

# Assessing Marine Transport for Oil Sands on Canada's West Coast

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## About this report

**Purpose.** The growth of oil sands production has given rise to projects that could result in the expansion of exports of Canadian oil sands from Canada's West Coast. This has raised questions about Canada's ability to move oil sands crude safely by sea on this coast. What is the historical track record of moving crude oil by tanker? What risk management and safety measures are in place, and how does Canada compare to other jurisdictions?

**Context.** This is part of a series of reports from the IHS CERA Canadian Oil Sands Dialogue. The dialogue convenes stakeholders in the oil sands to participate in an objective analysis of the benefits, costs, and impacts of various choices associated with Canadian oil sands development. Participants include representatives from governments, regulators, oil companies, shipping companies, and nongovernmental organizations.

This report and past Oil Sands Dialogue reports can be downloaded at [www.ihs.com/oilsandsdialogue](http://www.ihs.com/oilsandsdialogue).

**Methodology.** The focus of the research was on ship-source oil spills. IHS CERA and IHS Maritime conducted our own extensive research and analysis, both independently and in consultation with stakeholders. This report was informed by multistakeholder input from a focus group meeting held in Vancouver, British Columbia, on 21 March 2013 and participant feedback on a draft version of the report. IHS CERA has full editorial control over this report and is solely responsible for its contents (see end of report for a list of participants and the IHS team).

**Structure.** This report has an introduction, three main sections, and a conclusion followed by two annexes.

- Introduction
- Part 1: Tankers, incidents, and spills
- Part 2: Marine regulation, spill prevention measures, and application
- Part 3: Spill liability and compensation
- Conclusion
- Annexes A, B, and C: Details on international maritime governance, policy tools for maritime shipping safety and select IHS Maritime data.

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# ASSESSING MARINE TRANSPORT FOR OIL SANDS ON CANADA'S WEST COAST

## KEY IMPLICATIONS

If new or expanded pipelines are built from Alberta to the coast of British Columbia, tanker movements on Canada's West Coast would increase. Although crude oil is the single largest commodity handled by maritime shipping in Canada, relatively few tankers currently call on the West Coast. The prospect of increased tanker activity has raised public concerns about the safety of shipping crude by sea and the risk of a large oil spill. This report provides facts and data with the aim of informing the debate surrounding increased tanker movements on Canada's West Coast.

- **What are the rules and measures for moving crude in Canada, and how do they compare with other jurisdictions?** The shipping industry is governed by international regulations that many nations, including Canada, have adopted. Consequently, the rules are generally similar across countries. However, the application of prevention and response measures, such as compulsory tug escorts, pilotage, and spill response plans and capabilities, can differ among countries, reflecting each nation's particular resources and needs.
- **Compared with 1989—the time of the *Exxon Valdez* spill—how has the tanker industry changed?** The industry has changed dramatically in the past 24 years. Improvements in tanker technology, operation, and enforcement have all contributed to fewer and smaller spills. Despite a near doubling of the global fleet, oil spill volumes over the past decade (2003 to 2012) were 75% lower than in the previous decade.
- **If a spill were to occur, how does compensation in Canada compare with that of other countries?** Although most nations have adopted the international regime (and, as a result, can access international funds), only a smaller subset (including Canada) participate in all levels of international funding. Canada has also established its own domestic compensation pool that operates in addition to international funds. In total, Canada can access up to C\$1.3 billion per incident—exceeding what is available internationally.
- **If oil sands bitumen blends were to spill in the ocean, would they behave differently from other heavy crude oils?** Although experience is limited, there is insufficient evidence to conclude that oil sands bitumen blends would perform differently—sinking more rapidly than other crude oils of similar density. However, this is an area of active research; and if bitumen blends were found to perform differently, greater response capabilities (regarding the level of equipment and response timing) could be needed.

—June 2013



# ASSESSING MARINE TRANSPORT FOR OIL SANDS ON CANADA'S WEST COAST

## INTRODUCTION

Can Canada safely expand maritime oil exports, enhancing Canadian economic growth, while protecting the environment and local stakeholder interests? The purpose of this report, which is organized into three parts, is to shed more light on the three key questions that stakeholders are asking:

- What is the state of the global tanker industry?
- How does Canada compare with other nations in the regulation of maritime shipping and the level of prevention and response measures—particularly on its West Coast?
- In the event of a spill, who pays for cleanup?

The main text is followed by Annexes A, B, and C, which contain supporting information.

Canada has become the largest source of foreign oil to the United States over the past decade—3 million barrels per day (mbd) in 2012 compared with 1.4 mbd from the number two foreign supplier, Saudi Arabia.<sup>1</sup> This trend has made the oil industry an engine of economic activity and government revenue in Canada. But will the United States remain receptive to growing volumes of Canadian oil imports? This question has intensified owing to controversy in the United States over expansion of pipeline capacity between the two countries and highlights the risks of Canada's dependence on one market for its oil exports—a market that is past its peak in oil demand.

## WEST COAST ACCESS AND PRICING ISSUES

Below-market prices for Canadian crude—and the ensuing lost revenue—is another key reason that Canada wishes to build connections to the Asian oil market via the West Coast. In the past few years, rapid growth in US oil supply combined with oil sands growth has resulted in a crude oversupply and depressed prices for Canadian crudes.<sup>2</sup> If western Canadian producers had been able to bring their crude oils to the global market last year, they would have received about \$14 more per barrel.<sup>3</sup> In 2012 alone, this equates to \$15 billion in lost revenue.<sup>4</sup>

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1. Source: US Energy Information Administration.

2. Between 2010 and 2012 supply from North American tight oil increased by 1.5 mbd.

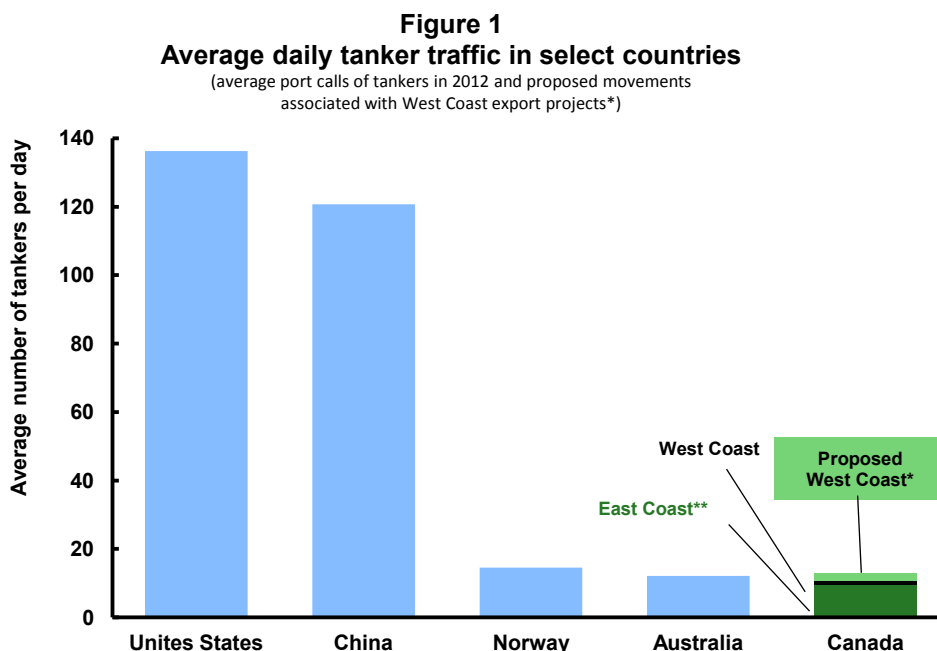
3. Calculation based on a weighted average between 2012 light and heavy production from western Canada sourced from the National Energy Board [www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/ststc/crdlndprlmprdct/stmtpdctn-eng.html](http://www.neb-one.gc.ca/clf-nsi/rnrgynfmtn/ststc/crdlndprlmprdct/stmtpdctn-eng.html) and 2012 average Platts prices of \$73 per barrel for Western Canadian Select (a western Canadian heavy crude), \$100 per barrel for Mexican Maya (a globally traded heavy crude), \$93 per barrel for synthetic crude oil (SCO) (a premium western Canadian light crude), and \$112 per barrel for dated Brent (a globally traded light crude). Prices were adjusted for transport costs to the Gulf Coast of \$10.50 per barrel for heavy and \$8 per barrel for light crude.

4. Estimate based on 3 mbd of production and an average discount of \$14 per barrel in 2012.

For these reasons, a number of new pipelines to bring oil sands (and other western Canadian crudes) to new markets have been announced. Two potential projects are targeting the fast-growing Asian market, with plan to transport western Canadian crudes through British Columbia to Canada’s West Coast via pipeline, for export by tanker.

## CANADIAN TANKER ACTIVITY

Canada has extensive experience in moving crude oil by sea. Crude oil is the single largest commodity moved by ship in Canada and accounts for one-third of all cargo handled.<sup>1</sup> However, as shown in Figure 1, compared with some jurisdictions, Canada’s activity is fairly modest—particularly on the West Coast, where only 9% of all tanker traffic occurs.<sup>2,3</sup>



Source: IHS Maritime.

Note: Data shown are port calls—a shipping arriving, berthing, and sailing is counted as one call. This includes tankers ranging from coastal/handysize through to ultralarge crude carriers.

\*Proposed movements include those associated with the Northern Gateway Pipeline Project and the Trans Mountain Pipeline Expansion project. See the text box “Primer: Canadian oil sands, tankers, West Coast export pipelines.”

\*\*East Coast includes movements on the Canadian East Coast and St. Lawrence. Movements in the Great Lakes are not shown.

1. Based on volume of crude oil loaded and unloaded as reported by Statistics Canada, “Shipping in Canada, 2011,” Tables 15-1 and 15-2, <http://www.statcan.gc.ca/pub/54-205-x/54-205-x2011000-eng.htm>.

2. For geographic reasons Canada’s primary experience with moving oil by sea has been from offshore production (e.g., Hibernia) and the export (including re-export) and import of crude oil and movement of refined products on Canada’s East Coast. Much smaller quantities of oil movements occur on the West Coast, where most oil transport is for refined products such as heating, power generation, and transport fuels in coastal communities.

3. Comparison made here is based on movement data provided by IHS Maritime and includes tanker traffic shown in Figure 1 plus an additional 1,362 movements that occurred in the Great Lakes in 2012. “Traffic” is defined here as port callings—a ship arriving, berthing, and sailing is counted as one call. This includes tankers ranging from coastal/handysize through to the largest of tankers. For more information see Table C-1 in Appendix C. On a volumetric basis, as measured by Statistics Canada, 15% of all crude oil handled in Canada is on the West Coast. Statistics Canada, “Shipping in Canada 2011,” <http://www.statcan.gc.ca/pub/54-205-x/2011000/part-partie1-eng.htm>, accessed 23 May 2013.

Although the transport of crude oil by sea is less familiar on Canada's West Coast, maritime shipping in general is not. The Port of Metro Vancouver is the busiest port in the country, accounting for over one-fifth of all cargo loaded and unloaded.<sup>1</sup> If constructed, the proposed projects would more than double tanker activity on Canada's West Coast (see Figure 1).

See the box “Primer: Canadian oil sands, tankers, and West Coast export pipelines” for an explanation of the crude oil and tanker terms and the proposed export projects discussed in this report.

### Primer: Canadian oil sands, tankers, and West Coast export pipelines

#### Canadian oil sands

In its natural state, raw bitumen is solid at room temperature and cannot be transported in pipelines. To be transported by pipeline, bitumen must be either diluted with light oil into a bitumen blend or converted into a light crude oil, called synthetic crude oil (SCO).

- **SCO.** SCO is produced by upgrading bitumen (either by removing carbon or adding hydrogen) from a heavy crude oil into a lighter crude oil. SCO resembles light, sweet crude oil, typically with a density less than 876 kilograms (kg) per cubic meter (or an API gravity greater than 30°).
- **Bitumen blends.** To meet pipeline requirements, bitumen is diluted with lighter hydrocarbons (often natural gas condensates) into a bitumen blend. The blend density is between 923 and 940 kg per cubic meter (20–22°API), making it comparable to other heavy crudes, such as Mexican Maya. A common bitumen blend is dilbit—short for diluted bitumen—which is typically about 70% bitumen and 30% lighter hydrocarbons.

#### Crude oil tankers

Crude oil is transported by vessels ranging from small barges to very large crude carriers (VLCCs) that can span over three football fields (about 274 meters) in length and carry over 2 million barrels of oil. The size of a tanker is generally reflective of its intended use; larger ships tend to be engaged in long-distance voyages, whereas smaller vessels are typically used in shorter voyages (and often with a more diverse range of cargo, such as refined products). Tankers are a subset of the global shipping fleet. In 2012 the entire shipping fleet consisted of about 58,800 vessels, with tankers accounting for about one-fifth (not including barges), or about 10,400 vessels.<sup>1</sup> Collectively, the total capacity of the global tanker fleet is about 4.2 billion barrels (or 568 million metric tons [mt])—roughly double that of 20 years ago.<sup>2</sup> Nearly two-thirds of total tanker capacity is held by large tankers (Aframax size and up).

Crude carriers are classified by both weight and dimension. For simplicity, this report uses two terms for classifying vessel size: small tanker for Panamax class and smaller and large tanker for Aframax class and larger. The focus of this report is on large tankers. Table 1 presents the ship classifications and the terms used in this report.

#### West Coast export pipeline projects

Two pipeline projects have been proposed. Collectively, they would increase the movement of oil along Canada's West Coast by about 1.3 mbd.

1. Source: IHS Maritime. This includes ships with a capacity greater than 10,000 metric tons for bunkering, chemical/products, crude oil, crude products, refined products, shuttles, and unspecified tankers.

2. In 1992 the global fleet had about 6,400 tankers with a combined capacity of just over 2 billion barrels (274 mt).

1. Statistics Canada, “Shipping in Canada 2011,” Table 13, <http://www.statcan.gc.ca/pub/54-205-x/54-205-x2011000-eng.htm>.

**Primer: Canadian oil sands, tankers, and West Coast export pipelines (continued)**

- The Northern Gateway Pipeline.** This project would involve the construction of two pipelines from Alberta to the Port of Kitimat, British Columbia. The first line would have export capacity of up to 525,000 barrels per day (bd) of crude oil, and the second line could import up to 192,000 bd of condensate—a necessary component in some bitumen blends. The project would result in about 220 tankers of different sizes calling on the Port of Kitimat annually and includes the capability to handle VLCCs. The Northern Gateway project is advanced in the Canadian regulatory process, and a decision is expected following the review process at the end of 2013.\* If approved, the project could be shipping crude oil by 2018.
- The Trans Mountain Expansion.** This project would expand the capacity of the existing Trans Mountain Pipeline that runs from Alberta to the Port of Metro Vancouver, British Columbia, from 300,000 bd today to 890,000 bd. Currently Trans Mountain loads about 60 tankers (a mix of Panamax and Aframax) and 36 crude and refined product barges per year. The proposed expansion would result in about 348 new tankers per year calling on the Port of Metro Vancouver; these would be up to partially loaded Aframax size vessels (navigational restrictions limit the cargo capacity to approximately 550,000 barrels (80,000 MT).<sup>3</sup> There are four other petroleum terminals in the Port of Metro Vancouver, all operated by oil companies; most traffic associated with these other terminals is barge traffic, with some limited tanker activity. The Trans Mountain Expansion project is still in the early stages and will become known when the permitting application is filed (scheduled for 2014). If approved, the project could be shipping crude oil at full capacity by 2018.

3. Final decision will be made by the Government of Canada following the Joint Panel Review report. Vessel draft limitations for ships accessing the oil terminals in the Port of Metro Vancouver would limit how much a tanker may be loaded in this port. Source: Application for Pipeline Certification for the Trans Mountain Expansion Project to the National Energy Board. Trans Mountain Pipeline, Project Description, Section 2, page 14, May 23, 2013; <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=956916&objAction=browse>, accessed 4 June 2013.

**Table 1****Tanker classifications**

Term used for this report	Class	Weight (metric tons)	Capacity (barrels) <sup>1</sup>	Number of ships <sup>2</sup>	Collective capacity of fleet (million tons) <sup>2</sup>
Small tankers	Panamax and smaller <sup>3</sup>	less than 80,000	less than 600,000	8,550	222
Large tankers	Aframax	80,000–120,000	600,000–900,000	880	100
	Suezmax	120,000–200,000	900,000–1,500,000	420	73
	Very large crude carrier (VLCC) <sup>4</sup>	200,000–320,000	1,500,000–2,400,000	550	173

Source: IHS Maritime.

1. Tanker carrying capacity in barrels would vary depending on the density of crude oil. Unless otherwise stated, in this report capacity estimates are based upon crude oil density of 845 kg per cubic meter (or API gravity of 36 degrees).

2. Approximate values. Actual value may differ owing to rounding.

3. Panamax vessels range from 55,000 to 80,000 dwt. Smaller ships include Handysize which range from 10,000 to 55,000 dwt.

4. In addition to the VLCC, a larger class of vessel exists, the ultralarge crude carrier. They are not included here as they are not contemplated for any export project on the West Coast and there are fewer than 30 in operation globally.



## PART 1: TANKERS, INCIDENTS, AND SPILLS

With the prospect of increased tanker activity on the West Coast of Canada, the risk of a large spill, such as occurred with the *Exxon Valdez*, remains central to public concerns. However, tanker operations have improved dramatically since 1989, resulting in a decrease in both the frequency and the volume of spills over time.

### INCIDENTS DON'T ALWAYS CAUSE SPILLS

IHS Maritime maintains a registry of global “incidents” which covers a wide range of events that can be as minor as removing a tanker from service for a few hours to repair an engine or as major as a grounding or fire that could lead to an oil spill. In the past 10 years, the vast majority of incidents (94%) involving large tankers have not resulted in a spill.<sup>1</sup> And when spills have occurred, most are small. Globally over the past decade, reported spills have averaged about 7,200 barrels per incident (about 971 mt).<sup>2</sup> Most incidents occur at sea, with machinery failure (such as a loss in power) being the most common direct cause. When incidents occur closer to land (in coastal waters or in port), the potential for a collision with other objects or vessels is greater. Consequently, near-shore incidents are more likely to result in an oil spill. This explains why most prevention and response capabilities are located closer to shore. For more IHS Maritime information on global tanker incidents and spills, both cause and location, see Annex B.

### RATE AND FREQUENCY OF TANKER OIL SPILLS DECLINING

Despite growth in the overall global tanker fleet, most oil spills are small and overall spill frequency and volume have decreased over time (see Figure 2). Spills from large tankers (the kind of ships proposed for Canada’s West Coast) are even less frequent, with no spills reported in the past two years.<sup>3</sup> According to the International Tankers Owners Pollution Federation (ITOPF), the decline in the number and size of spills is part of a long-term trend dating back to the 1970s. On average, spill volumes over the past decade (2003 to 2012) fell by 75% in comparison with levels the decade prior (1993 to 2002).<sup>4</sup> Volumes continued to decline over the past decade, falling by 87% in the past five years compared with the previous five years. Last year, 2012, was the lowest in ITOPF’s database, with less than 7,500 barrels (1,000 mt) spilled.<sup>5</sup> When a large spill occurs, it can account for a majority of the spill volume for that year. The last major spill globally was in 2007, when

1. Source: IHS Maritime.

2. From 2003 to 2012 over 1 million barrels (137,000 mt) were reported spilled in 141 incidents. Source: ITOPF (2012), “Oil Tanker Spill Statistics,” [www.itopf.com/information-services/data-and-statistics/statistics/documents/StatsPack\\_001.pdf](http://www.itopf.com/information-services/data-and-statistics/statistics/documents/StatsPack_001.pdf), accessed 8 April 2013.

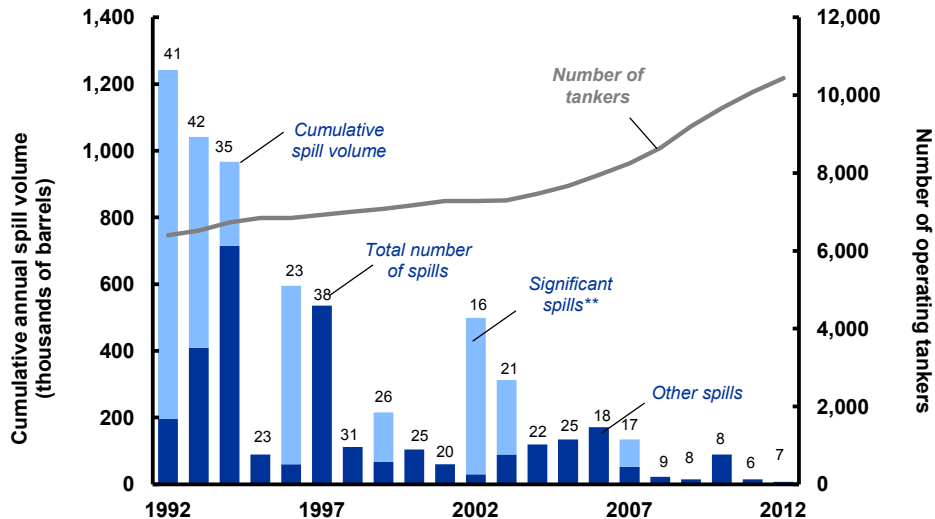
3. Source: IHS Maritime.

4. Spill volumes averaged 421,000 barrels (56,700 mt) per year for the decade from 1993 to 2002 versus an average of 102,000 barrels (13,700 MT) per year from 2003 to 2012. Source: ITOPF (2012).

5. Source: ITOPF (2012), “Oil Tanker Spill Statistics,” [www.itopf.com/information-services/data-and-statistics/statistics/documents/StatsPack\\_001.pdf](http://www.itopf.com/information-services/data-and-statistics/statistics/documents/StatsPack_001.pdf), accessed 8 April 2013.



**Figure 2**  
Global frequency and volume of spills from tankers\*



Sources: IHS Maritime, ITOPF, and various sources.

\*Spill data include accidental spills of oil from all sizes of tankers carriers and barges. For more information see [www.itopf.com](http://www.itopf.com).

\*\*Significant spills are spills originating from only one or two vessel. In order, significant spills over the period shown in this figure include the Aegean Sea and the *Katina P* (1992), the *Braer* (1993), the *Morris J. Berman* (1994), the *Sea Empress* (1996), the *Erika* (1999), the *Prestige* (2002), and the *Hebei Spirit* (2007).

the *Hebei Spirit* spilled 82,000 barrels (10,900 mt) near the Port of Daesan on the West Coast of South Korea.<sup>1</sup>

## TRANSFORMATION OF THE SHIPPING INDUSTRY COMPARED WITH 1989

On Canada's West Coast the 1989 *Exxon Valdez* incident is often cited as an example of the risk that tankers can pose and the extent of the damage that can result from a spill. Since then, however, technology and regulation have transformed the shipping industry.

The probability of this type of accident—a powered grounding owing to navigational error—is less likely today. Improvements in tanker technology and in tanker operations—including requirements crew competency; fatigue management; the use of pilots and tugs; improved navigational systems, including radar, global positioning systems, and use of electronic charts; and increased vigilance through monitoring and enforcement—have helped to reduce the risk of an oil spill. Spill response planning has also evolved. Risk analysis, scenario planning, simulations for training pilots and crew, and drills are often used to help responders to prepare for a potential spill. Many of changes are explained in Part 2, which reviews Canada's spill prevention measures and application.

1. The *Hebei Spirit* was a large single-hull tanker. On 7 December 2007, it anchored about 5 nautical miles off the west coast of South Korea, near the Port of Daesan when it was struck by a crane barge on its port side. At the time the *Hebei Spirit* was loaded with over 1 million barrels of crude oil [209,000 mt]. The collision punctured three of the vessels port cargo tanks, spilling an estimated 82,000 barrels [or 10,900 mt.] Source: IHS Maritime, International Oil Pollution Compensation (IOPC), "Incidents," *Hebei Spirit* cast study, <http://www.iopcfunds.org/incidents/incident-map/#2007-185-December> – accessed 11 June 2013.

One example of technical advancement is the adoption of double-hull tankers.<sup>1</sup> Twenty years ago, single-hull tankers accounted for 93% of large tankers globally.<sup>2</sup> Since 2010, all large tankers operating in international crude trade must be double hulled.<sup>3</sup> According to the International Maritime Organization (IMO), had double-hull vessels been used historically, up to 85% of spills could have been prevented.<sup>4</sup> Double-hull tankers are not risk free, however: if improperly maintained, they can be more susceptible to internal corrosion, highlighting the importance of proper vessel vetting and inspections. However, it is widely accepted that the benefits of a double hull outweigh these risks.<sup>5</sup> Other notable technological improvements include segregated cargo tanks to mitigate outflow in the event of a collision or grounding (consequently if both hulls were breached, the segregated tanker could limited the volume spilled to that contained in the section breached); corrosion coatings for cargo and ballast tanks (to reduce the risk of corrosion and hull failure); and minimum design requirements (such as rules for construction of tankers and inspections).

Modern tanker operations bear little resemblance to the fleet of 24 years ago. Despite a nearly doubling of the global tanker fleet, both the rate and volume of spills have declined owing to improvements in tanker technology, design, and operations.

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1. Double-hull tankers, as defined by IHS Maritime, are tankers in which the bottom and sides of the cargo tanks are separated from the bottom and sides of the hull by void spaces. These spaces carry the seawater ballast when required.

2. Source: IHS Maritime.

3. As of 2012, only 2% of large tankers were single hulled. The few remaining single hulls are believed to be engaged in trades other than the international transport of crude oil (e.g., in storage or in coastal operations in nations that haven't banned single hulls). Any of the remaining internationally operated single-hull tankers will be phased out by 2015. (Source: IHS Maritime.)

4. IMO (1992), "IMO Comparative Study on Oil Tanker Design," Marine Environmental Protection Committee, Session 32, Agenda Item 7 (MEPC/32/7/15), London, United Kingdom.

5. Source: Oil Companies International Marine Forum (OCIMF) (2003), Double Hull Tankers—Are they the answer?

## **PART 2: MARINE REGULATION, SPILL PREVENTION MEASURES, AND APPLICATION**

Crude oil is the single largest commodity handled by maritime shipping in Canada. Most of this occurs on the East Coast, and the transport of oil by sea is less common on Canada's West Coast. Increased traffic will increase the statistical risk of a spill. In this context, questions are being asked about Canada's experience and how Canada's management, prevention, and response regime compares to that of other nations.

Our research found that the international nature of maritime shipping has led to regulatory consistency across many nations, including Canada. However, subtle differences can emerge in how nations choose to apply these rules, often reflecting the resources and needs (economic, social, and environmental) of each country. In this context, if West Coast oil exports increase, Canada's level of prevention and response should be expected to rise. This expectation is already evident, with the Government of Canada appointing an expert panel to review and make recommendations on how to improve Canada's regime.<sup>1</sup>

This part is divided into three sections: key principles of Canadian maritime regulation; Canadian oil spill prevention measures; and examples of how Canada, Australia, Norway, and the United States compare in applying these measures.

### **REGULATION OF SHIPPING: CANADA FOLLOWS INTERNATIONAL STANDARDS**

Canada's maritime shipping is a highly regulated industry. Canada has chosen to follow and participate in a number of international agreements and conventions that help establish the rules for maritime shipping globally. Because of this, the rules in Canada tend to be similar to other jurisdictions'.

Because ships spend their economic lives going to and from different jurisdictions, the international community cooperated in establishing international bodies, agreements, and conventions that collectively govern the industry. Although nations can establish their own rules, and many do, the decision to establish unique rules must be balanced with a country's ability to enforce them and its own trade interests. For instance, if a country imposes unique and costly shipping requirements, this could create barriers to trade. An example of a unique rule would be an outright ban on tankers, as some have suggested for Canada's West Coast. However, no other country has chosen this approach to manage risk from tankers.

The IMO, a division of the United Nations, is the central organization in charge of establishing international rules and guidelines for the shipping industry. When countries are in agreement with an IMO convention, they choose to become a signatory to the convention. Next, a country must incorporate the regulations into its own domestic laws and enforcement. Collectively, when enough countries have both signed a specific convention and incorporated the rule into domestic law, the protocol becomes internationally accepted—and becomes a rule.

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1. Transport Canada, <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>.

Canada is a member of the IMO and participates in the development of international conventions. In Canada, the federal government has jurisdiction over shipping and the waters out to 200 nautical miles.<sup>1</sup> When Canada adopts an international convention, it is generally incorporated into the Canadian Shipping Act, but other legislation can be affected. Transport Canada is the principal federal department in charge of enforcing shipping rules in Canada. Other departments, such as the Department of Fisheries and Oceans, which includes the Canadian Coast Guard (CCG) and Environment Canada, also have important roles in ensuring safe and secure waterways and protecting the environment.

For more details on Canadian maritime shipping regulation and specific acts and regulations, see Annexes A and B.

## SPILL PREVENTION MEASURES: CANADA IS SIMILAR TO OTHERS

Canada's measures to improve ship safety and prevent incidents and spills tend to be similar to those of other nations owing to the common adoption of international conventions and industry best practices.<sup>2</sup> The following section highlights some key measures promulgated in Canada and imposed by industry to prevent and respond to oil spills.

### Canadian measures and regulations

- **Ship design and crew competencies.** International agreements prescribe tanker construction (including for double hulls) and other equipment.<sup>3</sup> Other conventions address human factors such as crew competencies, crew fatigue, and safety planning.<sup>4</sup>
- **Inspections.** Port state control enables Canadian authorities to board, inspect, and enforce regulations on foreign ships.<sup>5</sup> Canadian regulators conduct more than 1,300 foreign ship inspections each year. If a serious problem is found, enforcement tools include warnings, fines, vessel detention, and prosecution.<sup>6</sup>
- **Vessel traffic services and aids to navigation.** Transport Canada, the Department of Fisheries and Oceans (which includes the CCG), and Environment Canada all have roles to play in providing ships transiting Canadian waters aids to navigation, vessel identification and communications services, rules for transiting high traffic areas, and

1. Under the Constitution Act, 1867, the federal government has exclusive jurisdiction over shipping and the waters out to 200 nautical miles (though Canada's rights diminish beyond 12 nautical miles offshore; for more information see Annex A).

2. Since the potential damages from a spill can be large, industry practice often exceeds regulatory requirements. Some industry measures stem from requirements of insurance and other underwriters, and their activities can be part a self-assessment process or a requirement for compliance with terminals.

3. The International Convention on the Prevention of Pollution from Ships (MARPOL) requires double-hull tankers. The Safety of Life at Sea Convention (SOLAS) includes many other requirements for construction and equipment.

4. The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers established crew competencies and 1995 amendments to help prevent fatigue. International Safety Management Code (ISM Code) established requirements for safe management for pollution prevention.

5. Transport Canada Marine Safety Directorate administers the Canada Shipping Act 2001 and other federal statutes that govern port state control. These regimes enable foreign flagged vessels to be inspected for compliance with international requirements (e.g., MARPOL and SOLAS) and those of the nation where the vessel is registered.

6. Source: Transport Canada, Enbridge Northern Gateway Project Joint Review Panel submission, December 22, 2012, accessed 17 April 2013, [www.neb-one.gc.ca/fetch.asp?language=E&ID=A2K4S4](http://www.neb-one.gc.ca/fetch.asp?language=E&ID=A2K4S4).

weather reports.<sup>1</sup> Ships transiting Canadian waters are required to make use of specific Canadian navigational services.<sup>2</sup> On the West Coast, Canada requires all vessels of greater than 300 metric tons on an international voyage to have Automatic Identification Systems (AIS), which broadcasts detailed information such as ship identity, type, position, course, speed, and status to other vessels and ground receiver stations.<sup>3</sup> Services like AIS aid in vessel navigation around ships and other obstacles.<sup>4</sup>

- **Compulsory marine pilotage.** Pilots board ships at the entrance to sensitive or navigationally challenging areas to provide local navigational assistance to the master of a vessel.<sup>5</sup> Pilots are all experienced mariners with hundreds to thousands of days operating in the waters they pilot; they are well versed in local navigation hazards, currents, and weather patterns.<sup>6</sup> According to the Canadian Marine Pilots Association, Canadian pilots have consistently achieved an incident-free rate of 99.9%.<sup>7</sup> On Canada's West Coast, pilots are required over a large area—roughly 2 miles out from the entire coast and in all major channels and fjords. A minimum of two pilots would be required aboard full (or laden) tankers.<sup>8</sup>
- **Escort tugs.** In Canada, tug escorts are typically a requirement of local authorities (pilotage authority or other safety authority risk assessments, port authority, or marine terminal operating procedures). Tugs help maneuver vessels, control course, and influence speed. The number of tugs used depends on several elements: regulatory requirement, weather, size of the tanker, size and power of the tug, and navigational hazards. On the West Coast, the Port of Metro Vancouver requires full (or laden) tankers to have escort tugs. Under the proposed conditions for the Northern Gateway, escort tugs will

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1. Through various government departments the Government of Canada provides a range of navigational safety services. These can include communications services (e.g., radio contacts, navigation information and assistance, distress and safety communications, emergency response services); traffic services (e.g., enhanced global positioning systems [differential GPS], automatic identification systems [AIS]); nautical and waterway information [such as charts, water depth, tides, currents, and sailing directions]; and icebreaking, to name a few.

2. Under Charts and Nautical Publications Regulations, of the Canada Shipping Act (1995), mariners must have onboard and use the most recent edition of charts (for the areas to be navigated) and other required documents and publications when in Canadian waters. These requirements include the appropriate charts, Sailing Directions, and Tide/Current tables, as published by the Canadian Hydrographic Services, and Notice to Mariners; Radio Aids to Marine Navigation; and List of Lights, Buoys and Fog Signals, as published by the Department of Fisheries and Oceans.

3. This rule excludes fishing vessels; and if a ship has more than 12 passengers, the threshold is reduced to 150 mt. In addition to ground receivers, satellites can also be used to receive AIS signals. This can make AIS tracking potentially limitless. IHS Maritime, which manages a global AIS database, is capable of tracking about 90% of the global shipping fleet. The 10% remainder may represent vessels temporarily out of service for maintenance.

4. AIS is still not widely used on smaller vessels (fishing and recreational vessels). Although these vessels pose little direct risk to large tankers, they can influence their navigation, which could result in an incident.

5. The federal Pilotage Act mandates compulsory pilotage.

6. Specific requirements may vary by jurisdiction, and different types of experience are considered. All pilots must have specific levels of certification and pass specific tests to be qualified as a pilot. For more information on the requirements for pilots on Canada's West Coast, see [http://www.ppa.gc.ca/text/documents/How\\_to\\_become\\_a\\_pilot.pdf](http://www.ppa.gc.ca/text/documents/How_to_become_a_pilot.pdf), accessed 16 May 2013.

7. Source: Canadian Marine Pilots Association, <http://www.marinepilots.ca/en/the-canadian-system.html>, accessed 16 May 2013.

8. This includes tankers calling on the Port of Metro Vancouver as well as a proposed condition of the Joint Review Panel for the Enbridge Northern Gateway Project. Source: Northern Gateway Joint Review Panel, [www.neb-one.gc.ca/fetch.asp?language=E&ID=A2K4S4](http://www.neb-one.gc.ca/fetch.asp?language=E&ID=A2K4S4), accessed 17 April 2013.

also be required, including for empty tankers (or under ballast).<sup>1</sup> The requirement for escort tugs provides added security, even when the tanker is outside of the defined escort zone, because it provides a fleet of tugs that are generally stationed nearby in case of an emergency.

- **Oil spill response plans and capabilities.** Canada has signed onto international agreements for oil spill preparedness which mandate that ships entering Canadian waters have oil pollution emergency plans and report oil spills.<sup>2</sup> Tankers are obligated to have response equipment on hand and must actively plan and practice for a spill. In Canada, all tankers and terminals are required to have oil spill response plans as well as a contract with a certified response organization that is prepared to respond to ship or terminal oil spills.<sup>3,4</sup> Private response organizations are certified by Transport Canada and must demonstrate their ability to prepare and respond to marine oil spills. On the West Coast, the Western Canada Marine Response Corporation (WCMRC) is the certified private response organization.
- **Aerial surveillance.** Canada's National Aerial Surveillance Program patrols the coastal region. Air inspection does not prevent spills but is an important tool in deterring illegal activities, including discharges of oil and other waste—a concern not limited to tankers. Aerial surveillance also helps with early detection of marine pollution, which aids in rapid response to a spill.

In addition to these measures, Canada can also require crew standards, safety management procedures, places of refuge for vessels in distress, and special routing measure and waste control measures to protect environmentally sensitive areas. Many of these topics are included in Annex B: Key policy tools for safety of maritime shipping.

In addition to following the rules and measures from Canadian authorities, the shipping industry frequently adopts additional practices to enhance safety:

- **Industry collaboration.** There are numerous examples of industry collaboration aimed at reducing spill risk. The Oil Companies International Marine Forum (OCIMF), representing 93 oil companies, has created its own tools and standards for preventing oil spills. For instance, companies inspect tankers they hire and share inspection

1. Canada Shipping Act, 2001 does not mandate escort tugs. For the Northern Gateway one tug escort is proposed for when the tanker is empty (or under ballast) and two (one being tethered) when it is full (or laden). National Energy Board, Potential Panel Conditions, Attachment B—Collection of potential conditions, page 5, April 12, 2013, <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=942629&objAction=browse&redirect=3>, accessed 23 May 2013.

2. International Convention on Oil Pollution Preparedness, Response and Co-operations.

3. The prevention and control of ship-source pollution is governed by the Canada Shipping Act, 2001 and the Arctic Waters Pollution Prevention Act, 1985. To operate in Canadian waters, all tankers greater than 150 mt and all other vessels of more than 400 mt must carry an approved shipboard oil pollution emergency plan. Terminals are required to have oil pollution emergency plans. Under the proposed Safeguarding Canada's Seas and Skies Act, terminal plans will have to be approved by Transport Canada. Source: Transport Canada, 2013 Media Backgrounder, "World-Class Tanker Safety System: Amendments to the Canada Shipping Act, 2001 (Safeguarding Canada's Seas and Skies Act)," <http://www.tc.gc.ca/eng/mediaroom/backgrounders-menu-7087.htm>, accessed 17 May 2013.

4. In the event of a spill, the polluter is not obligated to use the response organization if the polluter is capable of handling the spill itself, and the response organization is not mandated to respond unless it is under contract to the responsible party or direction of the CCG.



results.<sup>1</sup> Most oil companies require a recent inspection—in some cases in the past six months or less—to hire a tanker. OCIMF also trains inspectors and publishes safety standards for oil tankers and terminals.<sup>2</sup> Governments may also access inspection data. Shipowners also have an industry organization, ITOPF, as discussed in Part 1. ITOPF has an experienced response team to assist in the case of an oil spill; it also provides training and spill response planning services. In collaboration with IMO, ITOPF, and others, the International Petroleum Industry Environmental Conservation Association, which represents both upstream and downstream oil and gas companies, promotes best practice and oil spill capabilities around the world.

- **Tanker requirements.** When hiring a vessel, oil companies often stipulate its maximum age; the limit typically ranges between 15 and 20 years. Although double hulls for large tankers were not required by regulation until 2010, many oil terminal operators required double hulls earlier. Prior to employing a vessel, operators are screened for their operational practices, including safety and risk management procedures as well as crew experience and knowledge.
- **Pilotage and terminal loading/unloading requirements.** In addition to government mandated pilotage, terminal operators often have their own pilots for tankers entering oil terminals. Often personnel from oil terminals supervise tanker loading and unloading to ensure that it follows best practice.

## APPLICATION OF SPILL RESPONSE MEASURES: SUBTLE DIFFERENCES EMERGE

Although there is great uniformity in spill response measures across jurisdictions, their application and enforcement are influenced by domestic programs and by local factors (e.g., traffic levels, weather, navigational conditions, and financial resources).

For some aspects of spill response and preparation, divergence in the application of oil spill preparedness measures is not necessarily an indication of one country's prudence over another. Rather, it is likely due to local conditions. What is practical in one location could be deemed inappropriate or imprudent in another.

This section compares specific illustrative examples of oil spill prevention and response in Canada to Norway, the United States, and Australia, which are often perceived as leaders in this area. To be sure, this analysis is not a comprehensive list of all aspects of oil spill prevention and response. We acknowledge that comparisons are a challenge, but this research helps to provide further context for the type of activities that are undertaken to prevent and respond to oil spills among countries.

- Response authority and leadership
- Response planning and exercising
- Use of risk assessment tools

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1. The OCIMF provides a standardized database of ship inspection reports, known as the Ship Inspection Report Program (SIRE). Although not all tankers are included in the database, as of 2010 the database included 7,737 vessels.  
2. OCIMF, International Safety Guide for Oil Tankers and Terminals, 5th Edition 2006.



- Response equipment and requirements
- Funding

## Response authority and leadership

Rapid spill response requires strong leadership, fast decision making, and the ability to gather and disseminate information quickly. All jurisdictions require the polluter to cover the costs of an oil spill (called the “polluter pays principle”). However, how they organize the response varies. Comparing current practice in Canada to others, authorities in other jurisdictions seem to exert greater ability in taking over response efforts (if the polluter is unable, unwilling, or judged to be doing an unsatisfactory job) and in exerting resources (intervention powers, cleanup equipment, and/or funding) if required. In a crisis, any response delay could worsen the ultimate outcome. It is unclear whether Canada’s model would slow response and be a detriment; ultimately Canadian authorities (such as the CCG) have powers similar to those of the United States to seize control (see the box “Response, authority, and leadership”).

### Response, authority, and leadership

**Canada.** In Canada, an industry and government partnership organizes oil spill response and relies on third-party organizations to clean up spilled oil. The CCG is the lead government agency responsible for ship-sourced pollution. In some ports, agreements may be in place that give the port authority a greater role to manage the response. Historically, the CCG has taken a monitoring role, putting the onus on the polluter to respond and appoint an on-scene commander. Private response organizations, such as the WCMRC, may execute the oil spill cleanup on behalf of the polluter. The CCG can take command if the polluter is unwilling or unable to respond or if the source of the spill is unknown. CCG also maintains its own oil spill response equipment in approximately 80 sites throughout Canada (about 14 on the West Coast).<sup>1</sup>

**United States.** As in Canada, the polluter is responsible for cleaning up oil spills using third-party organizations. However, unlike Canada’s current system the cleanup is conducted under the leadership of a federal government on-scene coordinator. If the on-scene coordinator deems the polluter’s actions as insufficient, the coordinator has the authority to take over and can use federal resources to respond if needed.

**Australia.** The Australian Maritime Safety Authority, a federal agency that is principally self-funded, is responsible for responding to oil spills from ships—providing both cleanup and leadership. If a spill occurs more than 3 nautical miles offshore, a single national decision maker—the Maritime Emergency Response Commander—is appointed to coordinate the response. If a spill is closer to shore and local governments are able to respond, they lead the effort. For the Great Barrier Reef, the state government has the main responsibility. The spill response leader is granted intervention powers and can take all necessary measures to reduce the impacts from an oil spill.

**Norway.** While the onus is on the polluter to pay for the cleanup, the Norwegian Coastal Administration (a federal agency) is responsible for leading the clean-up of oil spills from ships and has powers to draw upon all available resources in Norway. For spills from offshore oil wells (Norway has a large offshore oil production industry), oil companies (not the federal government) are expected to lead.

1. Source: CCG, Marine Spills Contingency Plans, Preparedness, [http://www.ccg-gcc.gc.ca/eng/Ccg/er\\_National\\_Response\\_Plan/s3](http://www.ccg-gcc.gc.ca/eng/Ccg/er_National_Response_Plan/s3), accessed 17 May 2013.

## Planning and exercising

All jurisdictions reviewed have prepared national, regional, vessel, and some port specific plans for managing the response to an oil spill, and they conduct exercises of these plans. Comparing the rigor of exercises among locations is a challenge because information on the scope and frequency of drills is limited. Canada, like the United States, does not have a systematic process for updating its national response plan (see the box “Planning and exercising”).

### Planning and exercising

**Canada.** Canada has both national and regional oil spill response plans and conducts exercises of its plans on an ongoing basis. There is no regimented requirement for refreshing Canada’s national response plan. Although the current plan was updated recently (in 2011), the vintage of the age of the prior plan had elicited criticism.<sup>1</sup> One example of a response exercise on the West Coast is the US and Canadian annual joint spill response exercise. Private response organizations are certified every three years to ensure that they can meet requirements, and oil terminal operators must conduct spill response exercises.

**United States.** As in other jurisdictions, each tanker in US waters is required to have an oil spill response plan. However, the United States imposes a more stringent requirement than most other countries: that the ship’s plan consider the worst-case scenario of a loss of the entire cargo. The US national oil spill response plan, the National Contingency Plan (NCP), was last updated in 1994. In addition, regional and area contingency plans are required. In early 2013 the US Environmental Protection Agency (EPA) recommended that the regional and area plans along with the national plan be updated to account for technology and communication changes since 1994.<sup>2</sup> The NCP requires practice exercises. At the national level, the United States has guidelines for the frequency and scope of exercises. For instance, about every three years the United States Coast Guard (USCG) conducts a significant national exercise. Exercises are also conducted at the regional level, and industry is also required to conduct exercises.

**Australia.** At the national level, Australia’s oil spill response plan was last updated in 2011.<sup>3</sup> Australia’s national plan is a cooperative effort among federal, state, and territorial governments; local emergency responders; and industry. About every 10 years there is a complete review of the oil spill plan, including the risk assessment fundamentals. Australia conducts national exercises every two years to test the administrative and operational effectiveness of the spill response plan.

**Norway.** Norway has a national oil spill contingency plan as well as municipal government and private contingency plans. Several large integrated exercises are conducted annually.

1. Marine Spills Contingency Plan—National Chapter (2011) replaced the Marine Spills Contingency Plan—National Chapter (1998). In 2010 the Commissioner of the Environment and Sustainable Development released an audit, finding that the national plan dated back to 1998 and the Pacific Region’s oil spill plan dated back to 2001. The 2010 report was titled Oil Spills from Ships Emergency Management Plan.

2. Source <http://www.epa.gov/oig/reports/2013/20130215-13-P-0152.pdf>, accessed 6 April 2013.

3. National Maritime Oil Spill Contingency Plan 2011.

## Use of risk assessment tools

Risk management tools provide information on the potential risks and outcomes of an oil spill. Insights learned can be used to inform oil spill response plans. Risk assessment tools are used in Canada, but not as systematically as in other nations included in our analysis.<sup>1</sup> However, a national tanker traffic risk assessment study is now under way in Canada (see the box “Use of risk assessment tools”).

### Use of risk assessment tools

**Canada.** Until recently, risk assessment tools have been used primarily in the environmental review of new projects and in some regional examples. For instance, in 2007 Canada completed a risk assessment for the south coast of Newfoundland and subsequently adjusted the regional oil spill response plan.<sup>1</sup> Less recently, Transport Canada conducted a risk assessment for oil transport on the West Coast of Canada in 2002, and the CCG conducted a risk assessment of response capacity in Canada in 2000 and an update on the probability of oil spills from tankers in 2002.<sup>2</sup> Canada is now undertaking a national risk assessment for marine spills.<sup>3</sup> The completed national study is expected to provide an updated view of the risks and spill scenarios that should be considered in national and regional oil spill response plans.

**United States.** The USCG uses risk assessments in oil spill response planning and has institutionalized models and tools to support this process. Unlike those in other jurisdictions, however, the US spill response plans must meet the regulatory requirement of preparing for a worst-case scenario. Oil spill response plans are developed at three levels: national, area, and regional. The USCG also funds an Oil Spill Response Research & Development Program.

**Australia.** To develop Australia’s 2011 national oil spill response plan, a national risk management model was used to assess the level of risk for 120 regions. For each region, data on the environmental sensitivity and ship traffic were gathered. Global oil spill data were used to understand the characteristics of past oil spills. These data were used to predict the probability of a spill for each region. Both the national and regional plans used these data for the response plans.

**Norway.** Norway uses risk analysis models to develop the most probable oil spill scenarios for each region and simulation tools to analyze the response to each scenario. The modeling criteria are for an oil spill of between 110,000 and 150,000 barrels (specifically 15,000 and 20,000 mt) and, unlike in the United States, no “worst case” scenarios are used. The simulations provide an estimate on the amount of oil recovered, dispersed, stranded, and evaporated. The response times necessary to achieve the cleanup goals are also evaluated. These results inform the oil spill response plans.

1. Source: Transport Canada, “Environmental Oil Spill Risk Assessment Project—Newfoundland,” <http://www.tc.gc.ca/eng/marinesafety/oep-ers-regime-study-1470.htm>, accessed 21 May 2013.

2. Source: 2010 Fall Report of the Commissioner of the Environment and Sustainable Development, Chapter 1, Section 1.27, [http://www.oag-bvg.gc.ca/internet/English/parl\\_cesd\\_201012\\_01\\_e\\_34424.html#hd4a](http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201012_01_e_34424.html#hd4a), accessed 23 May 2013.

3. In early 2013 Canada issued a request for proposal to perform a risk assessment for marine spill in Canadian waters. Source: Transport Canada (2013), “Harper government announces pan-Canadian risk assessment study on marine safety,” February 4, 2013 Press Release - <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h006e-7044.htm>, accessed 2 April 2013.

1. In Canada, historically the risk assessment tools have been used in some regional response plans.

## Oil spill response equipment and requirements

What is the most prudent level of equipment for responding to spills? Each jurisdiction answers this question differently. In most jurisdictions compared here, the amount and type of equipment and its location are determined by risk analysis and scenario planning. This results in unique thresholds for each region that can change according to the season, the volume of shipping, and even the environmental sensitivity of different regions (e.g., the Great Barrier Reef). Other jurisdictions—such as Canada—rely on more rigid standards (see the box “Oil spill response equipment and requirements”).

### Oil spill response equipment and requirements

**Canada.** On both the East and West coasts, Canada requires oil spill equipment capable of responding to a spill of 75,000 barrels (10,000 mt) within 72 hours and cleaning up to 500 meters of shoreline per day.<sup>1</sup> Transport Canada may also require additional dedicated oil handling equipment for individual oil handling facilities. These requirements are based on each facility’s unique needs. In general, the Canadian response requirement is uniform on both coasts and is not based on regional risk assessments. In the event of a larger spill, the resources of a specific area could be supplemented with those from other regions or other countries. The CCG also has its own stockpiles of equipment that can be brought in to assist.

For the Northern Gateway project, which includes the potential for VLCC (some of the largest tankers in the world), the Joint Review Panel for Northern Gateway has requested, as a potential condition of approval, capacity to respond to a spill of about 220,000 barrels (30,000 mt) within 6 to 12 hours plus travel time.\*\*

**United States.** The United States has many private oil spill removal organizations (the US Gulf Coast alone has over 100). Owing to the relatively high volume of crude oil movements in the US Gulf Coast region, there is a large amount equipment located around the coastline, and the US Navy has equipment at bases that can be deployed in case of an emergency.\*\*\* Government oil spill response resources are intended to provide backup for the private sector. Regional requirements for equipment vary and are based on regional plans and specific risks for each location. Therefore specific examples of requirements are difficult to obtain.

**Australia.** Australia has nine regional centers for storing spill response equipment. Ports, states, and oil companies hold additional equipment stocks. A central database, called the Marine Oil Spill Equipment System, monitors the location of all equipment and is maintained by a federal agency. Since regional requirements vary, specific response equipment requirements are difficult to obtain.

**Norway.** In addition to equipment maintained by the Norwegian Coastal Administration and municipal governments, private oil spill response organizations and oil companies have cleanup equipment for responding to offshore oil well spills. Since regional requirements vary and are determined by a risk-based assessment process, the specific levels of response equipment are difficult to obtain.

<sup>1</sup>Required response capability varies depending on the size of the spill, from the capacity to respond to spills of 1,100 barrels (150 mt) within 6 hours to the maximum capacity of 75,000 barrels (10,000 mt) within 72 hours. Source: Transport Canada, <http://www.tc.gc.ca/eng/marinesafety/tp-tp14539-review-current-regime-2279.htm>, accessed 17 May 2013.

\*\*National Energy Board, Potential Panel Conditions, Attachment B—Collection of potential conditions, Page 5, April 12, 2013, <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=942629&objAction=browse&redirect=3>.

\*\*\*The US Gulf Coast had over 38,000 tanker port callings in 2012—over three-quarters of all US movements—and 30% of these were large tankers. Source: IHS Maritime.

### *Oil sands bitumen blends—A special case?*

In comparing Canada's oil spill response requirements to those of other jurisdictions, concerns have been raised that, if spilled in the ocean, oil sands bitumen blends could behave differently—potentially sinking more quickly than other heavy crudes. If this were the case, different response requirements (regarding speed, capability, and accessibility) could be needed. Although there is limited experience with cleanup of oil sands heavy crudes in the marine environment, so far there is insufficient evidence to conclude that oil sands bitumen blends would perform differently than comparable heavy oils. However, this is an area of active research (see the box “Spill performance of bitumen blends”).

#### **Spill performance of bitumen blends**

##### **Does oil sands bitumen blend float on water?**

Raw bitumen is semisolid at ambient temperature and cannot be transported by pipeline. It must first be diluted with lighter hydrocarbons—typically natural gas condensate—into a bitumen blend. The bitumen blend mixture is of a low enough viscosity to flow in a pipeline. If projects to export oil from Canada's West Coast are completed, greater quantities of bitumen blend will be transported from Alberta to the coast by pipeline and eventually loaded onto tankers.

Like other heavy crude oils, bitumen blends are lighter than fresh or salt water; and since they are less dense, they float upon initial release into a marine or freshwater environment.<sup>1</sup>

##### **In the event of oil spill into the ocean, will bitumen blends remain afloat?**

On initial release into a marine environment, crude oils float. But, over time, the environment can alter the density of the spilled crude through a process called weathering. Weathering takes time, and the effect varies with the type of crude—light or heavy. Lighter oil is more susceptible to evaporation. Some refined products, such as gasoline or diesel, are sufficiently light that most will evaporate quickly, negating the need for an extensive cleanup. The heavier a crude oil, the more it will persist in the marine environment (since less of it will evaporate). It is for these persistent oils that spill prevention and response regimes have been established.

Experience with some heavier persistent oils, such as maritime fuel known as bunker, has shown that wind, turbulence, and dispersants can break up the oil into droplets. These droplets can take on sediment, and the combined density of some of the spilled oil can become neutrally buoyant and submerge. Once submerged, oil may float in the water column, sink toward the bottom, or later reemerge on the surface. Sunken oil can be hard to locate and subsequently to recover. The longer oil is left to weather, the more likely it will become neutrally buoyant; this is true of most persistent oils. Sinking is more likely to occur in shallow water with higher levels of sediment and with high wave activity that encourages the mixing of oil, sediment, and water, which increases the density of the resulting mixture; other key variables that affect weathering are the salinity and temperature of the water, as they impact the density of the water and the oil.<sup>2</sup>

1. According to the Geological Survey of Alberta, the density of bitumen from the Canadian oil sands ranges from 1,014 to 986 kg per cubic meter (8–12°API). However, bitumen blend density is lower; according to [CrudeMonitor.ca](http://CrudeMonitor.ca), the specific gravity of diluted bitumen ranges from 934 to 923 kg per cubic meter (19–22°API). Freshwater has a specific gravity of 1,000 kg per cubic meter (10°API), whereas salt water density ranges (depending on salinity) from about 1,030 to 1,020 kg per cubic meter (6–7°API).

2. Source: Castle, R. W., Wehrenberg, F., Barlett, J., and Nuckols, J. (1995), “Heavy Oil Spills: Out of Sight, Out of Mind,” International Oil Spill Conference Proceedings, February 1995, Vol. 1995, No. 1 (February 1995) pp. 565–571, <https://dx.doi.org/10.7901/2169-3358-1995-1-565>, accessed 8 April 2013.

### Spill performance of bitumen blends (continued)

There are different opinions on how bitumen blends would perform in a marine environment. In the event of a bitumen blend spill, the diluents, which can constitute up to 30% of the blend, could evaporate, leaving denser (less buoyant) bitumen behind, which would be more at risk of sinking. Recent studies by SL Ross (conducted as part of the Northern Gateway pipeline review) simulated an oil spill in a laboratory environment and found that the density of a bitumen blend (specifically Cold Lake Blend—a dilbit) in a marine environment does change over time. In its analysis, the density of the blend increased after 12 days, approaching that of freshwater, but did not sink since ocean water is heavier than fresh water.<sup>3</sup>

In 2007 another type of bitumen blend was accidentally released from the land into ocean water in Vancouver Harbor. This provided practical experience of a land-based spill with a unique blend of synthetic heavy crude oil (not to be confused with SCO defined earlier) and bitumen (specifically Albion Synthetic Heavy).<sup>4</sup> The spill occurred under ideal conditions of warm and calm water. Responders noted that the oil sands blend performed similar to other heavier oils, such as bunker. Their equipment worked well, and no traces of sunken oil were found.<sup>5</sup>

In 2010 another land-based spill, involving bitumen blends, made its way into the freshwater of the Kalamazoo River in Michigan, and some (estimated at 15–20%) of the crude oil was reported to have sunk into the water column.<sup>6,7</sup> In this instance, conditions were notably less than ideal and somewhat different from an ocean environment.<sup>8</sup>

Simple chemistry suggests that bitumen blends would float upon release into a marine environment because initially it is less dense than water. However, marine environments are dynamic, and a number of factors beyond the oil itself—such as the weather, sediment level, temperature, and the salinity of the water itself—can influence what happens in a spill. Under the right conditions heavier oils, such as bunkers, can become neutrally buoyant and submerge. However, there is insufficient evidence to conclude that bitumen blends are more or less prone to sinking than heavy oil of comparable density. To date, practical experiences have been limited, tests have been lab scale, and methodologies have been debated. More research is warranted. The Government of Canada has committed to more research in this area and as a potential condition for the Northern Gateway Project (in addition to scenario modeling for submerged oil).<sup>9</sup> If bitumen blends were found to be more susceptible to weathering and to the risk of submerging, greater and faster response capabilities could be warranted to respond to a spill before the effects of weathering can occur.

3. February 6, 2012, Submission to Northern Gateway Joint Panel Review by Northern Gateway Pipelines Limited Partnership. SL Ross, (2012), “J Meso-scale Weathering of Cold Lake Bitumen/Condensate Blend,” October 2012, <http://www.ceaa-acee.gc.ca/050/documents/p21799/85785E.pdf>.

4. Albion Synthetic Heavy is a blend of partially upgraded heavy oil (synthetic heavy) and bitumen with a density of 939 kg per cubic meter (five-year average, source: CrudeMonitor.ca). The precise blend is proprietary.

5. Western Canadian Marine Response Corporation.

6. Enbridge estimates that 20,082 barrels of crude oil were released from Enbridge’s Line 6B, 22.5% was Western Canadian Select (a proprietary oil sands blend of heavy crude—both bitumen and conventional heavy—SCO, and diluents); and 77.5% Cold Lake Blend—a dilbit. Source: Enbridge Pipelines LP. (2011), “Line 6B Incident, Marshall, Michigan Conceptual Site Model,” May 10, 2011, Approved July 8, 2011.

7. Enbridge estimated that 15–20% of the oil that reached the Talmadge Creek and Kalamazoo River submerged. Source: Northern Gateway Pipelines Limited Partnership (2012) “Northern Gateway Response to JRP Information Request No. 10 (A42038)” [https://www.neb-one.gc.ca/ll-eng/livelink.exe/fetch/2000/90464/90552/384192/620327/624798/823127/B74-2\\_-\\_NGP\\_Response\\_to\\_JRP\\_IR\\_No.\\_10\\_-\\_A2T9E4?nodeid=823025&vernum=0](https://www.neb-one.gc.ca/ll-eng/livelink.exe/fetch/2000/90464/90552/384192/620327/624798/823127/B74-2_-_NGP_Response_to_JRP_IR_No._10_-_A2T9E4?nodeid=823025&vernum=0), accessed 23 May 2013.

8. Crude oil that was released from the ruptured Line 6B was forced from the underground pipe and through the earth, emerged on the surface, and flowed overland before entering the freshwater of the Talmadge Creek and then down into the Kalamazoo River. Over time the density of the crude oil is reported to have fallen owing to evaporation, interaction with sediment, and the unique dynamic nature of the river. High river flows from recent rainfall and several constrictions and obstructions (dams/dikes) contributed to turbulent flow, are believed to have encouraged mixing, and may have contributed to driving spilled oil down into the water column. Source: Enbridge Pipelines LP. (2011), “Line 6B Incident, Marshall, Michigan Conceptual Site Model,” May 10, 2011, Approved July 8, 2011.

9. Source for the Government of Canada research, March 18, 2013 Transport Canada press release, “Harper government announces first steps towards World-Class Tanker Safety System,” <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>, accessed 23 May 2013. Source of Enbridge Northern Gateway potential condition, National Energy Board, Potential Panel Conditions, Attachment B—Collection of potential conditions, Pages 38–39, April 12, 2013, <https://www.neb-one.gc.ca/ll-eng/livelink.exe?func=ll&objId=942629&objAction=browse&redirect=3>. – accessed 11 June 2013.



## Funding

In all the jurisdictions we studied, the polluter is responsible for oil spill cleanup costs. But there are other costs. Who pays for regulating the industry, inspection, enforcement, and the activities taken to prepare for an oil spill? For all jurisdictions, both government and private funding play a role. The most sustainable funding model is one that adjusts with changes in shipping activity. Compared with Australia and Norway, the Canadian and US systems have weaker linkages between activity and funding (see the box “Funding”).

### Funding

**Canada.** In Canada, funding for prevention and response activities is from a mixture of private and public sources. While industry funding varies with shipping activity, federal funding is not directly linked to shipping activity.

Industry covers most spill response costs (through mandated third-party response organizations that charge shipping levies: ships are charged both flat fees and fees that vary with the cargo size) as well as costs for pilotage and for the regulatory review of new projects.

The federal government funds supports policy, regulation, and enforcement agencies, such as Transport Canada and the CCG, which deliver many prevention, response, and enforcement activities (including navigational aids, port control, inspections, weather forecasts, air and ship patrols, response planning, and exercises). Therefore, Canada’s prevention and response activities can be sensitive to federal budgets.

**United States.** Like in Canada, the US oil spill response is funded by a mix of public and private sources. The vast majority of the cost for US government agencies (such as the USCG and the US EPA) comes from the public and (as in Canada) this can be influenced by federal budgets.\* As in Canada, industry pays for private oil spill response organizations.

**Australia.** The shipping industry pays for most of the cost for regulation and spill response in Australia. Ships pay levies for aids to navigation, safety regulations, air surveillance, and port control. Levies also cover the cost of the National Plan and the provisions for response, including emergency response vessels, oil spill response, aircraft, and other expenses.

**Norway.** The Norwegian government covers most costs for preparing for ship-source and terminal oil spills. The extensive range of equipment held by national and local government and the oil industry (which is responsible for offshore oil spill response) has reduced the number of private cleanup contractors in Norway. Onshore response is supported in part by a fee companies pay to municipalities which allows them to include these capabilities in their response plans. Compared with other jurisdictions explored here, in Norway the public is exposed to more of the funding for prevention and response capability. However, unlike other nations explored in this analysis, Norway has a unique relationship with industry. The Norwegian government participates directly in the petroleum sector as an investor and is the majority owner of the country’s largest oil company.<sup>2,3</sup> As in other jurisdictions, in the event of a spill, the polluter is required to cover cleanup costs.

1. A small portion—we estimate less than 2%—comes from other means. US government agencies can receive allocations that are linked to shipping activity. For instance, agencies receive funding from the Oil Spill Liability Trust Fund that was established through a tax per barrel of oil transported by tanker. Appropriations for agencies from this fund are typically less than US\$100 million (see Figure 11 in the following source); meanwhile the USCG total budget in 2012 was over US\$10 billion. Source for appropriations funding: [http://www.uscg.mil/ccs/npsc/docs/PDFs/Reports/Liability\\_Limits\\_Report\\_2012.pdf](http://www.uscg.mil/ccs/npsc/docs/PDFs/Reports/Liability_Limits_Report_2012.pdf), accessed 22 May 2013. Source for USGC 2012 budget: [http://www.uscg.mil/top/about/doc/uscg\\_snapshot.pdf](http://www.uscg.mil/top/about/doc/uscg_snapshot.pdf).

2. Source: Norwegian Ministry of Petroleum and Energy, <http://www.regjeringen.no/en/dep/oed/Subject/state-participation-in-the-petroleum-sec/the-states-direct-financial-interest-sdf.html?id=445748>, accessed 22 May 2013.

3. Source: Statoil, <http://www.statoil.com/annualreport2011/en/shareholderinformation/pages/majorshareholders.aspx>, accessed 22 May 2013.



## PART 3: SPILL LIABILITY AND COMPENSATION

Concern about a proposed increase in the number of large tankers off Canada's West Coast is raising questions about the adequacy of spill compensation in Canada. Part 3 explores Canada's ship-source spill liability and compensation regime—how it functions, how much money is available, its sufficiency, and how Canada compares with other jurisdictions.

### CANADA FOLLOWS THE INTERNATIONAL REGIME: STRICT BUT LIMITED LIABILITY

Canada and 130 other nations have agreed to strict but limited liability for shipowners in oil spill compensation.<sup>1</sup> Strict liability provides few defenses for shipowners in the event of a spill: if a spill occurs and it came from a particular ship, the owner of that ship is liable. There are very few exceptions to this rule.<sup>2</sup> Because shipowners are by default automatically liable in the event of a spill, financial limitations (caps on the maximum amount the shipowner could owe in the event of a spill) have been imposed. Liability limits can be voided only if there is willful negligence on behalf of the shipowner. These liability limits were a compromise among shipowners, marine insurers, and coastal nations.

### INTERNATIONAL FUNDS PROVIDE ADDITIONAL SPILL COMPENSATION

If the cost of a spill exceeds the liability limit for a vessel (a ship's liability limit increases with the ship size to a maximum of C\$140 million), international compensation funds provide additional coverage to member states (and persons within them) for pollution damage.<sup>3</sup> The international compensation regime, including shipowner's liability and the international compensation funds, are paid out supplementally until full compensation is achieved or the funds are exhausted.

Since the initial pollution compensation fund was established in 1971, costs associated with oil pollution response and cleanup have increased, and the nature of loss admissible for compensation has broadened to include remediation and economic losses that flow directly from environmental damage. Compensation funds have also grown, and today two layers of international funding have been established: the International Oil Pollution Compensation Fund, 1992 (known as the 1992 Fund); and the International Oil Pollution Compensation Supplementary Fund, 2003 (known as the Supplementary Fund).<sup>4</sup> Combined these funds are

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1. Source of number of nations that have ratified: IMO, Status of Conventions, [www.imo.org/about/conventions/statusofconventions/pages/default.aspx](http://www.imo.org/about/conventions/statusofconventions/pages/default.aspx), accessed 18 April 2013. Key components of the international regime (as supported by the ratification of most nations) include the Civil Liabilities Convention (CLC); the International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage; and the International Convention on Civil Liability for Bunker Oil Pollution Damage.

2. Exceptions are acts of war or grave natural disasters, sabotage, or negligence of public authorities.

3. Ship liability limitations are established internationally and are valued in International Monetary Fund (IMF) Special Drawing Rights (SDRs), which are supplementary foreign exchange reserve assets. SDRs represent a claim to currency held by IMF member countries for which they may be exchanged. Note: 1 SDR = C\$1.528 on 12 April 2013.

4. The Supplementary Fund Protocol was adopted in 2003 and entered into force in 2005.

capable of providing up to C\$1.18 billion in compensation per incident and would contribute to cover costs if a spill occurred in Canadian waters.<sup>1</sup>

Canada is a party to both international funds and has also established its own additional layer of compensation domestically. Canada's Ship-Sourced Oil Pollution Fund (SOPF) can provide up to C\$159 million of additional compensation. The SOPF is funded by a tariff charged on the loading or unloading of crude oil from tankers in Canada.<sup>2</sup> Like other funds, the SOPF has a prescribed limit. It can also be used to address other types of marine pollution, such as so-called mystery spills (spills of unknown origin). In the absence of any major spills in recent history within Canadian waters, it has been fully funded since 1976. Table 2 shows the total value of oil spill compensation funds in Canada.

## ADEQUACY OF COMPENSATION

Based on historical evidence, the international funding levels have been sufficient to cover most oil spills from ships. Since the International Oil Pollution Compensation (IOPC) Funds were established in 1978, it has been involved in 145 incidents and cumulatively paid out about C\$900 million for compensation.<sup>3</sup> In 2004, a study by the IOPC Funds looked at the question of adequacy of compensation. It found that from 1978 to 2002 in over 5,800 spills worldwide (not including the United States which does not participate in the international regime) 98% of incidents were fully compensated by the first layer of coverage—ship-owner liability (about C\$140 million).<sup>4</sup> According to the IOPC there are no incidents that it has been involved in that exceeded (or are expected to exceed) the level of compensation currently available in Canada (in excess of C\$1.3 billion).<sup>5</sup> Since the Supplementary Fund was established in 2003, it has yet to be used.<sup>6</sup>

However, if a very large spill were to occur, under the right conditions, the level of compensation could be insufficient. To date, the most expensive tanker oil spill remains the *Exxon Valdez* incident, for which cleanup expenses alone exceeded US\$2 billion (taking into

1. These funds are administered by the International Oil Pollution Compensation Fund (IOPC) and are financed by contributions from member countries based on their crude oil import/export levels. Accessing these funds is not automatic, and claimants are required to prove their economic loss. Compensation is available to all parties, including shipowners, and there is no priority for compensation. All successful claims are paid out proportionally—including if claims exceed available funds. These funds cover quantifiable economic losses. Indirect environmental damages arising from the long-term impacts (nonrestorable) on wildlife habitat, such as on fish stocks, local birds, and other wildlife populations, are not covered.

2. The SOPF was established in 1989 and took over from its precursor organization, the Maritime Pollution Claims Fund, which had existed since 1973.

3. Based on £567 as reported in the IOPC (2012), "2012 Annual Report," Page 16, [http://www.iopcfunds.org/uploads/tx\\_iopcepublications/AR2012\\_e.pdf](http://www.iopcfunds.org/uploads/tx_iopcepublications/AR2012_e.pdf) - accessed June 13, 2013

4. Source: IOPC, "Review of the International Compensation Regime," Third Intersessional Working Group, Agenda Item 2, May 14, 2004. <http://documentservices.iopcfunds.org/meeting-documents/download/docs/2424/lang/en/> - accessed 13 June 2013.

5. Source: IOPC. Discussions with the IOPC. Note: Since 1978 there have been four incidents the IOPC has been involved in that exceeded the 1992 Fund levels (C\$318 million): the *Nakhodka* (1997), *Erika* (1999), *Prestige* (2002), and *Hebei Spirit* (2007). The *Hebei Spirit* is the only major incident to have occurred in recent years. Although this case is still ongoing, recent claims judgments in South Korea place the level of compensation required in excess of the 1992 Fund, but under what would have been available through the Supplementary Fund (had South Korea joined the supplementary fund at the time of the incident). Source: IOPC, *Hebei Spirit*, Recent Developments [update], January 2013, <http://www.iopcfunds.org/incidents/incident-map/#2007-185-December> - accessed 11 June, 2013 .

6. Source: IOPC, [www.iopcfunds.org/about-us](http://www.iopcfunds.org/about-us).

account other factors, such as economic loss and environmental damage, the costs are much higher).<sup>1</sup> Since this happened almost a quarter-century ago, it would be expected that the cost for a similar spill in a similar environment could be higher today. Some studies have suggested that costs arising from a spill on the West Coast could exceed what is currently available in Canada.<sup>2</sup>

### **How does Canadian coverage compare?**

The level of compensation available in Canada exceeds what is available internationally. Although most nations have adopted the international regime, only a smaller subset (including Canada) participates in all levels of international funding. Of the two tiers of international funding (listed in Table 2, above), Canada is one of only 29 nations to have joined both funds and to have access to the full C\$1.18 billion. Most nations (110) have only joined the first tier of funding, which provides up to C\$318 million.<sup>3</sup> In the event the IOPC funds are inadequate, Canada's SOPF provides an additional layer of compensation (\$159 million), making the total available funding available in Canada (from domestic and international regimes) \$1.3 billion per incident.

The United States is often cited to contrast with the international regime, as it has chosen to opt out of the international liability and compensation regime and establish its own rules. The US system has many similarities to the international regime—strict but limited liability and a compensation fund for remediation and uncompensated damages. Shipowner liability extends to \$1 billion, and a domestic compensation fund is available to provide up to \$1 billion each for remediation and uncompensated damages. In total this amounts to \$2 billion (\$1 billion in uncompensated funding is provided as coverage should the polluter be unknown or unable or unavailable to pay.) The US federal regime also does not preempt state law, and some states, including Alaska and Washington, have established unlimited liability. Although unlimited liability may seem attractive to some stakeholders, shipowners, could choose to manage risk under such a regime by incorporating each vessel separately. In the instance of a large liability (which exceeds their insurance), shipowners could opt for abandonment as a mitigation strategy, an option that helps no one.

In contrast to most other jurisdictions, in the United States damage to the environment that cannot be directly restored (such as long-term impact to the ecosystem and wildlife) is also covered. The ultimate value of this greater liability is a matter of debate. Although one might conclude that broader coverage is better coverage, these costs are harder to substantiate and can be significant, which can reduce the funding available for other damages. For

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1. Note: Total settlement still ongoing. Source: Exxon Valdez Oil Spill Trust Council, <http://www.evostc.state.ak.us/facts/qanda.cfm>, - accessed 22 May 22, 2013.

2. Hotte, N. and Sumaila, U. R. (2012), "Potential economic impact of a tanker spill on ocean-based industries in British Columbia." Fisheries Centre Research Reports, 2012 V. 20, No. 7.

3. IMO, Status of Conventions, [www.imo.org/about/conventions/statusofconventions/pages/default.aspx](http://www.imo.org/about/conventions/statusofconventions/pages/default.aspx), accessed 12 April 2013.

Table 2

**Oil tanker pollution compensations funds and limits available in Canada**

Compensation funds and liability limits (international liability and compensation funds apply cumulatively)	Value (Canadian dollars) <sup>1</sup>
<b>Civil Liability Convention &amp; Shipowner Liability (est. 1992)</b> In the event of an incident that results in ship-source pollution, the liability of the shipowner is capped under the International Convention of Civil Liabilities, which Canada adopted in the Marine Liability Act. Shipowners are obligated to maintain insurance to this level of coverage.	\$140 million
<b>International Oil Pollution Compensation Fund (est. 1992)</b> This fund pays compensation for oil pollution damage should full compensation not be reached under CLC. These funds are paid out as top-up to the shipowner's liability, or for the full amount should the shipowner not be liable.	\$318 million
<b>International Oil Pollution Compensation Supplementary Fund (est. 2005)</b> This top-up fund is used if there is a valid claim and the prior levels of funding are inadequate to address the level of compensation required.	\$1.18 billion
<i>Total compensation available from ship owners and international funds</i>	\$1.18 billion <sup>1</sup>
<b>Ship-Sourced Oil Pollution Fund (est. 1989)</b> This fund, which is unique to Canada, is available to provide funds, in addition to the international liability regime, up to \$159 million. It can be applied to mystery spills, and all classes of ships (not solely oil tankers).	\$159 million
<i>Total compensation available in Canada (inclusive of international funds)</i>	\$1.34 billion

Source: IHS CERA, Wave Point Consulting Ltd.

1. The international compensation regime, including shipowner's liability and the international compensation funds, are paid out supplementally up to C\$1.18 billion. In the event shipowners are unavailable to pay, the international regime will cover this share of the compensation regime.

Note: Estimated value in Canadian dollars based on IMF Special Drawing Rights (SDRs) which are supplementary foreign exchange reserve assets. SDRs represent a claim to currency held by IMF member countries for which they may be exchanged. Note 1 SDR = C\$1.54 on 13 February 2013.

example, about a quarter of the damages that Exxon paid as a result of the *Valdez* spill were environmental.<sup>1</sup>

There are no international provisions to prevent Canada from implementing additional compensation measures (such as the SSOF Canada already has in place). The Government of Canada has announced plans to review these issues. A panel of experts was appointed on 18 March 2013 to review the current state of maritime tanker safety in Canada, and the Department of Transport has also announced its intention to modernize the SOPF, which will include a review of the current liability and compensation regime for ship-source oil pollution.<sup>2</sup> The results of both reviews are expected this fall.

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1. Total costs have been estimated at over \$4 billion: cleanup (over US\$2 billion); fines and penalties (which included environmental damages, over \$1.1 billion); and private claims of economic loss (just under US\$1 billion). Some litigation is still ongoing, and this estimate does not include costs for legal fees, interest, and salvage. Source: Multiple Sources: Exxon Valdez Oil Spill Trust Council for clean-up cost and fines and penalty costs, <http://www.evostc.state.ak.us/facts/qanda.cfm> and Exxon Qualified Settlement Fund for civil litigation costs, <http://www.exspill.com/News/LitigationHistory/tabid/1918/Default.aspx>, both accessed 7 June 2013.

2. Sources: Transport Canada (2013), Press Release, <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>, accessed 23 May 2013. Transport Canada (2013), Press Release, <http://www.tc.gc.ca/eng/mediaroom/backgrounders-tanker-safety-system-liability-compensation-7091.htm>, accessed 4 June 2013.

## CONCLUSION

For most coastal nations, the transport of crude oil by sea is a common and often large-scale practice. Currently oil tanker activity on the West Coast of Canada is modest by comparison. Pipeline projects have been proposed to export greater volumes of crude from the Canadian West Coast, raising questions about Canada's ability to ship crude safely.

Although the *Exxon Valdez* incident is still a relevant example of the extent of damages that can result from an oil spill, new technology and practices implemented since 1989 have greatly reduced the potential for this type of event. Spill frequency and volumes have declined over the past few decades as a result.

The rules in Canada tend to be similar to those of other nations, since the international nature of maritime shipping has led to regulatory consistency across jurisdictions. How nations apply these rules, however, in terms of prevention and response measures such as pilotage, spill response plans and capabilities, and aids to navigation, can differ, reflecting the resources and needs (economic, social, and environmental) of each country. In this context, in comparing regions, it becomes clear that what is best for one or even several nations may not be best for all, and comparisons should be made carefully.

The prospect of increased tanker traffic on Canada's West Coast has led to new questions that have prompted the Government of Canada, in March 2013, to appoint an expert panel to review the country's current tanker safety system and to propose improvements.<sup>1</sup> The regulatory review process is currently under way for the Northern Gateway Project and expected later for the Trans Mountain Pipeline Expansion. Both reviews are likely to result in recommendations for improvements. This year Canada started a national risk assessment study and has announced, among other improvements, the implementation of an incident command system for the CCG.

Improvements in Canada's level of prevention and response capabilities on the West Coast in response to increased tanker movements would enhance the safety of the shipping industry as a whole. For example, more large tugs and greater spill response capabilities that would accompany the Northern Gateway Project would improve safety not only for those operations, but also all other shipping activity in the region.

Consequently, if Canadian West Coast tanker movements increase, it is likely that some measures taken to prepare for an oil spill would be adjusted from current practice to reflect the growing need. Ultimately this could lead to improved safety for all shipping in the region.

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1. Transport Canada (2013), Press Release, <http://www.tc.gc.ca/eng/mediaroom/releases-2013-h031e-7089.htm>, accessed 23 May 2013.

## REPORT PARTICIPANTS AND REVIEWERS

On 21 March 2013, IHS CERA hosted a focus group meeting in Vancouver, British Columbia, to provide a venue for oil sands stakeholders to discuss perspectives on the key issues related to transport of Canadian oil sands (and other crude oils) by tanker. Additionally, a number of participants reviewed a draft version of this report. Participation in the focus group or review of the draft report does not reflect endorsement of the content of this report. IHS CERA is exclusively responsible for the content of this report.

American Petroleum Institute (API)

Alberta Innovates, Energy and Environmental Solutions

British Columbia Chamber of Shipping

British Columbia Ministry of Environment

British Columbia Pilots Association

BP Canada

Canadian Association of Petroleum Producers

Canadian Oil Sands Limited

Cenovus Energy Inc.

Conoco Phillips Company

Canadian Natural Resources Ltd.

Government of Alberta, Department of Energy

Enbridge Northern Gateway Pipelines LP

IBM Canada

Imperial Oil Ltd.

In Situ Oil Sands Alliance (IOSA)

Kinder Morgan Canada

Puget Sound Harbor Safety Committee

Statoil Canada Ltd.

Suncor Energy Inc.

Total E&P Canada Ltd.

TransCanada Corporation

United States Coast Guard

Washington State Department of Ecology

Western Canada Marine Response Corporation



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## ANNEX A: INTERNATIONAL MARITIME SHIPPING GOVERNANCE

At one time, a nation's territorial waters—those waters where all domestic laws apply—were determined by the distance of a cannon shot from shore: about 3 nautical miles.<sup>1</sup> As technology advanced, nations extended their reach into the offshore. To address the potential for conflicting interests between nations, a common set of rules was needed.

The United Nations has been central in establishing these common rules, the most important mechanisms being the United National Convention on the Law of the Sea (UNCLOS) and the International Maritime Organization (IMO). It is important to understand that the regulations that govern international shipping are fluid and are evolving continually as members to these conventions raise issues and concerns and seek to amend the existing rules.

### THE UNITED NATIONS CONVENTION ON THE LAW OF THE SEA

To date, 165 nations have ratified UNCLOS, including Canada (but not the United States). UNCLOS establishes jurisdictional boundaries between international waters and waters controlled by nations. Within a nation's internal waters (which generally includes all rivers, fjords, inlets, canals, and harbors), the federal government is free to impose whatever requirements it sees fit, including limiting access to certain types of vessels.<sup>2</sup> Today, coastal nations' ability to regulate is principally limited to the first 12 nautical miles offshore, known as territorial waters. Within these waters other nations have the right to "innocent passage," which is regarded as the peaceful and meaningful movement through these waters. Past this point a coastal nation's sovereignty diminishes and a key international principle of the freedom of navigation takes on increasing importance. However, coastal nations have the exclusive right to all natural resources and to protect the environment up to 200 nautical miles offshore.

### THE UNITED NATIONS INTERNATIONAL MARITIME ORGANIZATION

The IMO was established to help address the jurisdictional challenges of regulating international shipping and is the primary international body for establishing rules and guidelines for the shipping industry. Its purpose is to improve the safety and security of shipping and the prevention of marine pollution by ships. This includes helping to ensure consistency between the rules established within various distinct coastal states as well as with the countries in which vessels are registered.

It is through the IMO that a number of international conventions and agreements have been implemented, such as the Civil Liability Conventions and International Oil Pollution Compensation Fund, which established the international liability and compensation regime discussed in Part 3; the Safety of Life at Sea Conventions (SOLAS), which put in place minimum standards for construction and operation of ships; or the International Convention

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1. A nautical mile is approximately 1.15 miles, or 1.85 kilometers.

2. This could include limitations on vessel size, design, equipment, and/or onboard communications and navigation aids. For example, in the United States special requirements were placed on tankers transporting US crude oil between US ports. The Jones Act requires such tankers to be owned, operated, and crewed by US citizens.

for the Prevention of Pollution from Ships (MARPOL), which aims to minimize ship-source pollution and phase out international single-hull tankers.

## **ANNEX B: KEY POLICY TOOLS FOR SAFETY OF MARITIME SHIPPING**

Maritime shipping, including oil tankers, can pose a risk to marine ecosystems. To mitigate these risks, a suite of domestic and international policies has been adopted, aimed at prevention, response, and mitigation. Table B-1 is a list of key policies, both domestic and international; their purpose; and how they influence maritime shipping (particularly tanker activity) in Canada.

Table B-1

## Summary of key maritime shipping policy tools

Instrument	Domestic or international policy	Purpose of measure	Description
Double hull tankers <sup>1</sup>	International	Prevention	Requires all tankers above 5,000 mt. to be double hulled by 2015.
Special Areas (SAs) <sup>1</sup>	International but onus is on domestic policy to identify areas	Prevention	SAs impose rules to prevent/limit ship-source pollution (such as sewage, air pollutants, etc.) outside a state's territorial waters in environmentally sensitive areas. For example Canada created an area in the Bay of Fundy to protect whales from shipping.
Particularly Sensitive Sea Areas (PSSAs) <sup>1</sup>	International, but onus is on domestic policy to identify areas	Prevention	PSSAs impose special rules, including routing measures, in areas beyond a state's territorial waters to protect ecologically or scientifically sensitive areas vulnerable to damage by marine shipping. For example, Australia created an area to protect the Great Barrier Reef from the risks posed by marine shipping.
International Safety Management (ISM) Code	International	Prevention	Provides an international standard for safe management of ships for pollution prevention. This requires that each ship have a safety management system that includes, among other things, procedures for reporting accidents and responding to emergencies.
International Ship & Port Facility Security Code	International	Prevention	Requires that a minimum level of security be established for ships and port facilities. For instance ships and ports must have security plans, security officers, and equipment as well as monitoring and restrictions on ship/port accessibility.
International Convention on Standards of Training, Certification and Watchkeeping for Seafarers	International	Prevention	Establishes minimum standards for masters, officers, and watch personnel on merchant vessels.
Places of refuge	International, but onus on domestic policy to identify areas	Prevention / mitigation	Identifies a prescribed location where ships can go if they need assistance. Examples include the accidental pollutants or the need for medical assistance (e.g., communicable disease outbreak).
Port state of control	International	Prevention	Inspection of ships ensures compliance with international, flagged-state, and domestic rules.

**Table B-1**  
**Summary of key maritime shipping policy tools (continued)**

Instrument	Domestic or international policy	Purpose of measure	Description
International Convention on Oil Pollution Preparedness, Response, and Co-operation	International	Response/mitigation	Requires ships to report pollution and participating nations to be prepared in the event of a spill (e.g., have detailed response plans, run response exercises, and stockpile response equipment) and to render assistance to one another.
Civil Liabilities Convention (CLC) and the International Oil Pollution Compensation Fund (IOPC Fund)	International	Mitigation	Imposes strict liability on the ship owner for marine pollution and establishes an international compensation fund to provide assurance that funds are available for cleanup and damages.
Ship-Source Oil Pollution Fund (SSOF)	Domestic	Mitigation	Establishes an additional layer of compensation funding in Canada that provides assurance that in the event of a spill, funds are available to address cleanup and damages. This fund can also cover costs to address the risk of oil pollution from ships, such as salvages, etc.
Aids to navigation	Domestic	Prevention	Canada provides navigational aids such as lights, buoys, markers, fog signals, radar, and radio, as well as weather forecasts. Canada also requires all ships within its waters to use appropriate Canadian maps, and merchant vessels must signal their location at all times.
Compulsory marine pilotage	Domestic	Prevention	Mandatory pilotage is required in certain coastal water areas of Canada using specially trained pilots with local knowledge of the area aid in the navigation of ships in coastal waters.
Marine Protected Areas	Domestic but principal routes also in international law	Prevention	Provides additional protection for areas of high biodiversity that can extend from all or a portion of the sea surface through to the seabed. Can impose special navigational or pollution rules around sensitive environmental areas (either more cautious rules or routing measures)
Oil spill response	Domestic	Response/mitigation	Canada Shipping Act establishes regulations to protect all navigable waters and imposes regulations on vessels, tankers, and oil handling facilities. It also requires all merchant vessels to employ the services of a dedicated, professional spill response organization within Canada.



**Table B-1**

**Summary of key maritime shipping policy tools (continued)**

Instrument	Domestic or international policy	Purpose of measure	Description
Port authorities and terminal procedures	Domestic	Prevention/Response	Port authorities can establish procedures for safe loading and unloading, which can also provide for more rapid response in the case of emergency.
Project specific risk assessments (e.g., environmental assessments, joint review process, etc.)	Domestic	Prevention/Response/Mitigation	Project-specific reviews associated with port expansions or new terminals can identify, mitigate, or avoid risks associated with a specific project. This can include terminal operations, vessel navigation, potential pollution, and sensitive ocean areas.
Tug assistance	Domestic	Prevention	Standby tugs provide rapid response to intercept and assist ships in distress which can prevent incidents from becoming accidents or spills.
Vessel traffic services	Domestic	Prevention	Provides vessel traffic management, not unlike air traffic controllers. Vessels are required to identify themselves upon entering Canadian waters and provide regular check-ins.

Source: IHS CERA, Wave Point Consulting Ltd.

1. These measures all fall under the auspice of International Convention for the Prevention of Pollution from Ships (MARPOL).

## ANNEX C: IHS MARITIME REGIONAL TANKER ACTIVITY AND INCIDENT AND SPILL DATA

**Table C-1**

**Annual port callings of tankers in select jurisdictions in 2012<sup>1</sup>**

Country/region	Small tankers			Large tankers		
	Coastal	Handy <sup>2</sup>	Panamax	Aframax	Suezmax	VLCC & larger
China	23,147	17,234	1,646	862	155	1,002
Australia	977	706	1,827	19	817	95
Norway	3,417	1,369	54	281	182	11
United States	850	31,029	4,220	9,704	3,218	696
East Coast	61	4,593	784	653	249	-
US Gulf Coast	707	24,148	2,878	8,567	1,584	612
West Coast <sup>3</sup>	82	2,288	558	484	1,385	84
Canada <sup>4</sup>	403	2,766	146	236	358	60
East <sup>5</sup>	403	2,377	97	182	358	60
West	-	389	49	54	-	-

Source: IHS Maritime.

1. A port calling is defined as a ship arriving, berthing, and sailing and is counted as one call.

2. Handy size category includes up to Medium Range (MR) tankers (to everything smaller than Panamax).

3. US West Coast includes movements in the State of Alaska. In 2012 there were 588 movements; 263 were large tankers up to Suezmax which singularly accounted for 244 of these movements.

4. Canada has tanker movements on the great lakes that are not included here. In 2012, there were an estimate 1,362 small tanker port callings (no large tanker).

5. Canadian East Coast port callings include those that occur in the St. Lawrence.

**Table C-2**

**Occurrence of incidents and spills from 1993 to 2012 for large double hull tankers**

Location		At sea		Territorial and inland waters <sup>1</sup>		In port or harbors	
		Incident	Spill	Incident	Spill	Incident	Spill
Cause of incident (and spill)	Collision or contact	55	3	42	3	55	5
	Machinery (or hull) failure	71		17	1	25	1
	Grounding	23	1	44	2	10	
	Fire/explosion	7		2		13	
	Break-up	4		1		3	
	Other	3		0		1	
<b>Total</b>		<b>163</b>	<b>4</b>	<b>106</b>	<b>6</b>	<b>107</b>	<b>6</b>

Source: IHS Maritime.

1. Includes coastal waters, rivers, canals, and fjords.