canada Marine Act* sets out federal ports' authorities to maintain safe navigation and environmental protection within port boundaries, including directing and controlling vessel traffic.

The current system depends partly on cooperation among the different organizations and individuals involved, especially following a spill. This includes cooperation among the national headquarters and regional organizations of each of the federal government departments, as the regional officers are usually on the "front line" of a response. However, the Canadian Coast Guard has established a clear "response management system" to ensure that the right steps are taken in the right order, whether the Coast Guard is operating as only a monitor of the actions taken by the polluter or as the "On-Scene Commander". The response management system is based on the "management by objectives" approach and outlines the roles and responsibilities of individual functions, identifies the reporting structure, establishes a common set of terminology and uses standard documentation. For each spill, an "Incident Action Plan" is used to detail the existing conditions and outline the objectives and strategies for monitoring or responding.

Liability and Compensation

As is the case with pipelines, the companies that own and operate tankers have a strong financial incentive to avoid spills. In Canada, the Marine Liability Act (MLA) is the principal legislation dealing with ship owner and vessel operator liability. Its intent is to establish uniform rules on liability and compensation by balancing the

interests of ship owners and other parties involved in maritime accidents. Canada's compensation regime is based on the fundamental principle that the ship owner is primarily liable for oil pollution damage caused by the ship up to its statutory limits of liability – that is, the polluter pay principle.

Generally, ship owners are liable for damages, losses and costs directly related to a discharge or the threat of a discharge from their vessel. The international community has adopted a number of international conventions at the IMO that govern ship owner liability, which Canada has ratified and implemented in the MLA.

The MLA implements several international conventions that require ship owners to hold insurance in an amount that is linked to the tonnage of the vessel. The MLA incorporates various international conventions and domestic compensation provisions, and provides for various levels of liability, depending on the type of oil causing the pollution damage and the type of vessel involved in an incident. These international conventions also limit or cap the liability of ship owners and specify the amounts that must be made available for cleanups, compensation and to address natural resource damages. If the cost of damages exceeds the ship owner's liability, international and domestic funds provide additional amounts to a maximum total of approximately \$1.36 billion. This funding to pay for cleanup costs is multi-tiered.

- The first tier, as required under the IMO's International Convention on Civil Liability for Oil Pollution Damage, 1969 (the Civil Liability Convention), is paid on behalf of a ship-owner by the ship's insurer or by a protection and indemnity club or association that offers insurance coverage to ship-owners and charterers against third-party liabilities. Ship-owners are strictly liable for oil pollution damage to an extent calculated according to ship tonnage but which does not exceed approximately \$145 million.
- The second tier is paid by the International Oil Pollution Compensation Fund, 1992, which provides an additional maximum amount of approximately \$180 million for a total of approximately \$325 million. This additional amount is accessible after funds in the first tier are exhausted or in instances where the ship-owner is legally exempt from liability.
- The third tier is paid by the International Oil Pollution Compensation Supplementary Fund, which provides up to an additional \$875 million, for a total of approximately \$1.2 billion. This funding can be accessed when funds from the second tier are exhausted.
- Finally, Canada has its own Ship-Source Oil Pollution Fund (SOPF), a national fund which constitutes a fourth tier of funding

The SOPF was created in 1973 from levies paid by receivers and importers of oil in Canada. Over the years, the balance of the fund has grown with interest paid to it to

approximately \$409 million, as of March 31, 2015. The SOPF covers pollution damages from any type of oil and any type of vessel, including mystery spills that are believed to be from a vessel. The current maximum liability for the SOPF is approximately \$166 million for a single incident. This amount is adjusted annually with the Consumer Price Index. With the SOPF and the CLC/IOPC Funds regime, the total amount of compensation for a tanker spill of persistent oil would be approximately \$1.48 billion. This is one of the largest amounts of compensation available in the world.

On November 7, 2016, the Canadian government announced that it will soon introduce new legislation into Parliament that will amend the Ship-source Oil Pollution Fund to ensure even more industry-funded compensation is available for those affected by oil spills.

Recent Improvements in the Canadian Regime

The Canadian government, under both the Conservatives and Liberals, has recently taken several steps to improve the safe movement of oil by tankers in Canadian waters.

On March 13, 2013, the Conservative government announced an initiative to create a “world-class tanker safety system”. This initiative included legislative changes and the following suite of measures:

- An increase in the number of tanker inspections;
- Expansion of the national Aerial Surveillance Program;
- Establishment of a Canadian Coast Guard Incident Command System;
- Review of existing pilotage and tug escort requirements;
- An increase in the number of ports designated for traffic control measures, starting with Kitimat, B.C.;
- Scientific research on non-conventional petroleum products, such as diluted bitumen, to enhance understanding of these substances and how they behave when released in a marine environment;
- New and modified aids to navigation including buoys, lights and other devices to warn of obstructions and to mark the location of preferred shipping routes; and
- Enhancement of Canada’s current navigation system.

On November 7, 2016, the Liberal government announced a further set of measures in the “Oceans Protection Plan”. Specifically, the plan will do the following:

- Prohibit owners from abandoning their vessels;
- Make vessel owners responsible and liable for the cost of any vessel cleanup as a result of abandonment, maritime casualty or irresponsible vessel management;
- Empower the federal government to take more proactive action on vessels causing hazards before they become costly to address;
- Improve the accuracy of vessel owner identification to help ensure they can be held responsible;
- Create a list of problem vessels to understand the scope, scale and risks associated with this issue;
- Work with provincial, territorial and local governments and Indigenous communities to support the cleanup of smaller high-priority vessels posing risks to coastal communities, and develop plans to address large commercial problem vessels in line with the risks they pose; and
- Promote education and outreach activities to inform owners of their responsibilities for proper vessel disposal.

The polluter-pays will be even further strengthened by amending the Canadian Ship-source Oil Pollution Fund to ensure adequate industry-funded compensation is available for those affected by oil spills. In addition, the Oceans Protection Plan will set “tougher requirements on industry to provide quicker action for any spills from a ship.” With regard to the Canadian Coast Guard (CCG), the plan’s measures include increasing towing capacity by leasing two large vessels capable of towing commercial vessels and large container ships, as well as installing towing kits on CCG major vessels to improve capacity to take swift action to avoid disasters.

The Oceans Protection Plan includes over \$1.5 billion in funding over five years, starting in 2017-18.

Taken together, the recent improvements to an already comprehensive and stringent tanker safety regime makes Canada one of the safest countries in the world in which to operate oil tankers and other marine vessels.

Results of Recent Marine Risk Assessments

Transport Canada's TERMPOL Process and Review Report

“TERMPOL” stands for “Technical Review Process of Marine Terminal Systems and Transshipment Sites.” It is an interdepartmental process, introduced in 1977, that brings together experts from many different disciplines to develop safe vessel operating criteria and a corresponding pollution prevention program during the planning stage of a new or modified marine terminal. TERMPOL is an extensive, although voluntary, review process in which proponents involved in building and operating a marine terminal system for bulk handling of oil, chemicals and liquefied gases can participate. It focuses on the marine transportation components of a project (i.e., when a tanker enters Canadian waters, navigates through channels, approaches berthing at a marine terminal, and loads and unloads oil or gas).

Proponents of new projects that involve the establishment or expansion of marine terminals and tanker operations use the TERMPOL process as a “single window” to receive assessment and advice concerning how to ensure the safety of the marine shipping component.

Federal and provincial regulatory bodies that are responsible to review projects and to certify them before they may proceed then use the results of these reviews. The most important federal organization is the National Energy Board (NEB). The National Energy Board is an independent, quasi-judicial, expert regulatory panel that is responsible to review new interprovincial and international energy pipeline projects in terms of their economic, financial, environmental, engineering, safety and other public interest considerations and to recommend to the federal Cabinet whether they should be approved and, if so, under which conditions. The NEB was established as an expert body operating at arms' length from the partisan political process to ensure that decisions about major energy infrastructure are made, in the first instance, on the basis of evidence and professional analysis, not politics. As part of its responsibilities during a project review, the NEB performs an environmental assessment and review under the terms of the Canadian Environmental Assessment and Review Act, including holding extensive public hearings and offering opportunities for a broad range of stakeholders to provide comments. The NEB reports to the Minister of the Environment and Climate Change on the results of the environmental assessment and to the Minister of Natural Resources on the overall Canadian public interests with respect to a proposed project.

A number of studies have been done that provide insights into the nature of the marine risks associated with proposals to increase oil tanker movement in Canada.

1. The GENIVAR Study

In May, 2013, Transport Canada commissioned GENIVAR, a leading professional services firm, to conduct a Canada-wide risk assessment to determine the national risks associated with ship-source spills and to create a way of comparing the risks between regions of Canada. GENIVAR subcontracted portions of the work to SL Ross, a consulting firm specializing in the behavior of oil and chemical spills.

Phase one of the study examined the likelihood and potential impacts of oil spills in Canadian waters south of 60 degrees north latitude. Under this phase, GENIVAR divided the Canadian coastline south of 60 into 29 subsectors and calculated the probability and the potential impacts of ship-source oil spills for each sub-sector. They then performed 12 separate calculations for each sub-sector, to estimate the probability for a spill of crude oil, refined product and bunker occurring in four potential ranges of volume: 10 to 100, 100 to 999, 1,000 to 9,999 and larger than 10,000 tonnes.

GENIVAR used international spill rates to calculate the probability of oil spills. They factored the historical spill data against the volume of Canadian oil movements in each sub-sector. They concluded that the risk of a crude oil spill varied considerably depending upon the size of the spill, and they illustrated this in two ways. The first way was in terms of the “annual estimate” (i.e. percentage likelihood that a spill would occur in a year).

The following table shows the estimates for crude oil:

Overall Canadian Crude Oil Spill Frequency (per year)

Volume (cubic metres)	Frequency
10 to 100	2.522
100 to 1,000	0.714
1,000 to 10,000	0.049
Over 10,000	0.004

The second way was in terms of the “return period”, as measured in years. The following table shows the estimates for crude oil:

Overall Canadian Crude Oil Spill Frequency (Return Period, Years)

Volume (cubic metres)	Return Period
10 to 100	0.4
100 to 1,000	1.4
1,000 to 10,000	20.2
Over 10,000	242.3

Expressed in simpler terms, a spill between 10 and 100 cubic metres in size is likely to happen about two and a half times per year somewhere in Canada. A spill between 1,000 and 10,000 cubic metres is likely to happen about once every twenty years. Another spill the size of the 1970 Arrow may occur every 242 years. It is important to note that the GENIVAR estimates of spill frequency were not based on actual experience in Canada, where the number of spills has been so low that GENIVAR considered projecting this forward would mean an extremely low rate of spills. Rather, GENIVAR based its risk analysis on international averages, which, one could reasonably argue, considerably over-estimates the risks in Canada.

The GENIVAR study can be read here:

<https://docs.neb-one.gc.ca/ll-eng/llisapi.dll/fetch/2000/90464/90552/548311/956726/2392873/2449925/2451281/2785499/C269%2D22%2D3 %2D Appendix A %28Part 1 of 3%29%2C Narrative of Chief Arliss Daniels d May 27%2C 2015 %2D A4L7F4.pdf?nodeid=2785271&vernum=-2>

2. Det Norske Veritas Review of the Enbridge Northern Gateway Project

According to Wikipedia, Det Norske Veritas is an international [certification body](#) and [classification society](#) with main expertise in technical assessment, advisory, and risk management. It was created in 2013 as a result of a merger between two leading organizations in the field - Det Norske Veritas ([Norway](#)) and [Germanischer Lloyd](#) ([Germany](#)).

Det Norske Veritas is also the world's largest technical consultancy to onshore and offshore wind, wave, tidal, and solar industries, as well as the global oil and gas industry - 65% of the world's offshore pipelines are designed and installed to Det Norske Veritas' technical standards.

Enbridge contracted with Det Norske Veritas to conduct a marine shipping quantitative risk analysis of the Northern Gateway Project's marine shipping component. The analysis, completed in 2010, can be seen here:

http://www.ceaa.gc.ca/050/documents_staticpost/cearef_21799/2559/marine_shipping.pdf

The analysis involved an examination of the potential for any marine incident that might result in a spill of varying sizes, of the possible sizes of the spills, and of the risks that these might occur under conditions in which no special measures were taken by the Project ("unmitigated") and conditions in which Enbridge took special measures as proposed by Det Norske Veritas ("mitigated"). Much of the analysis is cast in terms of the "return period", meaning the likely number of years between spill incidents. These are the principal conclusions of the analysis:

- *The greatest unmitigated hazard to marine traffic to and from Kitimat Terminal is drift or powered grounding. While this is so, it is also the hazard most effectively mitigated by the use of escort tugs. It is predicted that the use of an appropriately placed and sized escort tug fleet can more than triple the return period of an oil spill along the tanker routes.*
- *Overall risk levels are in line with that of comparable terminals located on the west coast of Norway.*
- *Without mitigation measures in place, the Project is expected to have close to world average incident and spill frequencies. With mitigation measures in place, the frequency of incidents and spills is expected to be about one third the world average.*
- *The mitigated return period of a small spill at the marine terminal is 77 years and the mitigated return period of a medium spill is 290 years.*
- *The mitigated return period of a small oil spill resulting from an incident during marine tanker transport is 350 years.*
- *The mitigated return period of spills resulting from an incident during marine tanker transport exceeding 5,000 cubic metres (31,400 barrels), 20,000 cubic metres (126,000 barrels), and 40,000 cubic metres (252,000 barrels) is approximately 550, 2,800 and 15,000 years respectively.*

3. Det Norske Veritas Review of the Trans Mountain Expansion Project

Det Norske Veritas also completed a general risk analysis for the Trans Mountain Expansion Project in the lower British Columbia Mainland. This project, unlike the Enbridge Northern Gateway Project, involved the expansion of an existing Pipeline that has operated for many years and the consequent expansion of the Westridge Marine Terminal and an increase in existing tanker traffic from 60 to 400 tankers per year. The assessment can be seen here:

https://transmountain.s3.amazonaws.com/application14/V8C_TERMPOL_REPORT_S/1142.html

The assessment considered the effect on incident risk of traffic growth from Trans Mountain tanker traffic as well as from overall growth in the area. Here are the main conclusions as stated in the risk analysis submitted to the TERMPOL process:

- *The increase in traffic resulting from the Project is found to have a negligible effect on the total incident frequency for the region. With or without the Project, tanker traffic remains a small part of the total traffic in the region.*
- *Without the Project, the frequency of accidents resulting in an oil cargo spill of any size is estimated to be one in every 309 years. Post implementation of the Project, if no additional risk reducing measures are implemented, the frequency will be one in every 46 years. If all the risk reducing measures discussed in this report are implemented, the frequency will be one in every 237 years.*
- *Without the Project, the risk of a credible worst-case oil spill (estimated by modeling to be 16,500 cubic metres) is estimated to be one in every 3093 years. Once the Project is implemented, if no additional risk reducing measures are implemented, the frequency will be one in every 456 years. If all the risk reducing measures discussed in this report are implemented, the frequency will be one in every 2366 years.*
- *Spill response in the region is currently the subject of review by the Federal and Provincial governments of Canada. Based on the information from the risk assessment, enhanced planning standards for spill response describe a regime that will be able to deliver 20,000 tonnes of capacity within 36 hours from dedicated resources staged within the study area. This represents a response capacity that is double and a delivery time that is half the existing planning standards. These enhancements will reduce times for initiating a response to two hours for the harbor and six hours for the remainder of the study area and parts of the west coast of Vancouver Island. The standard for cleaning of oiled shoreline is also improved significantly from 500 metres per day to 3,000 metres per day.*
- *DNV concludes that the regional increase in oil spill risk caused by the expected increase in oil tanker traffic to Trans Mountain Westridge Marine Terminal is low, and that the region is capable of safely accommodating the additional one laden crude oil tanker per day increase that will result from the Project.*

Conclusion

The public dialogue concerning proposed new oil pipelines to Canada's coasts is often dominated by claims that the risk of oil spills from tanker operations is so large as to make the projects unacceptable. These claims rarely are based upon an objective analysis of the probability of spills occurring, and they usually postulate the worst-case scenarios as though these were the most likely cases. This seriously undermines the quality of the public discussion and tends to politicize decisions.

The reality is that the safety of marine oil transport has improved dramatically around the world over the past fifty years to the point at which large oil spills are extremely rare; that the largest oil spill in Canada's history occurred 44 years ago; that virtually all spills in the past twenty years have been small and quickly cleaned up; that there is an extensive and comprehensive international and domestic legal framework in place to govern marine safety, prevent spills, and ensure rapid actions if one occurs; that Canada already has a world-class marine safety regime in place and it is constantly being improved; that the most recent studies show the extremely low likelihood of large spills in future; and that a comprehensive liability and compensation regime is in place to ensure that industry bears the costs of any spill that occurs.

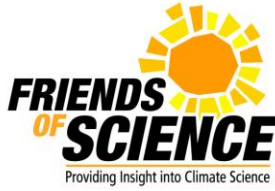
Canadians should be able to expect, and indeed should demand, that decisions about new oil transportation projects involving increased tanker traffic be made based upon the best evidence available, and a cool-headed examination of Canada's interests from economic, environmental and social perspectives.

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Other resources:

<http://www.api.org/~media/files/oil-and-natural-gas/tankers/tankers-lores.pdf>

*Robert Lyman is an energy economist and transportation expert with 27 years' experience as a public servant, and ten years' experience as a diplomat.*



*Robert Lyman is a frequent contributor to Friends of Science Society's library of information on the economics of renewable energy, GHG reduction targets and transportation issues. We present this document on marine transport of oil in Canada in the interests of encouraging informed debate on public policy.*

## About

Friends of Science has spent a decade reviewing a broad spectrum of literature on climate change and have concluded the sun is the main driver of climate change, not carbon dioxide (CO<sub>2</sub>). Friends of Science is made up of a growing group of earth, atmospheric and solar scientists, engineers, and citizens.

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