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TERMPOL Review Process Report
on the
Enbridge Northern Gateway Project

Canada 

Northern Gateway Project TERMPOL Review Process Report

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FOREWORD

This report has been prepared and approved by the following government authorities:

Transport Canada
Environment Canada
Fisheries and Oceans Canada
Canadian Coast Guard
Pacific Pilotage Authority Canada

Approved for Publication:

A handwritten signature in black ink, appearing to read 'Donald Roussel', with a long, sweeping flourish extending to the right.

20/02/2012

Donald Roussel
Director General, Marine Safety
Transport Canada

GLOSSARY

Automated Identification System (AIS) - Ships of 300 tonnes gross tonnage or more (other than fishing vessels) engaged on an international voyage and domestic ships of 500 tonnes gross tonnage or more (other than fishing vessels) must be fitted with an automatic identification system. Automated Identification Systems automatically provides information, including the ship's identity, type, position, course, speed, navigational status and other safety-related information, to equipped shore stations, other vessels and aircraft.

Ballast - Ballast water is brought on board a vessel to increase the draught and change the trim so as to regulate the stability or maintain stress loads within acceptable limits. The Ballast Water Control and Management Regulations under the *Canada Shipping Act, 2001* address the growing problem of aquatic species that may be carried in vessels' ballast water.

Bitumen – Crude oil in semi-solid or solid forms.

Canada Shipping Act, 2001 - The *Canada Shipping Act, 2001* is the principal statute that governs safety in marine transportation and protects the marine environment. The *Canada Shipping Act, 2001* seeks to balance shipping safety and marine environment protection while encouraging maritime commerce. The *Canada Shipping Act, 2001* applies to all vessels operating in Canadian waters and Canadian vessels worldwide.

Classification Societies - classification societies (such as Lloyd's Register, the American Bureau of Shipping, Det Norske Veritas, etc), are organizations with the expertise and capabilities to inspect, verify and certify that vessels are built, maintained and operated in accordance with established and recognized rules, regulations and standards to ensure vessel safety.

Condensate – Refined hydrocarbons, usually derived from crude oils. They are liquid at standard pressure and temperature.

Crude oil - Un-processed naturally occurring petroleum product.

Double Hull - A type of hull where the bottom and sides of a vessel have two complete layers of watertight hull surface

Electronic Chart Display and Information System (ECDIS) – An Electronic Chart Display and Information System is a computer-based navigation information system that complies with International Maritime Organization regulations. It can be used as an alternative to paper nautical charts. An Electronic Chart Display and Information System displays the information from electronic navigational charts or digital nautical charts and integrates position information from the Global Positioning System and other navigational sensors, such as radar and automatic identification systems. It may also display additional navigation-related information, such as sailing directions and fathometer readings.

Escort Tug - A vessel with capabilities to provide assistance that accompanies another vessel. The scope and range of the capabilities to provide assistance are determined by those establishing and using the service. Some escort tugs can be tethered to the vessel in order to provide a different level of service.

Flag State - Country of registry of a sea going vessel. A flag state prescribes the safety standards and pollution prevention requirements applicable to sea going vessels flying its flag.

Joint Review Panel – The Joint Review Panel for the Enbridge Northern Gateway Project is an independent body, mandated by the Minister of the Environment and the National Energy Board. The panel will assess the environmental effects of the proposed project and review the application under both the *Canadian Environmental Assessment Act* and the *National Energy Board Act*.

International Maritime Organization (IMO) - Established in 1948 at an international conference in Geneva, the IMO Convention entered into force in 1958 and the new organization met for the first time the following year. The International Maritime Organization's main task has been to develop and maintain a comprehensive regulatory framework for shipping. Its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.

Marine Communications and Traffic Systems (MCTS) - The Marine Communications and Traffic Services program provides safety radio-communication services, vessel traffic information and a commercial marine telephone call service on a 24/7 basis.

Marine Liability Act - The *Marine Liability Act*, which has been in force since August 2001, is the principal legislation dealing with the liability of shipowners and ship operators in relation to passengers, cargo, pollution and property damage. The intent of the legislation is to set limits of liability and establish uniformity by balancing the interests of shipowners and other parties.

National Oil Spill Response and Preparedness Regime - Transport Canada is the lead federal regulatory agency responsible for the regime, which was established in 1995 and is built on a partnership between government and industry. Within the framework of the regime, Transport Canada sets the guidelines and regulatory structure for the preparedness and response to marine oil spills.

Navigable Waters Protection Act (NWPA) - Transport Canada, through the Navigable Waters Protection Program administers the *Navigable Waters Protection Act*. Approvals under the Act are granted under the authority of the Minister of Transport. The *Navigable Waters Protection Act* aims to minimize the extent to which projects might interfere with navigation on waters throughout Canada. It ensures a balance between the public right to navigate and the need to build works such as bridges, dams, pipelines or docks in navigable waters.

Northern Gateway Project - Enbridge Northern Gateway Pipelines Ltd. (the proponent) is proposing to construct and operate 1,170 kilometres of twin pipelines within a single right of way between an inland terminal at Bruderheim, Alberta, and a marine terminal near Kitimat, British Columbia. One of the pipelines will transfer a mixture of crude oil and condensate west from Bruderheim to Kitimat and the second pipeline will carry condensate east from Kitimat to Bruderheim. In addition, the proponent proposes to construct and operate a marine terminal for loading and unloading oil tankers. The project also addresses marine transportation of oil and condensate along the proposed shipping routes that are within the 12 nautical-mile limit of Canada's territorial sea.

Pilotage - Marine pilotage involves a mariner with extensive knowledge of a local waterway and its ports boarding a ship to guide it safely to its destination.

Pilotage Act - Parliament enacted the *Pilotage Act* in 1972 and amended it in 1998. It establishes the following four Pilotage Authorities that operate, maintain and administer a safe and efficient pilotage service within their respective regions: the Atlantic Pilotage Authority, the Laurentian Pilotage Authority, the Great Lakes Pilotage Authority and the Pacific Pilotage Authority.

Port State Control - Port State Control is a program for boarding and inspecting foreign vessels entering a sovereign state's waters to ensure they comply with major international maritime conventions.

Regional Advisory Councils (RACs) - The Minister of Transport appoints Regional Advisory Councils pursuant to section 172 of the *Canada Shipping Act, 2001* to provide advice on the preparedness and response regime set out in Part 8 of the Act. Regional Advisory Council members provide a cross-representation of the communities and interests potentially affected by an oil spill.

Safety management systems (SMS) - Safety management systems are formal management systems that strengthen safety awareness and pollution prevention practices. Safety management systems integrate formal rules and processes to enhance the safety of daily operations, and seek to identify and manage any risks before they lead to accidents. In short, safety management systems allow vessel owners and operators to have a safety system that prepares them for the realities of day-to-day work and that meets safety management regulatory requirements.

Ship Inspection Report Program (SIRE) - This program was originally launched in 1993 to specifically address concerns about sub-standard shipping. The Ship Inspection Report program is a unique tanker risk assessment tool of value to charterers, ship operators, terminal operators and government bodies concerned with ship safety. The program operates a very large database of up-to-date information about tankers and barges.

International Convention for the Safety of Life at Sea (SOLAS)- This convention is an international maritime safety treaty. The convention, in its successive forms, is generally regarded as the most important of all international treaties concerning the safety of merchant ships. The first version was adopted in 1914, in response to the Titanic disaster. Newer versions were adopted in 1929, 1948, 1960 and 1974. The *International Convention for the Safety of Life at Sea (SOLAS), 1974*, requires flag states to ensure that their ships comply with minimum safety standards in construction, equipment and operation.

Tanker Acceptance Program (TAP) – A program proposed by the proponent with respect to the Northern Gateway Project. According to the proponent, under their Tanker Acceptance Program, tankers will be vetted by independent, third-party agencies and will be required to meet the terminal operator's safety and environmental standards prior to being cleared to berth at the Kitimat marine terminal.

TERMPOL – “TERMPOL” stands for “Technical Review Process of Marine Terminal Systems and Transshipment Sites.” It dates from the late 1970s when an interdepartmental committee reviewing marine pollution issues identified the need for a precise and reliable way to measure the navigational risks associated with placing and operating marine terminals for large oil tankers. The process was further revised in 2001 and is the one used today. TERMPOL is an extensive yet voluntary review process that proponents involved in building and operating a marine terminal system for bulk handling of oil, chemicals and liquefied gases can request. It focuses on the marine transportation components of a project.

TERMPOL Review Committee - Transport Canada chairs a TERMPOL Review Committee for this project. The following agencies and organizations have been involved in the TERMPOL Review Process: Transport Canada; Fisheries and Oceans Canada; the Canadian Coast Guard; Environment Canada; Aboriginal Affairs and Northern Development Canada; Canadian Hydrographic Services; the Department of Justice Canada; the British Columbia Ministry of Environment; Pacific Pilotage Authority Canada; British Columbia Coast Pilots; the City of Kitimat; Haisla First Nations; the British Columbia Chamber of Shipping; and the Council of Marine Carriers.

Vessel Traffic Services (VTS) – Vessel Traffic Services provides a means of exchanging information between ships and a shore-based centre. Canada’s Vessel Traffic Services system is operated by certified Marine Communication and Traffic officers who monitor the movement of vessels using VHF (very high frequency) radio and direction-finding equipment, tracking computers and, in areas of high traffic density, surveillance radar. The Canadian Coast Guard, Pacific Region, operates three Vessel Traffic Services zones: Vancouver, Tofino and Prince Rupert.

Vetting – Oil exporters have established extensive inspection programs, referred to as “vetting,” to prevent unsafe tankers from entering into service.

1. INTRODUCTION

1.1 Project Background and Description

Enbridge Northern Gateway Pipelines Ltd. (the proponent) is proposing to construct and operate 1,170 kilometres of twin pipelines within a single right of way between an inland terminal at Bruderheim, Alberta, and a marine terminal near Kitimat, British Columbia. One of the pipelines will transfer a mixture of crude oil and condensate west from Bruderheim to Kitimat and the second pipeline will carry condensate east from Kitimat to Bruderheim. The proponent also proposes to construct and operate a marine terminal for loading and off-loading product from crude oil and condensate tankers. The project also addresses the transportation of crude oil and condensate along proposed shipping routes within the 12 nautical mile limit of Canada's territorial sea.

The proponent estimates that each year:

- it would export approximately 30 million tonnes of crude oil;
- it would import about 11 million tonnes of condensate; and
- up to 250 oil tankers would call at the Kitimat marine terminal.

Of these 250 vessels, up to 60 would have a deadweight of 320,000 tonnes. While there are currently large commercial vessels operating to and from Kitimat Harbour, the oil tankers used for the Northern Gateway Project would be larger. These vessels would operate in waters under Canadian jurisdiction and would have to comply with Canada's regulatory regime for the safe operation of vessels. In Canadian waters, and internationally, the requirements and responsibilities for safe vessel operation, and the monitoring and enforcement of those requirements, are well established through international conventions.

The proponent has stated that the oil tankers transiting to and from the Kitimat marine terminal will be chartered by other parties. For the Northern Gateway Project, the proponent is proposing to implement safety measures that exceed national and international regulatory frameworks for vessel safety and operations.

The proponent states it will ensure that the vessels meet these enhanced safety measures before they will be cleared to berth at its Kitimat marine terminal. These enhanced safety measures will be described in detail in the Northern Gateway Project Terminal Operations Manual and, Port Information Book, and enforced through the proponent's Tanker Acceptance Program.

1.2 The TERMPOL Process and Review Report

"TERMPOL" stands for "Technical Review Process of Marine Terminal Systems and Transshipment Sites." It was developed in the late 1970s when an interdepartmental committee reviewing marine pollution issues identified the need for a precise and reliable way to measure the navigational risks associated with placing and operating marine terminals for large oil tankers. The TERMPOL Review Process was revised in 1982 so it could be applied to other hazardous bulk cargoes. The process was further revised in 2001, and is the one used today. It is set out in Transport Canada's Technical Publication TP 743, TERMPOL Review Process 2001 found at the following link:
<http://www.tc.gc.ca/eng/marinesafety/tp-tp743-menu-655.htm>

TERMPOL is an extensive, although voluntary, review process in which proponents involved in building and operating a marine terminal system for bulk handling of oil, chemicals and liquefied gases can

participate. It focuses on the marine transportation components of a project (i.e., when a tanker enters Canadian waters, navigates through channels, approaches berthing at a marine terminal, and loads and unloads oil or gas). Through the TERMPOL Review Process, the proponent works with a review committee formed by federal departments and other stakeholder representatives. The committee may propose safety measures, above and beyond existing regulations, to address any site-specific circumstance.

The findings and recommendations of a TERMPOL report are not binding and the proponent may choose to adopt one or more of them. Recommendations cannot reduce the regulatory requirements of the *Canada Shipping Act, 2001*, but Transport Canada and other agencies, may use a TERMPOL committee's work and report to help determine the need for regulatory improvements or special measures.

A TERMPOL report should neither be interpreted as a statement of government policy, nor as the government endorsing the project being reviewed. The TERMPOL Review Process is not a regulatory instrument. No approvals or permits are issued as a result of the TERMPOL Review Process.

The TERMPOL report on the Northern Gateway Project analyzes the marine transportation necessary to support the project. The review process takes into consideration:

- studies, surveys and technical data produced by the proponent in support of the TERMPOL Review Process 2001 guidelines (TP743);
- current and anticipated national and international regulatory frameworks to ensure safe vessel operations; and
- current marine transportation activities along the proposed shipping routes.

In the 1970s a TERMPOL review was completed for the *Proposal of Kitimat Pipe Line Ltd.* There are some similarities between the marine transportation components of that project and the Northern Gateway Project. The 1977 TERMPOL report identified several recommendations to enhance safe vessel operations. Since that time, most of those issues and concerns have been addressed by national legislation and international regulatory frameworks for improvements in vessel construction, equipment requirements, crew certification and navigational information systems.

1.3 Scope of TERMPOL

The *TERMPOL Review Process 2001* guidelines lay out an extensive list of subjects to consider when analyzing vessel safety and the risks associated with vessel manoeuvres and operations. Based on those guidelines, the proponent produced studies, surveys and technical data on the marine transportation needed to support the Northern Gateway Project. The various federal departments, agencies, subject matter experts and technical advisors involved in the TERMPOL Review Process analyzed the proponent's project-related information, documentation and studies.

This review focuses on vessel safety and vessel operation safety in Canadian waters along the proposed shipping routes to and from the proposed Northern Gateway Project's Kitimat marine terminal. It examines vessel characteristics, the proposed routes, navigability, other waterway users and the marine terminal operations associated with vessel operations. It is a technical analysis designed to assess the risks to navigation and public safety associated with shipping and navigation.

The report also examines the marine transportation operations in the context of the existing marine regulatory regime. This appraisal gives federal government departments, agencies and the proponent an

opportunity to address new or changing issues, concerns or priorities related to the project's marine transportation components.

As set out in the *TERMPOL Review Process 2001* guidelines, the proponent submitted the following studies, surveys, and technical data and they were analyzed by the TERMPOL review team for this report:

- Origin, Destination and Marine Traffic Volume Survey
- Fishery Resources Survey
- Offshore Exercise and Offshore Exploration and Exploitation Activities Survey
- Route Analysis, Approach Characteristics and Navigability Survey
- Special Underkeel Clearance Survey
- Transit Time and Delay Survey
- Casualty Data and Survey
- Ship Specifications
- Site Plans and Technical Data
- Cargo Transfer and Transshipment Systems
- Channel, Maneuvering and Anchorage Elements
- Berth Procedures and Provisions
- Single Point Mooring Provisions and Procedures
- General Risk Analysis and Intended Methods of Reducing Risks
- Port Information Book
- Terminal Operations Manual
- Contingency Planning
- Oil Handling Facilities Requirements

The results of this review are in the "Analysis" section of this report and are divided into sections on the ships, the routes and the terminal.

There are other marine related issues and concerns surrounding the Northern Gateway Project that are addressed by other agencies, or using other established regulatory processes. The TERMPOL Review Process does not replace the safety, security and environmental requirements of any Acts and/or Regulations that are in effect. For example, the TERMPOL Review Process is not a mechanism to deliver on any of the proponent's requirements under the *Canadian Environmental Assessment Act*. Nor is it a process to approve or reject the Northern Gateway Project. The proponent must obtain any such approvals from the appropriate regulatory authorities, in accordance with their own specific processes.

The Northern Gateway Project includes a marine terminal and pipelines that could affect local navigation. During the regulatory phase of the project, the proponent will be required to apply for authorization to build these structures, with their related operations, under the *Navigable Waters Protection Act*. Transport Canada's Navigable Waters Protection Program will carry out analysis, assessments and consultations before determining if the application may be authorized.

The following issues are not addressed in this TERMPOL Review Process. They are described in greater detail in Transport Canada's written submission to the Enbridge Northern Gateway Project Joint Review Panel.

These issues are:

Liability and Compensation

The *Marine Liability Act* was adopted in 2001 and later amended in 2009. It is the principal legislation dealing with the liability of shipowners and vessel operators in relation to passengers, cargo, pollution and property damage. The *Marine Liability Act* is based on the polluter pays principle. There are various regimes available to pay for cleanup and compensation costs, such as shipowners' insurance, and domestic and international funds. A single oil pollution incident may draw compensation from multiple regimes. The Act sets uniform rules on liability and compensation by balancing the interests of shipowners and other parties involved in maritime accidents. It incorporates both international and domestic law, and provides for various levels of liability, depending on the type of oil causing the pollution damage and the type of ship involved in an incident.

Transport Canada's comments on the oil pollution liability and compensation, and the Northern Gateway Project are contained in Transport Canada's written submission to the Enbridge Northern Gateway Project Joint Review Panel.

Oil Pollution Response Planning and Preparedness

If the Northern Gateway Project proceeds, the proponent must meet all of Canada's oil spill preparedness and response regulations. While these elements are not covered by this TERMPOL review, a brief overview is provided here.

Transport Canada is the lead federal regulatory agency responsible for the National Oil Spill Preparedness and Response Regime, which began in 1995. This means that it sets the guidelines and regulatory structure for the preparedness and response to marine oil spills. The regime is a partnership between government and industry, governed under Part 8 of the *Canada Shipping Act, 2001* and its Regulations and standards. Canada, as an active member of the International Maritime Organization (IMO), has acceded to a number of international conventions that support the regime, such as the *International Convention on Oil Pollution Preparedness, Response and Co-operation*. Canada's regime reflects this convention.

Transport Canada ensures that, in Canada, an appropriate level of preparedness is available to respond to marine oil pollution incidents of up to 10,000 tonnes within set time standards and defined operating environments. The regime is built on the principle of cascading resources, which means that, in the event of a spill larger than 10,000 tonnes, the response can be supplemented by the Canadian Coast Guard, by resources from other regions or internationally through the *International Convention on Oil Pollution Preparedness, Response and Co-operation*.

Parts 8 and 9 of the *Canada Shipping Act, 2001* concern environmental response and pollution prevention. These Parts of the *Act* and their Regulations:

- require vessels and oil handling facilities to have emergency plans and arrangements with a Transport Canada-certified oil spill response organization before operations begin - this ensures that an appropriate level of preparedness is available to respond to marine oil spills, and
- provide the foundation for Transport Canada programs to certify and inspect response organizations, and to inspect oil handling facilities and vessels to ensure compliance.

Canada's Oil Spill Response Planning and Preparedness Regime is built upon the polluter pays principle, which makes the polluter liable for reasonable preparation and response costs associated with oil spills.

There is a designated lead federal agency for every type of environmental emergency. The Canadian Coast Guard is the lead agency for the response to ship-source and mystery marine spills, and other federal agencies assist. For example, Environment Canada, as co-chair of the Regional Environmental Emergency Team (REET) provides the Canadian Coast Guard with expert environmental advice to ensure an appropriate response to an incident. When the polluter is unknown, or is unwilling or unable to respond, the Canadian Coast Guard will manage the response.

When the polluter is known, willing and able to respond, the Canadian Coast Guard will advise the polluter of its responsibilities. Once satisfied with the polluter's intentions and plans, the Canadian Coast Guard will monitor the polluter's response, and provide advice and guidance as required.

Transport Canada works with stakeholders through a network of six Regional Advisory Councils. Each has seven members, representing people, groups and companies whose interests could be affected by spills. The role of each Regional Advisory Council is to address areas of mutual concern and to advise the Minister of Transport on issues related to the regime.

The Canadian Coast Guard and Environment Canada also have roles concerning oil pollution planning and preparedness.

2. METHODOLOGY

This TERMPOL report follows *TERMPOL Review Process 2001* (TP743) guidelines.

The TERMPOL Review Process for this proposed project began in 2005, at the proponent's request. It was then held in abeyance, awaiting further information until March 2009, when the proponent set a schedule to restart the review.

Transport Canada then invited representatives of federal departments and authorities, including specialized subject matter experts in marine transportation, to participate in the review of the marine transportation studies and information. The agencies and organizations that participated in the TERMPOL Review Process are listed in Appendix 3.

The first meeting of the participants was held on May 27, 2009, and two more meetings were held in 2010. These initial committee meetings identified the studies and related work the proponent should complete for review by committee members.

Committee members also held discussions on an ongoing basis by electronic mail and by telephone. The TERMPOL report was then completed by the five federal government authorities that have responsibilities for safe marine transportation: Transport Canada; Fisheries and Oceans Canada; Environment Canada; Canadian Coast Guard; and the Pacific Pilotage Authority Canada.

Since 2009, the proponent has completed 16 studies and submitted close to 3,500 pages of surveys, studies, technical data, analysis and other information^[1] related to the marine transportation components of the Northern Gateway Project. Discussions took place between review participants and the proponent, as required, to provide clarification and further information as needed. Participants from the various agencies reviewed the proponent's proposal and studies from the perspective of their respective mandates, regulatory authorities, responsibilities and expertise.

Overall, this report represents a coordinated federal government analysis of the marine transportation elements of the vessels and vessel operations that could be associated with the Northern Gateway Project. The views of the technical advisors and the subject matter experts as they relate to marine transportation have also been taken into account in the preparation of this report.

The analysis and commentary in this report are based on the information, documentation and technologies available at the time the report was written. Some aspects of this analysis may need to be re-evaluated if there is a substantial delay in the start of operations or change in the proposed Northern Gateway Project.

This report applies specifically to the proposed Northern Gateway Project and the associated marine transportation to and from the proposed Kitimat marine terminal.

This report should be read in conjunction with the *TERMPOL Review Process 2001* (TP 743) guideline and the information submitted by the proponent in support of its participation in this TERMPOL Review Process for the proposed Northern Gateway Project.

¹ See Appendix 4: List of Documents Submitted for TERMPOL.

All of the information provided by the proponent, for the TERMPOL Review Process, as well as some additional marine transportation background material and a significant amount of other project-related material, has been submitted to the Joint Review Panel. The marine transportation-related material forms volumes 8A, 8B and 8C of the Northern Gateway Project application material held on file with the Joint Review Panel at the National Energy Board web site. All of this material is also available at the Northern Gateway Project website.

This TERMPOL report was reviewed and approved by the five federal government authorities that have responsibilities for safe marine transportation. All technical advisors and the proponent were also briefed on the contents of the report.

3. ANALYSIS

The “General” section of the analysis introduces the proponent’s risk assessment studies. It is followed by an overview of the risk mitigation measures the proponent has committed to implementing through a comprehensive strategy.² The analysis then explores three areas in more detail: ship information, routing information and a review of terminal operations.

From the outset, it is understood that the ships involved in the proposed project would have to fully comply with all applicable Canadian and international laws and regulations. The *Canada Shipping Act, 2001* is the principal statute that governs safety in marine transportation and protects the marine environment from ship-source pollution in Canada. The Act references several international conventions and seeks to balance vessel safety and marine environment protection with the need for maritime commerce. Also very important are the *Pacific Pilotage Regulations* under the *Pilotage Act*, which establish mandatory pilotage areas along Canada’s West Coast.

This analysis is based on the assumption that, if the project should proceed, the proponent will implement all proposals, commitments, protocols, strategies, rules and its own requirements as described in its TERMPOL Review Process submissions. The “safety enhancements,” proposed and committed to by the proponent, have been an important consideration in the TERMPOL Review Team’s assessment of the project’s safety elements.

Recommendation 1: The proponent should notify the relevant authority if it wishes to alter any of the commitments, operational parameters or characteristics of the project, so the authority can review the safety elements of the changes.

3.1 General

One of the proponent’s key submissions is the Marine Shipping Quantitative Risk Analysis,³ which estimates the risk associated with the oil tankers that will be used for the Northern Gateway Project.

Risk Analysis

One of the foundations of the risk analysis is the Casualty Data Survey⁴ using vessel incident data, extracted from many sources, including Lloyd’s Register Fairplay casualty database. It shows steady improvements in worldwide oil tanker operations. The data also show that oil tankers have one of the best safety records in shipping. Recognizing the importance of understanding how the risk of oil spills is quantitatively determined, the proponent held a roundtable of stakeholders and First Nations groups to identify issues of concern.⁵ Participants contributed to the scoping, terms of reference and selection of the consultant that completed the Marine Shipping Quantitative Risk Analysis. Det Norske Veritas (DNV), a marine classification society that specializes in marine risk assessment, was selected by the round table participants to analyze the marine terminal and oil tanker operations along the proposed shipping routes.

² TERMPOL Review Process Study 3.15, section 15

³ Det Norske Veritas Marine Shipping Quantitative Risk Analysis

⁴ TERMPOL Review Process Study 3.8, Casualty Data Survey

⁵ Application Volume 8C, Preface

The Det Norske Veritas analysis:

- identifies the risks of operating very large oil tankers to and from Kitimat;
- demonstrates that the unmitigated risk for Northern Gateway oil tankers would be the same as, or less than the world averages for similar oil tanker and terminal operation in similar waters and conditions⁶; and
- identifies and evaluates several risk mitigation measures implemented by oil tanker and terminal operations around the world.⁷ The Det Norske Veritas evaluation describes how these mitigation measures could enhance the safety of marine transportation operations.

Risk Reduction Strategy

The proponent is committed to a series of risk reduction measures.⁸ They will be included in its strategy for ensuring that oil tankers meet high safety standards and operate in an environmentally sound manner. The risk reduction strategy and measures include:

- Full compliance with national and international regulatory frameworks, including the requirements for:
 - double hulls,
 - segregated ballast tanks,
 - internationally recognized crew certification,
 - pilotage,
 - arrangements with a certified response organization,
 - a shipboard oil pollution emergency plan, and
 - an electronic chart display and information system (scheduled to be in force in 2015)⁹
- Commitment to implement voluntary measures:
 - simulator training for pilots and tug crews;
 - a requirement for laden tankers in a confined channel¹⁰ area to have two escort tugs (one tethered);
 - a requirement for ballasted tankers to be accompanied by a close escort tug;
 - escort tugs available for ocean rescue;
 - tugs equipped with oil pollution emergency response equipment;
 - safe transit speeds identified in the Port Information Book;
 - a requirement for tankers to modify their speed to reduce harm to marine mammals;
 - a requirement for radar to be installed to monitor traffic and provide additional information to the Canadian Coast Guard's Marine Communications and Traffic Services;
 - a requirement for vessel operational safety limits covering visibility, wind and sea conditions;
 - a requirement for terminal operational safety limits covering visibility, wind and sea conditions;
 - the proponent's Tanker Acceptance Program;
 - non-acceptance of tankers with full width cargo tanks;

⁶ Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsection 7.8

⁷ Det Norske Veritas Marine Shipping Quantitative Risk Analysis, section 8

⁸ TERMPOL Review Process Study 3.15, section 15

⁹ TERMPOL Review Process Study 3.15, subsection 4.3.1, Application Volume 8B, subsection 13.5.2.2

¹⁰ Force Technology no.108-29930-ES Version 4.0, part 1: Executive Summary final report, subsection 3.1, figure 3.1

- highly skilled and trained terminal personnel;
- tug crews trained in emergency response;
- strategic location of response equipment;
- identification and prioritization of particularly sensitive areas; and
- deployment of a boom around tankers during cargo operations.

While many of the items above are mandatory regulatory requirements, others are safety enhancements not required by regulations. The risk reduction strategy described by the proponent can reduce the probability of an incident and reduce the consequences. Given the potential consequences of a major spill on the environment and local communities, practical measures that help reduce the probability or consequences of a spill should be considered and implemented.

Finding 1: The proponent’s commitment to fully implement its proposed Northern Gateway Project risk reduction strategy will help enhance the safety of the project’s marine transportation components.

As previously noted, the proponent will not own or charter the oil tankers nominated to call at the Kitimat marine terminal.¹¹ The proponent will review and approve oil tankers before granting them access to the terminal. It will do this by vetting the tankers through its Tanker Acceptance Program,¹² and by requiring tankers to meet the regulations in its Terminal Operations Manual and Port Information Book.

Finding 2: The proponent’s commitment to control access to the Kitimat terminal will help ensure oil tankers comply with its Northern Gateway Project risk reduction strategy and enhance safety.¹³

The proponent stated¹⁴ that the Port Information Book and the Terminal Operations Manual will be completed six months before the start-up of the terminal operation. The proponent will need to be explicit about what requirements will be in these documents.¹⁵ This will ensure that there is no ambiguity in the proponent’s operations and navigation standards that oil tankers must meet before being granted access to the terminal.

Recommendation 2: The proponent should provide copies of its Terminal Operations Manual and Port Information Book to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start-up of terminal operations.

The proponent indicated¹⁶ that the Terminal Operations Manual and Port Information Book will be given to each oil tanker and its agent before calling at the terminal.

Recommendation 3: The proponent should ensure oil tankers and their agents receive the proponent’s Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with these documents.

¹¹ TERMPOL Review Process Study 3.9, subsection 1.1

¹² TERMPOL Review Process Study 3.9, subsection 3.1

¹³ TERMPOL Review Process Study 3.15, section 3.4, subsection 15.1

¹⁴ Application Volume 8A, subsections 4.7.13 and 4.7.14

¹⁵ Application Volume 8A, subsections 4.7.13 and 4.7.14

¹⁶ Application Volume 8A, subsection 4.7.14

3.2 Ship Information

The proponent provided a description of the types of oil tankers that could operate to and from the Kitimat marine terminal. The proponent states that up to 250 large oil tankers will call at its Kitimat facility each year.

The described characteristics of these oil tankers¹⁷ are consistent with typical modern vessel design, construction and operation. Oil tankers, and their operations, must comply with the safety and environmental protection requirements of international conventions and, while in Canadian waters, with Canada's marine safety regulatory regime. Canadian and international requirements address such areas as safe ship design and construction, including double-hull requirements for tankers; safe manning, crew qualifications and training; working conditions; safety management systems, radio communications equipment and equipment for safe navigation including Electronic Chart Display and Information Systems (ECDIS) and automatic identification systems (AIS); voyage planning; ship reporting; and rules to prevent collisions.

Ships trading internationally, including tankers, are inspected regularly and certified by their administration¹⁸ in accordance with the relevant international conventions. The *International Convention for the Safety of Life at Sea (SOLAS), 1974* is the main international convention on the safety of ships. Each ship's administration, or the organization authorized by the administration, must carry out inspections and surveys according to the convention, and issue the appropriate certificate. For example, for a Cargo Ship Safety Construction Certificate, the ship's structure, machinery and certain equipment are subject to an initial inspection, a renewal survey (at least every five years), intermediate and annual surveys. What is covered by each type of survey is set out in the convention. The initial and renewal surveys include a complete inspection to confirm the inspected items comply with the regulatory requirements, are in satisfactory condition and are fit for the service for which the ship is intended.

Globally, terminal operators, vessel owners, vessel operators, vessel charterers, cargo owners, flag states, underwriters, classification societies, port states and the public all have an interest in oil tanker safety. Canada has several measures in place to help ensure large vessels entering Canadian waters are compliant and do not pose an undue risk to safety or the environment. Vessel Traffic Services zones have been established along Canada's east and west coasts as far as the limit of its territorial sea. Shipping in these zones is monitored by the Canadian Coast Guard's Marine Communications and Traffic Services. Vessels of 500 tonnes gross tonnage or more must report to a Marine Communications and Traffic Services officer 24 hours before entering Canadian waters. Vessels must report prescribed information about the vessel and its intended route, including pollutant cargoes and defects, if any. Vessels are not allowed to enter unless they receive clearance from a Marine Communications and Traffic Services officer. Under the *Canada Shipping Act, 2001*, a vessel that is believed to be in violation of international conventions can be directed not to enter Canadian waters or, if already in Canadian waters, directed to leave.

Finding 3: Taking into account the information provided by the proponent on vessels¹⁹ that would be used to support the Northern Gateway Project, and existing Transport Canada and international requirements, no regulatory issues or concerns were identified.

¹⁷ See Appendix 5: Design Vessels.

¹⁸ "Administration" means the government of the state whose flag the ship is entitled to fly.

¹⁹ See Appendix 5: Design Vessels.

Port State Control Program

Canada's Port State Control program verifies foreign vessel compliance with Canadian requirements and the international conventions that apply. Before a foreign vessel may enter Canadian waters, Port State Control officers make use of international databases to review a vessel's safety and inspection record. It is Transport Canada's policy that every foreign oil tanker calling at a Canadian port is inspected on its first visit to Canada and at least once a year thereafter. In addition, tankers more than 12 years old are targeted for a more detailed or expanded inspection. An expanded inspection includes, among other things, confirmation of watertight/weather tight condition, structural condition (exterior as well as inside ballast tanks), emergency systems, propulsion machinery, and pollution prevention measures.

Finding 4: Up to 250 additional foreign oil tankers arriving in Kitimat annually would increase the number of inspections performed under Transport Canada's Port State Control program.

Tanker Acceptance Program

As an added layer of safety, the proponent is committed to providing a vessel-vetting process through its Tanker Acceptance Program.²⁰ The proponent highlighted this program as its primary mechanism to prevent unsafe or substandard oil tankers from calling at its Kitimat marine terminal. Oil tankers that do not meet the requirements of the proponent's Tanker Acceptance Programs will not be allowed access to the Kitimat terminal.

Oil tankers will be nominated by vessel owners, vessel charterers or cargo owners. The ownership, operation or selection of these oil tankers will not be under the direct purview of the proponent. However, the proponent will exercise indirect control over the selection and operations of nominated oil tankers through its Tanker Acceptance Program. As part of the program, the proponent will document tanker operational parameters and criteria in its rules and requirements. The proponent will also use the most current Ship Inspection Report (SIRE) Program. The Ship Inspection Report Program was launched in 1993 specifically to address concerns about substandard shipping.

The Tanker Acceptance Program is a key tool the proponent can use to further enhance oil tanker safety.

Finding 5: The proponent's commitment to vet oil tankers through its Tanker Acceptance Program will help ensure vessels exceed national legislation and international regulatory frameworks and meet high industry standards as promoted by the Oil Companies International Marine Forum.

Ballast Water Requirements

The Northern Gateway Project will involve very large vessels arriving at Kitimat Harbour. In all likelihood, the vessels will be arriving ballasted with sea water. These vessels will be required to comply with the *International Convention for the Control and Management of Ships' Ballast Water and Sediments* and Canada's own regulations regarding ballast water management.

Finding 6: Up to 250 additional foreign oil tankers arriving in Kitimat annually would increase the number of inspections performed under Transport Canada's Ballast Water program.

²⁰ Application Volume 8A, subsection 4.1.4.1: TERMPOL Review Process Study 3.9, section 3; TERMPOL Review Process Study 3.9, section 4; TERMPOL Review Process Study 3.9, subsection 4.2

Ship Security Requirements

Vessel security requirements are administered through national and international regulatory frameworks beyond the scope of the TERMPOL Review Process. All vessels must comply with national legislation and international frameworks for vessel security.

3.3 Route Information

3.3.1 General

The shipping routes²¹ to and from Kitimat are well established and regularly used by deep-sea vessels. Since the 1950s, large commercial vessels (50,000 tonnes) have travelled to and from Kitimat. Since the 1980s, petroleum condensate tankers, of up to 50,000 tonnes, have used the routes.

Larger (250,000 tonne) vessels regularly dock in Prince Rupert, and large (90,000 tonne) cruise ships ply the Inside Passage along the coast of British Columbia.

The oil tankers associated with the Northern Gateway Project will be two to three times larger than the condensate tankers currently using the route and will carry as much as three to six times more cargo.

3.3.2 Overall Route

The proponent analyzed the established shipping routes to and from Kitimat that the very large (320,000 tonne) oil tankers could use. Its analysis takes into account the physical characteristics of the routes, the manoeuvring and physical characteristics of the oil tankers, existing local vessel traffic and marine activities, and the experiences of the local British Columbia Coast Pilots. The proponent then identified the preferred shipping routes for the project.

Canadian Hydrographic Service Charts

The proponent examined the Canadian Hydrographic Service charts for channel depths and widths along the proposed shipping routes. Its analysis showed that there were no obstructions that would pose a safety hazard, even for the deepest-draught oil tankers (23.1 metres) carrying crude oil from the Kitimat marine terminal. The cumulative effect of vessel draught (fully loaded, underway, buoyancy changes, sea state, etc) was 33.2 metres.²² Oil tankers using the 36 metre water depth contour line on current nautical charts as a navigation aid should find sufficient under-keel clearance to avoid obstructions under all conditions in all areas where the Canadian Hydrographic Service has conducted 100-per-cent coverage surveys. This was confirmed by a review of the charts for the proposed shipping routes.

The Canadian Hydrographic Service is updating the navigation charts for Canadian waters off the coast of British Columbia. This includes navigation charts covering the proposed Northern Gateway Project shipping routes. The Canadian Hydrographic Service is resurveying the approaches to Kitimat Harbour using the latest multibeam echo sounder technology. This will ensure accurate information is available to assist deep-draught vessels to safely transit the area. The Canadian Hydrographic Service is incorporating this information into a suite of new navigational charts. To date, the Canadian Hydrographic Service has published 16 new charts for this area, with one more in the final completion stage. There are nine more navigational charts in production and they are scheduled for completion by 2014.²³ The proponent has

²¹ See Appendix 6: Proposed Shipping Routes.

²² TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4; Study 3.6, subsection 4.5; and Application Volume 8A, subsection 4.2.2

²³ See Appendix 7: Canadian Hydrographic Service Chart Update program.

committed to using the revised charts to re-evaluate the proposed shipping routes to verify that there are no previously uncharted hazards to navigation in these areas.²⁴

Recommendation 4: The proponent should monitor the Canadian Hydrographic Service's Chart Update program to ensure it is aware of any new hazards to navigation for deep-draught vessels or other warnings issued by the Canadian Hydrographic Service as the area's navigational charts are updated.

Recommendation 5: The proponent should provide Transport Canada with the results of its re-evaluation of the proposed shipping route after the Canadian Hydrographic Service's navigational charts have been updated.

Canadian Coast Guard's Marine Communications and Traffic Services

The preferred shipping routes to and from Kitimat are in the Vessel Traffic Services zones monitored by the Canadian Coast Guard's Marine Communications and Traffic Services. All large vessels, including oil tankers, are subject to mandatory ship reporting requirements and must make regular reports at specified calling-in points.²⁵ Ships of 300 tonnes gross tonnage or more engaged on an international voyage and domestic ships of 500 tonnes gross tonnage or more (other than fishing vessels) must be fitted with an automatic identification system (AIS).²⁶ Automatic Identification Systems automatically provide information, including the ship's identity, type, position, course, speed, navigational status and other safety-related information, to Automatic Identification System equipped shore stations, other vessels and aircraft. These ships can also automatically receive such information from similarly fitted vessels. This improves a ship's situational awareness and greatly enhances the traffic-monitoring capabilities of the Automatic Identification System equipped Marine Communications and Traffic Services centres. Monitoring ship traffic within the zone allows Marine Communications and Traffic Services officers to provide information to vessels to help make on-board navigational decisions. There is no requirement for additional sensors. Radio reception is sufficient for Douglas Channel.

To provide a higher level of navigational awareness along the preferred shipping route, the proponent, in consultation with the British Columbia Coast Pilots, recommended enhancements to Marine Communications and Traffic Services. The proponent identifies four additional calling-in points for specific portions of the shipping routes. The Canadian Coast Guard Marine Communications and Traffic Services is conducting a calling-in point review.

The proponent also refers to reducing risk by installing radar to augment Vessel Traffic Services' radar coverage at Wright Sound and along the approaches to Kitimat.²⁷ The proponent states that radar will be installed along sections of the northern and southern approaches to Kitimat. It will be used to monitor marine traffic and provide additional guidance to pilots and other vessel operators.²⁸

Recommendation 6: The proponent should work closely with Canadian Coast Guard and Canadian Hydrographic Service officials to explore possible enhancements to marine communication and traffic services that could result in safer vessel operation to and from Kitimat.

²⁴ Application Volume 8A, subsection 4.6.6

²⁵ *Vessel Traffic Services Zones Regulations*

²⁶ *Navigation Safety Regulations*

²⁷ TERMPOL Review Process Study 3.15, subsections 15.1.2 and 15.1.4; and Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsections 8.4.1 and 8.4.3

²⁸ Application Volume 8A, subsection 4.8.1.4

Canadian Coast Guard's Aids to Navigation

The shipping routes are marked by aids to navigation in accordance with the Canadian Coast Guard's recognized levels of service for safe navigation. To provide a higher level of navigational awareness along the preferred shipping route, the proponent, in consultation with the British Columbia Coast Pilots, recommended enhancements to navigation services. The proponent identifies 36 additional aids to navigation for specific portions of the shipping routes²⁹.

The Canadian Coast Guard's Aids to Navigation Program officials will complete a thorough review to determine the aids to navigation requirements for safe and efficient navigation in the area. The review will be done in accordance with the Canadian Coast Guard's design methodology and provision directives. The review will also identify the responsible authority to implement and maintain the aids. A key consideration is that the Canadian Coast Guard does not provide aids to navigation for a single or a small number of users. The Aids to Navigation Program is also not funded to provide new aids to navigation. Installing the new navigational aids to service Kitimat would cost an estimated \$11.9 million, plus \$500,000 on an annual, ongoing basis. In addition, previous availability reports on the Differential Global Positioning System indicate potential gaps in coverage for the Douglas Channel and Kitimat Arm areas. This will require further analysis by the Canadian Coast Guard.

Recommendation 7: The proponent should work closely with Canadian Coast Guard officials to explore possible enhancements to marine navigation services that could result in safer vessel operation to and from Kitimat.

Pilotage

The *Pacific Pilotage Regulations* under the *Pilotage Act* govern pilotage activities in Canada's western waters. At present ships over 350 tonnes en route to or from Kitimat are subject to compulsory pilotage. Marine pilotage involves a mariner with extensive knowledge of a local waterway and its ports, boarding a ship to guide it safely to its destination. Pacific Pilotage Authority Canada is a federal Crown corporation whose mandate is to administer this service in Canadian waters off the coast of British Columbia.

The proponent states that local pilots will board tankers at established pilot boarding stations, either by helicopter or pilot boat, depending on visibility and weather conditions. Due to the duration of the passage, a minimum of two pilots will board the tankers for transit to and from the Kitimat marine terminal and through coastal waters. Pacific Pilotage Authority Canada, in consultation with the British Columbia Coast Pilots and stakeholders, will assess the need for establishing new pilot boarding stations that would be suitable for tankers en route to the proposed terminal.³⁰

Marine Environment

The proposed shipping routes pass through a marine environment rich in fish, benthos, marine mammals and sea birds. The proponent provided a catalogue of fisheries information for the area.³¹ The information includes maps showing the locations of the referenced fisheries-related information. Fisheries and Oceans

²⁹ TERMPOL Review Process Study 3.5 and 3.12, subsection 12.7

³⁰ TERMPOL Review Process Study 3.15, subsection 7.1; and Application Volume 8A ,subsection 4.2.14

³¹ TERMPOL Review Process Study 3.3

Canada Fisheries Management has offered comments and expressed concerns with regard to the accuracy and adequacy of the fisheries-related information. The proponent has stated that additional restrictions will be implemented to mitigate potential effects on marine mammals.³² Fisheries and Oceans Canada officials observed that the potential for increased vessel traffic to cause ship strikes with marine mammals, especially whales, causing bodily injury to or death of the mammals, should be analyzed. It is understood that the proponent will be carrying out a ship strike analysis. Fisheries and Oceans Canada has made some marine mammal data available to the proponent.

Finding 7: The proponent's commitment to developing procedures to help minimize harmful effects on marine mammals will enhance the protection of the marine environment. Fisheries and Oceans Canada encourages the proponent to show a similar commitment to develop procedures to help minimize harmful effects on all marine fisheries resources and fishing activities.

Other Activities in the Area

There are two well-established military exercise areas off the West Coast of Canada, near the shipping routes. These areas are active for up to two per cent of the year (one week). Routine advisories are provided to mariners when these areas are active. Available³³ information indicates that it is not difficult for mariners to avoid these areas when necessary.

The proponent identified a potential wind farm planned for Hecate Strait as being an exploitation activity. The proponent also identified fish farms and aquaculture operations as exploitation activities. These activities may affect near-shore vessel operations but they do not conflict with the proposed oil tanker routes.

The proponent explored the implications of the waves and wakes the oil tankers and escort tugs would generate (at various speeds) while using the proposed shipping routes. The study found that the wave heights produced are small, compared to the naturally occurring wind-generated waves in Douglas Channel. The tanker-generated waves are not expected to contribute in any significant way to shoreline erosion or to create new safety issues for local marine traffic or other activities in the area.

³² Application Volume 8A, subsection 4.3.3

³³ *Notices to Mariners Annual Edition*, section F; National Defence – Military Notices

3.3.3 Navigability and Vessel Operations

Canadian Coast Guard's Guidelines

The physical characteristics of the shipping routes proposed by the proponent fall within the Canadian Coast Guard's *Guidelines for the Safe Design of Commercial Shipping Channels* and comply with international standards (i.e., PIANC's³⁴ *Approach Channels: A Guide for Design*). Vessel clearances and safety allowances were calculated based on vessel length, beam, draught, traffic density and environmental factors affecting manoeuvrability (i.e., tides, winds and currents). In terms of the minimum required channel width, all proposed routes³⁵ met the minimum requirements for very large crude carrier (VLCC) tankers to safely navigate along the proposed and alternate routes, including through the S-curve in the Lewis Passage-Wright Sound area.

Navigation Studies

The proponent conducted navigability studies that followed the *TERMPOL Review Process 2001* guidelines,³⁶ which define safe channel widths in terms of a vessel's breadth. The largest oil tankers being considered for the Northern Gateway Project are 70 metres wide. The narrowest segments of the proposed shipping routes are about 21 times (1,470 metres) the breadth of these vessels. Modern channel design suggests that seven times (490 metres) the breadth of the vessel provides a suitable safety margin for two-way vessel traffic.

Water depths in the preferred channels are significantly deeper than the recommended minimum safe water depth. The TERMPOL guidelines state that the ship's minimum under-keel clearance should be 15 per cent of its maximum permissible draught. For a 320,000 tonne oil tanker, with a loaded draught of 23.1 metres, a channel depth of less than 26.6 metres would be a cause for concern. The proponent's studies take into account dynamic weather and sea conditions, and recommend an under-keel clearance of 10.1 metres for safe transit in the more exposed sections of the route. They require a total of 33.2 metres water depth for safe transit.³⁷ The entire proposed north and south oil tanker routes are more than 36 metres deep,³⁸ with one exception (a 35 metre patch) near the northern entrance to Principe Channel. That area can easily be avoided. The Learmonth Bank (26.4 metres) in Dixon Entrance must also be avoided.

The proponent carried out simulations and evaluations based on the preferred shipping routes, and the dimensions and characteristics of a typical tanker that would be used in support of the Northern Gateway Project. These were done to demonstrate that it was viable to operate oil tankers in these waterways. The proponent engaged Force Technologies³⁹ to evaluate and analyze (using full mission bridge simulations) how the largest oil tankers might safely sail between the open ocean and Kitimat Harbour. These simulations were conducted with the participation of the British Columbia Coast Pilots, which contributed to the findings of these exercises.⁴⁰ The simulations show that the largest proposed oil tankers⁴¹ are

³⁴ "PIANC" stands for "Permanent International Association of Navigation Congresses."

³⁵ See Appendix 6: Proposed Shipping Routes.

³⁶ TERMPOL Review Process 2001 TP 743, Appendix 2 Channel, Manoeuvring and Anchorages Guidelines

³⁷ TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4; Study 3.6, subsection 4.5; and Application Volume 8A, subsection 4.2.2

³⁸ TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4

³⁹ Force Technology no. 108-29930-ES Version 4.0, part 1: Executive Summary, final report

⁴⁰ Force Technology no. 108-29930-ES Version 4.0, part 1: Executive Summary, final report, subsection 1.3

capable of safely navigating the entire proposed shipping route, unassisted. The route includes an S-curve where the channel widths are between 3,500 and 5,000 metres. Navigation simulations carried out by the proponent have demonstrated that a typical 320,000 tonne crude oil tanker loaded, or in ballast, can safely negotiate this area.

The preferred shipping routes in the Confined Channel Assessment Area are in the compulsory pilotage zone of Canada's west coast waters. These zones are established by the *Pacific Pilotage Regulations* under the *Pilotage Act* and administered by Pacific Pilotage Authority Canada. The British Columbia Coast Pilots have extensive experience with various vessel operations on the proposed shipping routes. The proponent's studies identify^{42, 43} narrow sections of the shipping route that it feels warrant caution when two-way traffic flow involves larger vessels. Existing safe navigation practices and procedures encourage vessel operators to exercise caution in these situations. In practice, the British Columbia Coast Pilots communicate with Marine Communication and Traffic Services, and with other vessels in the area. The pilot then adjusts the vessel's speed to avoid passing situations at the narrowest sections of the channel.

Recommendation 8: The proponent should advise oil tankers to exercise caution with two-way traffic flow in the areas identified by the proponent on the proposed Northern Gateway Project marine route.

Tug Escort Program

In addition to these unassisted oil tanker simulation runs, other simulations were carried out using escort tugs. Escort tugs provide an additional level of safety. In an emergency, they can provide assistance in steering and stopping tanker vessels to reduce the probability of a collision, grounding or other incidents that might occur.

To further reduce risk, the proponent is committed⁴⁴ to implementing a mandatory escort tug program. Under the program:

- laden oil tankers will be required to make use of a tethered escort tug while in the confined channel; and
- all oil tankers (laden and unladen) will have a tug escort while sailing between the pilot's station and the Kitimat marine terminal.

There are no requirements under the *Canada Shipping Act, 2001* for the use of escort tugs. However, escort tugs are used in some local areas to provide an additional margin of safety. The proponent's own escort tug program, along with pilotage requirements in the compulsory pilotage zone, would provide an extra safety layer if there were a human error and/or machinery failure aboard an oil tanker. Having two escort tugs could also provide built-in redundancy if one of the tugs had an incident or broke down. The proponent has also stated that the escort tugs would be available for emergency (ocean rescue) response in the open water area outside the confined channels.⁴⁵

⁴¹ See Appendix 5: Design Vessels.

⁴² TERMPOL Review Process Study 3.5 and 3.12, subsection 7.3

⁴³ Force Technology no. 108-29930-ES Version 4.0, part 1: Executive Summary, final report, subsection 5.4

⁴⁴ TERMPOL Review Process Study 3.1, subsection 2.4.2

⁴⁵ TERMPOL Review Process Study 3.15, section 15

Finding 8: The proponent's commitment to implement a tug escort system for oil tankers that provides immediate and effective action will help mitigate risk if a tanker's steering or propulsion system fails. The tug escort system will enhance tanker safety.

The proponent's Manoeuvring Study of Escorted Tankers to and from Kitimat⁴⁶ notes that emergency procedures should be practised so that the pilots and the escort tug operators are comfortable implementing and using them.

Finding 9: An effective tug escort system would include a requirement that escort tug operators and the British Columbia Coast Pilots practise tug escort operations and emergency procedures to reduce the risk of oil tanker incidents.

The proponent commits to contracting a qualified towage company to design and construct a suitable fleet of escort and harbour tugs for the Northern Gateway Project.⁴⁷ In its route analysis and navigability study, the proponent outlines design considerations for the performance specifications of the escort tugs.

The proponent states that it will require loaded tankers to travel with a tethered escort tug. A "strong point" on the oil tanker will be used to tether the tanker to the escort tug.⁴⁸ To be effective, it is important that the strength ratings of the tanker's strong point are compatible with the forces that could be exerted by a tethered escort tug.

*Finding 10: An effective tug escort system would ensure that the "strong point" on nominated oil tankers would accommodate the static and dynamic forces escort tugs could exert while assisting tankers in the range of weather conditions common to the area.*⁴⁹

Finding 11: An effective tug escort system would ensure that information on the strengths and limitations of the tethered tug equipment and procedures is shared between the escort tug operators and the oil tanker operators.

Safe Operating Speeds

The proponent estimates that the safe operating speeds of the oil tankers used for the Northern Gateway Project will be between eight and 12 knots, with an average speed of nine knots.⁵⁰ This takes into account the vessels' capabilities, escort tug design performance characteristics and the proponent's commitment to implement additional restrictions to mitigate potential effects on marine mammals.⁵¹ The real-time simulations, conducted by Force Technologies, demonstrated that escorted oil tankers operating at these speeds would have time to complete safe and controlled manoeuvres.⁵²

The proponent identified factors that might delay the scheduled arrival of oil tankers at Kitimat. Major delays would most likely be weather related and occur in open water, before the mandatory British Columbia Coast Pilots would board the vessels. Given the length of the transit between the pilot station to

⁴⁶ Force Technology no. 108-29930-ES Version 4.0, part 1: Executive Summary, final report section 5.6; and Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsection 8.2.1

⁴⁷ TERMPOL Review Process Study 3.5 and 3.12 subsection 2.1.14 and subsection 12.8

⁴⁸ Application Volume 8A, subsection 4.1.3.7

⁴⁹ Application Volume 8A, subsection 4.1.3.7

⁵⁰ TERMPOL Review Process Study 3.7, section 4

⁵¹ Application Volume 8A, subsection 4.3.3

⁵² Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary, final report, subsection 4.6

the terminal, and the twin berth arrangement, transit times and delays should not cause significant issues or concerns.

Anchorage

Vessels may need to anchor due to adverse weather conditions or to address equipment failures. The proponent's studies have identified a few locations along the proposed shipping routes where a large oil tanker could anchor.⁵³ Fisheries and Oceans Canada offers that the proponent may work with Canadian Hydrographic Service officials and other industry stakeholders to identify other potential anchorages and temporary holding areas, near the proposed shipping routes. Given the proponent's commitment to have the oil tankers escorted by tugs, the escort tugs would be available to assist oil tankers in station keeping, in lieu of a need to anchor.⁵⁴

Weather and Sea Conditions

The crew of an oil tanker considers a number of factors when dealing with poor weather conditions and rough seas. Some of those factors include national and international regulatory frameworks, the vessel's performance characteristics, the shipping route's navigation characteristics, long-term weather forecasts, real-time weather, vessel owner requirements, terminal operator requirements, and pilots' and Vessel Traffic Services' advice and guidance. Establishing weather and environmental restrictions on vessel operations can help ensure vessels do not exceed safe operating limits and take undue risks as wind, visibility and sea conditions deteriorate. The proponent's studies (including simulations and input from the British Columbia Coast Pilots) identified a number of potential weather and environmental limits for vessel and terminal operations. We note that the limiting wind speeds used in the simulations were up to 50 knots.⁵⁵ The proponent is encouraged to evaluate how frequently wave heights in the area are expected to exceed weather and environmental limits being developed for vessel operations in support of the project, taking into account the rate at which waves could build to extreme heights. With respect to the oil tanker transits, the British Columbia Coast Pilots have not yet determined the weather conditions and limits beyond which a pilotage assignment will be aborted. Once established, Pacific Pilotage Authority Canada will notify the marine industry of the weather limit criteria through its "Notices to Industry."

Recommendation 9: The proponent should consult with the operational stakeholders including Pacific Pilotage Authority Canada, British Columbia Coast Pilots, and escort tug operators to set environmental limits (weather and sea conditions) on oil tanker navigation associated with the project. These limits will help ensure the oil tankers remain well within safe operating parameters while navigating to and from Kitimat.

Finding 12: The proponent's commitment to include environmental limits (weather and sea conditions) on oil tanker navigation in the Terminal Operations Manual and Port Information Book will enhance safety. It will help ensure the oil tankers remain within safe operating parameters while navigating to and from Kitimat.

⁵³ TERMPOL Review Process Study 3.5 and 3.12, section 10

⁵⁴ Application Volume 8A, subsection 4.4

⁵⁵ Force Technology FORCE Technology no. 108 – 29930 – main, Version 1.0, subsection 6.8

3.3.4 Marine Traffic Considerations

Fishing vessels, tugs, cargo ships, ferries and recreational vessels all use the waters near the proposed shipping routes. Marine traffic studies for the project were completed by the proponent. The studies counted and identified the vessel traffic in the area of the proponent's preferred shipping routes. The studies considered historical information and forecast future vessel traffic based upon the area's trends and plans. The future plans included potential liquefied natural gas projects in the area. If all anticipated projects become operational, annually, there could be up to 415 additional oil tankers, liquefied natural gas carriers and bulk carriers calling at Kitimat, or 830 additional transits of the waterways.

The information in the studies varies in reliability. Information on commercial traffic, obtained primarily from the Canadian Coast Guard's Vessel Traffic Services, is reliable and accurate. Information on pleasure craft and some small commercial vessels is estimated by the Canadian Coast Guard. Nonetheless, observations by the British Columbia Coast Pilots suggest that the estimates would be a reasonable representation of the number and types of vessels using the waterways.

Oil tankers for the Northern Gateway Project will add up to two vessel transits per day to the existing vessel traffic in this area. Other proposed projects could introduce one to two more large vessels per day. The existing vessel traffic includes large cargo ships, tug and tow, fishing vessels, recreational vessels, coastal ferries and cruise ships. Approximately 20 vessels a day, an average of less than one vessel per hour, use the Wright Sound on a peak day. Adding up to four large vessels to this waterway would represent a 20-per cent increase in peak vessel traffic. It does not appear to be a significant safety issue to introduce four large vessel transits per day to the area's vessel traffic network, especially when we consider the characteristics of the shipping routes; current vessel traffic; the national and international regulatory frameworks governing safe navigation and collision avoidance; mandatory pilotage requirements for oil tankers in this area; and the proponent's requirement for tug escorts. Pacific Pilotage Authority Canada and the British Columbia Coast Pilots agree that the additional traffic is not a significant increase and does not cause concerns with vessel traffic density. The project also does not involve a significant workload increase for the Canadian Coast Guard's Marine Communications and Traffic Services.

The preferred route for the project includes transiting Wright Sound, where many⁵⁶ north coast shipping routes converge. The proponent states that tanker speeds should be adjusted in Wright Sound when other marine traffic is present.⁵⁷ This is consistent with the practice of the British Columbia Coast Pilots and prudent mariners to exercise caution in areas where other traffic is present.

Recommendation 10: The proponent should advise oil tankers to exercise caution with regard to marine traffic in Wright Sound.

Vessel Traffic Separation Scheme

The proponent recommends that a vessel traffic separation scheme (traffic lanes) be assessed for the area. In its risk analysis, it states that the collision risk for oil tankers is low. While implementing a vessel traffic separation scheme would have a low impact on oil tanker safety, it could be a benefit for the

⁵⁶ Application Volume 8A, subsection 2.2

⁵⁷ TERMPOL Review Process Study 3.15, subsection 15.1

recreational craft in the area.⁵⁸ However, given the low traffic densities and mandatory pilotage, there is no obvious need for a traffic separation scheme. If the need for a vessel traffic separation scheme becomes apparent due to increased reports of vessel traffic conflict, Transport Canada could assess the need for a routing measure, in consultation with marine stakeholders, after the proposed terminal opened.

Fishing Vessels

The proponent gives special consideration⁵⁹ to fishing vessels in the area. The proponent states that its restrictions on the timing of oil tanker transits will take into account fishing vessels in the area. The proponent's proposed **Fisheries Liaison Committee**⁶⁰ would allow for an exchange of information and advice on the safe shared use of the waterways.

Finding 13: The proponent's commitment to establish a Fisheries Liaison Committee, that would discuss fishing vessel safety and oil tanker movements would enhance the safety of shared waterway usage.

⁵⁸ TERMPOL Review Process Study 3.15, subsection 15.1.5

⁵⁹ TERMPOL Review Process Study 3.2, subsection 7.5

⁶⁰ TERMPOL Review Process Study 3.15, subsection 11.4.3

3.4 Review of Terminal Operations

As per the proponent's proposal, only oil tankers that meet the proponent's Tanker Acceptance Program requirements and comply with the Terminal Operations Manual and Port Information Book will be granted access to the Northern Gateway Project's Kitimat marine terminal.⁶¹ The Terminal Operations Manual will describe the rules for oil tankers moored at the berth,⁶² as well as terminal regulations.⁶³

3.4.1 Berthing and Mooring Procedures

Before the master of a vessel, or a pilot, brings a ship into a berth, he or she must be confident that the facility is suitable for the vessel. The proponent submitted information describing the berthing facility and its location. The facility has sufficient water depth and turning basin characteristics for the oil tankers proposed for the project.⁶⁴ The proponent describes environmental and marine conditions that are appropriate for the oil tankers proposed for the project.

*Recommendation 11: The proponent should consult with the operational stakeholders including the Pacific Pilotage Authority Canada, British Columbia Coast Pilots and harbour and escort tug operators to set Kitimat marine terminal operations environmental limits (weather and sea conditions). These limits will help ensure the oil tankers remain well within safe operating parameters while berthing and mooring.*⁶⁵

Finding 14: The proponent's commitment to include Kitimat marine terminal operations environmental limits (weather and sea conditions) in the Terminal Operations Manual and Port Information Book will enhance safety. It will help ensure the oil tankers remain within safe operating parameters while berthing and mooring.

Recommendation 12: The proponent should provide copies of its Terminal Operations Manual and Port Information Book⁶⁶ to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start of terminal operations.

Recommendation 13: The proponent should ensure oil tankers and their agents receive the Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with the contents of these documents.

The Marine Terminal

The proponent submitted plans and development studies outlining its commitment to design, build and operate the proposed marine terminal to meet the applicable standards and codes, and industry best practices.⁶⁷ The relevant codes and standards are listed in the proponent's study.⁶⁸ The construction and

⁶¹ TERMPOL Review Process Study 3.9, subsection 1.1

⁶² Application Volume 8A, subsection 4.7.14

⁶³ TERMPOL Review Process Study 3.9, subsection 4.3

⁶⁴ TERMPOL Review Process Study 3.13, subsection 4.6.6

⁶⁵ TERMPOL Review Process Study 3.13, subsection 4.6.8

⁶⁶ Application Volume 8A, subsection 4.7.13

⁶⁷ TERMPOL Review Process study 3.10, subsection 4.5

operation of the marine terminal will be under the jurisdiction of the National Energy Board and is not reviewed as part of this report.

Management and environmental concerns about the location, construction and operation of the marine terminal are outside the authority and expertise of the TERMPOL review team, except for three issues:

- The marine terminal will require regulatory approval under the *Navigable Waters Protection Act*.
- As an oil handling facility, the terminal must meet oil spill planning, preparedness and response requirements.
- The marine terminal will have to meet security requirements.

However, as explained in the “Scope” section of this report, two of those issues are being addressed under the *Navigable Waters Protection Act* and the National Oil Spill Preparedness and Response Regime processes. The “Scope” section provides information on these subjects.

The third issue, marine terminal security requirements, is administered through national and international regulatory frameworks that are beyond the scope of the TERMPOL Review Process. Before operations may begin at the Kitimat marine terminal, the terminal operator must comply with national and international regulatory frameworks for security.

3.4.2 Cargo Transfer Operations

While in Canadian waters, vessels transferring oil must comply with Canadian *Regulations for the Prevention of Pollution from Ships and for Dangerous Chemicals*. The proponent describes joint ship-shore cargo transfer operations that meet or exceed Canadian requirements for safe vessel operations.⁶⁹ The proponent will require oil tankers to comply with its Kitimat marine terminal regulations.⁷⁰ Those requirements provide a level of safety for ship-to-shore transfer operations that meet or exceed national and international regulatory frameworks and are in line with industry best practices.⁷¹

Finding 15: The proponent’s commitment to use industry best practices and standards (International Safety Guide for Oil Tankers and Terminals) for ship-to-shore cargo operations as outlined in its Terminal Regulations of Mandatory Procedures and Requirements will enhance safety and the protection of the marine environment.

The Kitimat marine terminal will not have any dirty ballast water treatment capability. The proponent points out that ballast water often originates from a foreign harbour or port of call.⁷² Vessels that have not complied with Canadian *Ballast Water Control and Management Regulations* will be required to retain their ballast water on board or return to the open ocean to exchange ballast water. Retaining ballast water on board or embarking on a return trip to the open ocean from Kitimat could have operational implications for a vessel operator. The proponent should ensure that all nominated oil tankers are aware of the potential consequences of non-compliance with Canadian *Ballast Water Control and Management Regulations*.

⁶⁸ TERMPOL Review Process Study 3.10, Appendix B

⁶⁹ TERMPOL Review Process Study 3.11, section 4

⁷⁰ Application Volume 8A, subsection 4.1.6

⁷¹ TERMPOL Review Process Study 3.11, subsection 4.1.2

⁷² TERMPOL Review Process Study 3.11, subsection 2.4.2

The proponent has stated⁷³ the Terminal Operations Manual will be completed six months prior to the start of terminal operations.

Recommendation 14: The proponent should provide copies of its Terminal Operations Manual and Port Information Book to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start of terminal operations.

Recommendation 15: The proponent should ensure oil tankers and their agents receive the Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with the contents of these documents.

⁷³ Application Volume 8A, subsection 4.7.14

4. SUMMARY AND CONCLUSION

The focus of the TERMPOL Review Process is on marine safety and accident prevention to help ensure the marine transportation components of the Northern Gateway Project can be carried out within acceptable risk levels consistent with Canada's regulatory regime and safety standards, and industry best practices.

Several key government departments and authorities participated in the TERMPOL Review Process for this project. Together, these departments and authorities are responsible for delivering the Government of Canada's comprehensive regulatory framework to help ensure Canada's marine transportation is safe, secure and environmentally responsible. Transport Canada has a lead role in regulating shipping. Fisheries and Oceans Canada (including the Canadian Coast Guard and the Canadian Hydrographic Service), Environment Canada and Pacific Pilotage Authority Canada are responsible for providing critical programs and services for safety and environmentally responsible marine transportation. These federal departments and authorities have coordinated a review, based on the *TERMPOL Review Process 2001* guidelines (TP 743), and the studies provided by the proponent. The review evaluates the Northern Gateway Project from a safety perspective to identify potential problems and to explore appropriate ameliorative measures. Specialized subject matter experts in marine transportation also assisted in the review.

If this project goes ahead, the proponent would be expected to fully implement its commitments and intentions detailed in the information it submitted for the TERMPOL Review Process. As the terminal operator, the proponent's authority to vet and to grant or deny permission for tankers to berth is a significant tool to compel vessels to comply with the proponent's Tanker Acceptance Program and terminal regulations. However, if at any time the operational parameters or project's characteristics change, or the proponent's commitments need to be modified, then further review and analysis will be required by the relevant authority.

The review has not identified any regulatory issues or gaps or the need to consider any new regulatory requirements at this time. The existing international and Canadian marine laws and regulations, complemented by the enhanced safety measures the proponent is committed to implementing and monitoring will provide for safer shipping in support of the Northern Gateway Project. Tankers and shipping operations, like any other vessel operations, will have to comply fully with national and international regulatory frameworks. Through the proponent's oil tanker vetting and acceptance process, ship operators will have to follow the proponent's additional safety enhancements, which are designed to reduce the risks during operations. The review did note that with up to 250 additional tankers per year arriving in Kitimat, there will be an impact on Transport Canada's compliance monitoring programs.

The proposed shipping routes are appropriate for the oil tankers that will be used at the proposed terminal. The TERMPOL review confirmed that there are no charted obstructions that would pose a safety hazard to fully loaded oil tankers. As noted, the Canadian Hydrographic Service is in the process of updating several charts of the area to ensure the most accurate information is available for safe navigation.

The Canadian Coast Guard reviewed the waterways taking into account the size of the largest proposed oil tankers, traffic density and environmental factors affecting manoeuvrability. It found that the waterways comply with the Canadian Coast Guard's *Guidelines for the Safe Design of Commercial Shipping Channels* and the Permanent International Association of Navigation Congresses (PIANC's) – *Approach Channels; A Guide for Design*. The proposed routes provide the required clearances for good vessel manoeuvrability and allowances for very large crude oil tankers to safely navigate. This is

consistent with the results produced using the full mission bridge simulations provided by the proponent. The simulations showed that tankers of the largest design are capable of navigating the entire route unassisted. This is also consistent with opinions of Pacific Pilotage Authority Canada and the British Columbia Coast Pilots. The British Columbia Coast Pilots identified some narrow sections of the waterways as warranting caution for two-way traffic. The Canadian Coast Guard identified that the Lewis Passage-Wright Sound area warrants caution as a result of multi-directional traffic. In practice, the British Columbia Coast Pilots, supported by information from Marine Communications and Traffic Services, would adjust a vessel's speed to avoid meeting other vessels in these areas. Transit speeds may also have to be adjusted to take into account traffic in the Wright Sound area.

The overall increase in marine traffic levels is not considered to be an issue for the shared safe use of the project's preferred shipping routes. The proponent has also committed to including safe speeds for oil tankers and tugs in its terminal rules and requirements. It will also include safety limits for environmental and marine conditions for both vessels and terminal operations.

With the increase in shipping activity, there may be an increased threat to the well-being of marine mammal populations along the shipping route. To address this risk, the proponent has proposed measures to avoid contact with mammals. The proponent is encouraged to develop appropriate procedures to help minimize harmful effects on marine mammals.

Other areas that have been identified in the proponent's studies for further consideration by the relevant departments or authorities include pilot boarding stations, improvements in aids to navigation and vessel traffic services. Pacific Pilotage Authority Canada, along with the British Columbia Coast Pilots and shipping stakeholders, will assess pilot boarding station requirements and locations. The Canadian Coast Guard is committed to conducting a review of the aids to navigation and calling-in-points and encourages the proponent to work closely with the Canadian Coast Guard on these reviews.

Safe operation of the Kitimat marine terminal will be assured through regulatory compliance and compliance with the proponent's terminal requirements.

While there will always be residual risk in any project, after reviewing the proponent's studies and taking into account the proponent's commitments, no regulatory concerns have been identified for the vessels, vessel operations, the proposed routes, navigability, other waterway users and the marine terminal operations associated with vessels supporting the Northern Gateway Project. Commitments by the proponent will help ensure safety is maintained at a level beyond the regulatory requirements. The Termpol Review Committee has identified several findings and recommendations where further action is proposed that would provide a higher level of safety for vessel operations. A complete list of the findings and recommendations is included in Appendix 1.

Appendices

Appendix 1 LIST OF FINDINGS AND RECOMMENDATIONS

The findings and recommendations of this report are based on the project as proposed by the proponent, including their risk reduction strategies. Many of these strategies exceed the current regulatory requirements. Those strategies that exceed the regulatory requirements are voluntary.

Findings

1. The proponent's commitment to fully implement its proposed Northern Gateway Project risk reduction strategy will help enhance the safety of the project's marine transportation components. *(3.1 General – Risk Reduction Strategy)*
2. The proponent's commitment to control access to the Kitimat terminal will help ensure oil tankers comply with its Northern Gateway Project risk reduction strategy and enhance safety. *(3.1 General – Risk Reduction Strategy)*
3. Taking into account the information provided by the proponent on vessels that would be used to support the Northern Gateway Project, and existing Transport Canada and international requirements, no regulatory issues or concerns were identified. *(3.2 Ship Information)*
4. Up to 250 additional foreign oil tankers arriving in Kitimat annually would increase the number of inspections performed under Transport Canada's Port State Control program. *(3.2 Ship Information – Port State Control Program)*
5. The proponent's commitment to vet oil tankers through its Tanker Acceptance Program will help ensure vessels exceed national legislation and international regulatory frameworks and meet high industry standards as promoted by Oil Companies International Marine Forum. *(3.2 Ship Information – Tanker Acceptance Program)*
6. Up to 250 additional foreign oil tankers arriving in Kitimat annually would increase the number of inspections performed under Transport Canada's Ballast Water Program. *(3.2 Ship Information – Ballast Water Requirements)*
7. The proponent's commitment to developing procedures to help minimize harmful effects on marine mammals will enhance the protection of the marine environment. Fisheries and Oceans Canada encourages the proponent to show a similar commitment to develop procedures to help minimize harmful effects on all marine fisheries resources and fishing activities. *(3.3.2 Overall Route – Marine Environment)*
8. The proponent's commitment to implement a tug escort system for oil tankers that provides immediate and effective action will help mitigate risk if a tanker's steering or propulsion system fails. The tug escort system will enhance tanker safety. *(3.3.3 Navigability and Vessel Operations – Tug Escort Program)*
9. An effective tug escort system would include a requirement that escort tug operators and the British Columbia Coast Pilots practise tug escort operations and emergency procedures to reduce the risk of

oil tanker incidents. (3.3.3 *Navigability and Vessel Operations - Tug Escort Program*)

10. An effective tug escort system would ensure that the “strong point” on nominated oil tankers would accommodate the static and dynamic forces escort tugs could exert while assisting tankers in the range of weather conditions common to the area. (3.3.3 *Navigability and Vessel Operations– Tug Escort Program*)
11. An effective tug escort system would ensure that information on the strengths and limitations of the tethered tug equipment and procedures is shared between the escort tug operators and the oil tanker operators. (3.3.3 *Navigability and Vessel Operations– Tug Escort Program*)
12. The proponent’s commitment to include environmental limits (weather and sea conditions) on oil tanker navigation in the Terminal Operations Manual and Port Information Book will enhance safety. It will help ensure the oil tankers remain within safe operating parameters while navigating to and from Kitimat. (3.3.3 *Navigability and Vessel Operations – Weather and Sea Conditions*)
13. The proponent’s commitment to establish a Fisheries Liaison Committee, that would discuss fishing vessel safety and oil tanker movements would enhance the safety of shared waterway usage. (3.3.4 *Marine Traffic Considerations – Fishing Vessels*)
14. The proponent’s commitment to include Kitimat marine terminal operations environmental limits (weather and sea conditions) in the Terminal Operations Manual and Port Information Book will enhance safety. It will help ensure the oil tankers remain within safe operating parameters while berthing and mooring. (3.4.1 *Berthing and Mooring Procedures*)
15. The proponent’s commitment to use industry best practices and standards (*International Safety Guide for Oil Tankers and Terminals*) for ship-to-shore cargo operations as outlined in its *Terminal Regulations of Mandatory Procedures and Requirements* will enhance safety and the protection of the marine environment. (3.4.2 *Cargo Transfer Operations*)

Recommendations

1. The proponent should notify the relevant authority if it wishes to alter any of the commitments, operational parameters or characteristics of the project, so the authority can review the safety elements of the changes. (3. *Analysis*)
2. The proponent should provide copies of its Terminal Operations Manual and Port Information Book to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start-up of terminal operations. (3.1 *General – Risk Reduction Strategy*)
3. The proponent should ensure oil tankers and their agents receive the proponent’s Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with these documents. (3.1 *General – Risk Reduction Strategy*)
4. The proponent should monitor the Canadian Hydrographic Service’s Chart Update program to ensure it is aware of any new hazards to navigation for deep-draught vessels or other warnings issued by the Canadian Hydrographic Service as the area’s navigational charts are updated. (3.3.2 *Overall Route – Canadian Hydrographic Services Charts*)

5. The proponent should provide Transport Canada with the results of its re-evaluation of the proposed shipping route after the Canadian Hydrographic Service's navigational charts have been updated. *(3.3.2 Overall Route – Canadian Hydrographic Services Charts)*
6. The proponent should work closely with Canadian Coast Guard and Canadian Hydrographic Service officials to explore possible enhancements to marine communication and traffic services that could result in safer vessel operation to and from Kitimat. *(3.3.2 Overall Route – Canadian Coast Guard's Marine Communications and Traffic Services)*
7. The proponent should work closely with Canadian Coast Guard officials to explore possible enhancements to marine navigation services that could result in safer vessel operation to and from Kitimat. *(3.3.2 Overall Route – Canadian Coast Guard's Aids to Navigation)*
8. The proponent should advise oil tankers to exercise caution with two-way traffic flow in the areas identified by the proponent on the proposed Northern Gateway Project marine route. *(3.3.3 Navigability and Vessel Operations – Navigation Studies)*
9. The proponent should consult with the operational stakeholders including Pacific Pilotage Authority Canada, British Columbia Coast Pilots, and escort tug operators to set environmental limits (weather and sea conditions) on oil tanker navigation associated with the project. These limits will help ensure the oil tankers remain well within safe operating parameters while navigating to and from Kitimat. *(3.3.3 Navigability and Vessel Operations – Weather and Sea Conditions)*
10. The proponent should advise oil tankers to exercise caution with regard to marine traffic in Wright Sound. *(3.3.4 Marine Traffic Considerations)*
11. The proponent should consult with the operational stakeholders including Pacific Pilotage Authority Canada, British Columbia Coast Pilots and harbour and escort tug operators to set Kitimat marine terminal operations environmental limits (weather and sea conditions). These limits will help ensure the oil tankers remain well within safe operating parameters while berthing and mooring. *(3.4.1 Berth and Mooring Procedures)*
12. The proponent should provide copies of its Terminal Operations Manual and Port Information Book to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start of terminal operations. *(3.4.1 Berth and Mooring Procedures)*
13. The proponent should ensure oil tankers and their agents receive the Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with the contents of these documents. *(3.4.1 Berth and Mooring Procedures)*
14. The proponent should provide copies of its Terminal Operations Manual and Port Information Book to Transport Canada, Fisheries and Oceans Canada and Pacific Pilotage Authority Canada for review at least six months before the start of terminal operations. *(3.4.2 Cargo Transfer Operations)*
15. The proponent should ensure oil tankers and their agents receive the Terminal Operations Manual and Port Information Book in time for them to understand and fully comply with the contents of these documents. *(3.4.2 Cargo Transfer Operations)*

Appendix 2 FOOTNOTE REFERENCES

Footnote No.	Reference	Description
1	See Appendix 4: List of Documents Submitted for TERMPOL.	
2	TERMPOL Review Process Study 3.15, Section 15	The proponent is committed to reducing project risk as described.
3	Det Norske Veritas Marine Shipping Quantitative Risk Analysis	Full report
4	TERMPOL Review Process Study 3.8	Casualty Data Survey
5	Application Volume 8C, Preface	Risk Assessment and Management of Spills – Marine Transportation. Based on the importance of understanding how the risk of spills is determined quantitatively, the proponent initiated a round-table process involving stakeholders and participating Aboriginal groups to identify issues of concern.
6	Det Norske Veritas Marine Shipping Quantitative Risk Analysis subsection 7.8	The unmitigated risks calculated in this chapter are comparable to marine terminal and tanker operations located in parts of the world with navigable waters comparable to the west coast of British Columbia.
7	Det Norske Veritas Marine Shipping Quantitative Risk Analysis, section 8	In this regard, the exact quantification of the probability of events and their consequences is not as important as ensuring that the relative discussion of risk along the routes and at the marine terminal is correct so that effective measures are taken to reduce risk.
8	TERMPOL Review Process Study 3.15, section 15	The proponent is committed to reducing project risk as described.
9	TERMPOL Review Process Study 3.15 subsection 4.3.1	One of the navigational mitigations is the use of Electronic Chart Display and Information Systems (ECDIS) on the tankers, which will be mandatory on new tankers, built after 1 July 2012 and on older tankers after 1 July 2015, and is currently used by some tankers. All tankers calling on the Kitimat Terminal will be required to have ECDIS. For an individual tanker otherwise without ECDIS installed, the installation of ECDIS is expected to reduce the probability of powered grounding by some 30 %, and the total probability of an oil spill by some 15 to 20 % (DNV 2010).
9	Application Volume 8B,	The International Maritime Organization (IMO) intends to mandate the installation of Electronic Chart Display and Information Systems

	subsection 13.5.2.2	<p>(ECDIS) on all international tankers. This should enable mariners to execute all route planning, route monitoring and positioning with the most current data in a safe and timely manner. One study indicates that the installation of ECDIS, with approved charts, may reduce the risk of powered grounding by up to 30% (MSC 1981).</p> <p>Installation of ECDIS will be mandatory on new tankers constructed on or after July 1, 2012 and on existing tankers by July 1, 2015 and many tankers have already installed it. Installation of ECDIS will be required for the tankers calling at the Kitimat Terminal.</p>
10	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report, subsection 3.1, figure 3.1	<p>The North Route for the Confined Channel Assessment Area (CCAA), starts at Browning Entrance and continues through Principe Channel, Nepean Sound, Otter Channel, Squally Channel, Lewis Passage, Wright Sound and Douglas Channel.</p> <p>The South Route for the CCAA, starts at Caamaño Sound and continues through Campania Sound, Squally Channel, Lewis Passage, Wright Sound, and Douglas Channel.</p>
11	TERMPOL Review Process Study 3.9, subsection 1.1	As terminal operator, the proponent will not directly own or charter the vessels and does not have a role in the selection of particular vessel(s) that will call at the terminal. Nonetheless, the proponent will establish Tanker Acceptance (Vetting) Criteria that will be used to review and approve each vessel prior to it being granted permission to call at the terminal.
12	TERMPOL Review Process Study 3.9, subsection 3.1	The proponent's Kitimat Terminal will use a Tanker Acceptance Program to assure that the tankers scheduled to berth at the terminal will meet the highest industry standards.
13	TERMPOL Review Process Study 3.15, section 3.4	The proponent is committed to confirming that tankers transporting condensate, diluted bitumen and synthetic oil to and from the Kitimat Terminal adhere to high safety standards and operate in an environmentally responsible manner.
13	TERMPOL Review Process Study 3.15, subsection 15.1	The proponent is committed to confirming that tankers transporting condensate, diluted bitumen and synthetic oil to and from the Kitimat Terminal adhere to high safety standards and operate in an environmentally responsible manner.
14	Application Volume 8A, subsection 4.7.14	The Terminal Operations Manual provides the vessel with the rules that are in effect when the vessel is moored at the terminal's berths.
14	Application Volume 8A, subsection 4.7.13	[Port Information Book] - Its main purpose is to provide ship's personnel with all relevant information pertaining to the terminal site and its navigation routes. This book includes information about the general geographical area, navigation procedures, berthing strategy, pilots, tug assistance, vessel services, security and safety procedures, communication procedures, anchorages, weather information, marine

		mammal protection measures and other information relevant to vessel operations.
15	Application Volume 8A, subsection 4.7.14	The Terminal Operations Manual provides the vessel with the rules that are in effect when the vessel is moored at the terminal's berths.
15	Application Volume 8A, subsection 4.7.13	[Port Information Book] - Its main purpose is to provide ship's personnel with all relevant information pertaining to the terminal site and its navigation routes. This book includes information about the general geographical area, navigation procedures, berthing strategy, pilots, tug assistance, vessel services, security and safety procedures, communication procedures, anchorages, weather information, marine mammal protection measures and other information relevant to vessel operations.
16	Application Volume 8A, subsection 4.7.14	The Terminal Operations Manual provides the vessel with the rules that are in effect when the vessel is moored at the terminal's berths.
17	See Appendix 5: Design Vessels	
18	"Administration" means the government of the state whose flag the ship is entitled to fly.	
19	See Appendix 5: Design Vessels	
20	Application Volume 8A, subsection 4.1.4.1	The terminal operator will use a Tanker Acceptance Program (TAP) so that the tankers scheduled to berth at the marine terminal will meet the proponent's required standards.
20	TERMPOL Review Process Study 3.9, section 3	The proponent's Kitimat Terminal will use a Tanker Acceptance Program to assure that the tankers scheduled to berth at the terminal will meet the highest industry standards.
20	TERMPOL Review Process Study 3.9, section 4	To further ensure the highest standards for tankers calling at Kitimat Terminal, minimum Standards of Acceptance will be developed by the proponent that will include additional ship vetting items to complement their TAP.
20	TERMPOL Review Process Study 3.9, subsection 4.2	The ship acceptance criteria will include a maximum vessel age of 20 years. Based on a review of current vessel fleet age statistics and considering the significant number of new-build vessels that are currently on order with deliveries expected by 2010, the vast majority of tankers will meet the stated age criteria when Kitimat Terminal is eventually commissioned.
21	See Appendix 6 Proposed Shipping Routes	
22	Application Volume 8A, subsection 4.2.2	Maximum dynamic vertical ship motions (under wave or swell conditions) will require an underkeel clearance of 10.1 m or a cumulative draught of 33.2 m (18 fathoms) for safe transit.

		This dynamic effect is applicable to the more exposed sections of the route (e.g., Hecate Strait and Dixon Entrance). In the more sheltered portions of the route, wave effects are much reduced and the required dynamic underkeel clearance is less.
22	TERMPOL Review Process Study 3.6, subsection 4.5	<p>Summary of Cumulative Draught Effects due to Ship Motions.</p> <p>The required underkeel clearance for safe transit of the design vessel should be based on the loaded draught of the design vessel plus the cumulative increases due to the effects discussed.</p>
22	TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4	<p>Dynamic forces, as described in TRP Study 3.6, Section 4.5 “Summary of Cumulative Draught Effects Due to Ship Motions,” arrive at a larger minimum under keel clearance of 10.1 m, giving a cumulative draught of 33.2 m (18 fathoms) for safe transit.</p> <p>With the exception of one 35 m (19 fathoms) patch which can be easily avoided, the minimum charted water depth along the entire proposed North and South routes is more than 36 m (20 fathoms).</p> <p>In Principe Channel, near Dixon Island with depths of approximately 88 m (48 fathoms) mid channel and from 56 to 91 m (31 to 50 fathoms) on two significant sub-sea ledges on the NE side of the channel. On one of these ledges in position Latitude 53°33.06’N Longitude 130°09.82’W there is a 35 m (19 fathoms) patch. This shoal patch can easily be avoided by using the deeper portions of the navigation channel.</p>
23	See Appendix 7: Canadian Hydrographic Service Chart Update program	
24	Application Volume 8A, subsection 4.6.6	<p>Based on a review of the existing navigation charts, there is ample water depth to accommodate the largest design vessel over the entire length of approaches.</p> <p>This assessment of the Northern and Southern Approaches will be revisited once the new charts are available, and additional project-specific surveys will be commissioned along any critical portions to verify that there are no navigational hazards in these areas.</p>
25	<i>Vessel Traffic Services Zones Regulations</i>	
26	<i>Navigation Safety Regulations</i>	
27	TERMPOL Review Process Study 3.15, subsection 15.1.2	It should be noted that increased aids to navigation was cited as an important potential risk reducing measure in interviews with local stakeholders. The aids should have a positive risk on reducing incidents not only involving tankers travelling to and from the Kitimat marine terminal, but also other marine traffic in the area of

		the three routes.
27	TERMPOL Review Process Study 3.15, subsection 15.1.4	Improvements such as the installation of radar coverage proposed by the proponent to augment VTS systems has a risk reduction effect on all shipping in the area and therefore the overall risk reducing effect would be greater than the effect for this project alone.
27	Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsection 8.4.3	It is recommended that an enhanced VTS be assessed based on the total current and predicted traffic pattern in the area. Improvements such as the installation of radar coverage to augment VTS systems will reduce the risk of both project and non-project related marine incidents in the area of the three routes.
27	Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsection 8.4.1	It should be noted that increased aids to navigation was cited as an important potential risk reducing measure in interviews with local stakeholders. The aids should have a positive effect on reducing the risk of both project and non-project related marine incidents in the area of the three routes.
28	Application Volume 8A, subsection 4.8.1.4	The marine strategy will include the following standards: <ul style="list-style-type: none"> • only tankers meeting the proponent's safety and environmental standards will be permitted at the terminal • radar will be installed along important sections of the Northern and Southern approaches to monitor all marine traffic and provide additional guidance to pilots and other vessels in the area
29	TERMPOL Review Process Study 3.5 and 3.12, subsection 12.7	Based on discussions with navigational experts, additional calling-in points for the design vessels provided within the Outside Passage channels would enhance the effectiveness of the current VTS system and increase the navigational safety in the area. Remote Radar Coverage of Wright Sound Area would greatly enhance navigational safety and the ability of VTS to monitor traffic. See also study 3.5 and 3.12 Section 5 and Appendix A.2 – Table A-2
30	TERMPOL Review Process Study 3.15, subsection 7.1	Tanker transit times in the CCAA will be in excess of eight hours, and will therefore require at least two pilots to travel through Pilotage Waters. Objectives of the Pilotage Authority are to establish, operate, maintain and administer in the interests of safety an efficient pilotage service within a specific region.
30	Application Volume 8A, subsection 4.2.14	The Pacific Pilotage Authority, in consultation with the BCCP and shipping stakeholders, will assess the requirements for establishing new pilot boarding stations at suitable locations along the Northern and Southern Approaches and size of vessels and frequency of calls being needed for the Project and other projects proposed for the region.

31	TERMPOL Review Process Study 3.3	<p>Fisheries Resource Survey</p> <ul style="list-style-type: none"> • Fish and Fish Habitat • Geographic Location of Fishing Activities • Seasonal Variations of Fishing Activities • Customary Routes to Major Fishing Grounds
32	Application Volume 8A, subsection 4.3.3	The safe speed profile for the tankers is the maximum allowable speed along the Northern and Southern Approaches for which all of the factors affecting navigational safety can be managed properly and safely. Within the Northern and Southern Approaches, establishing the safe speed profile for the tankers will be dependent on the factors listed in the preceding sections.
33	<i>Notice to Mariners, Annual Edition</i> , section F; National Defence – Military Notices	
34	PIANC stands for “Permanent International Association Of Navigation Congresses”	
35	See Appendix 6 – Proposed Shipping Routes	
36	<i>TERMPOL Review Process 2001</i> TP 743, Appendix 2 Channel, Manoeuvring and Anchorages Guidelines	
37	Application Volume 8A, subsection 4.2.2	<p>Maximum dynamic vertical ship motions (under wave or swell conditions) will require an underkeel clearance of 10.1 m or a cumulative draught of 33.2 m (18 fathoms) for safe transit.</p> <p>This dynamic effect is applicable to the more exposed sections of the route (e.g., Hecate Strait and Dixon Entrance). In the more sheltered portions of the route, wave effects are much reduced and the required dynamic underkeel clearance is less.</p>
37	TERMPOL Review Process Study 3.6, subsection 4.5	<p>Summary of Cumulative Draught Effects due to Ship Motions.</p> <p>The required underkeel clearance for safe transit of the design vessel should be based on the loaded draught of the design vessel plus the cumulative increases due to the effects discussed.</p>
37	TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4	Dynamic forces, as described in TRP Study 3.6, Section 4.5 “Summary of Cumulative Draught Effects Due to Ship Motions,” arrive at a larger minimum under keel clearance of 10.1 m, giving a cumulative draught of 33.2 m (18 fathoms) for safe transit.

38	TERMPOL Review Process Study 3.5 and 3.12, subsection 7.4	<p>With the exception of one 35 m (19 fathoms) patch which can be easily avoided, the minimum charted water depth along the entire proposed North and South routes is more than 36 m (20 fathoms).</p> <p>In Principe Channel, near Dixon Island with depths of approximately 88 m (48 fathoms) mid channel and from 56 to 91 m (31 to 50 fathoms) on two significant sub-sea ledges on the NE side of the channel. On one of these ledges in position Latitude 53°33.06'N Longitude 130°09.82'W there is a 35 m (19 fathoms) patch. This shoal patch can easily be avoided by using the deeper portions of the channel.</p>
39	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report	Manoeuvring Study of Escorted Tankers to and from Kitimat. Real-time Simulations of Escorted Tankers bound for a Terminal at Kitimat.
40	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report, subsection 1.3	Participants in real-time simulations include British Columbia Coast Pilots.
41	See Appendix 5: Design Vessels	
42	TERMPOL Review Process Study 3.5 and 3.12, subsection 7.3	<p>The narrower passages along the North and South routes, each with charted depths of 36 m (20 fathoms) or more are all wide enough for two-way navigation by the largest design vessel.</p> <p>The review indicates that for the design vessels, the proposed channels meet the specified requirements for two-way marine traffic in the TRP Guidelines and this has been demonstrated in the ship s[t]imulation program. In practice, the BCCP may choose to ensure that passing and overtaking situations do not occur in the narrowest sections, by good traffic management.</p>
43	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report, subsection 5.4	<p>Consensus from discussions with the Pilots is that the meeting of two large ships at locations 1), 2), 3), and 4) should, in general, be avoided, particularly during severe (wind 30 knots or above) weather conditions. The reason for this restriction is that the margins for safe navigation are limited in case of an emergency situation where the engine is lost or the rudder is locked at an angle different from “mid ship”.</p> <p>According to the pilots, the meeting of ships at these locations can easily be avoided through:</p> <ol style="list-style-type: none"> 1) Proper planning and pilot to pilot communication 2) Use of a VTS service in the area 3) Use of AIS data of other ships' movements <p>With the use of the above three tools, it is not considered to be</p>

		problematic for tankers to manoeuvre through areas 1), 2), 3) and 4).
44	TERMPOL Review Process Study 3.1, subsection 2.4.2	In order to mitigate risk, all laden tankers will have a tethered escort tug throughout the Confined Channel sections (from Browning Entrance or Caamaño Sound to the Kitimat Terminal).
45	TERMPOL Review Process Study 3.15, section 15	The proponent is committed to reducing project risk as described.
46	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report, subsection 5.6	It is important to keep in mind that the emergency situations described rarely occur, but that it is necessary for the Pilots and Tug Masters to rehearse these situations on a regular basis in order to be prepared in case an incident actually occurs. Proper training of Pilots and especially Tug Masters is essential for a generally safe operation.
46	Det Norske Veritas Marine Shipping Quantitative Risk Analysis, subsection 8.2.1	Operational Requirements: The following section describes the requirements that must be met in order for the tug to have the full risk reducing effect. Should any of these requirements not be met the risk reduction effect would decrease accordingly.
47	TERMPOL Review Process Study 3.5 and 3.12, subsection 12.8	It is anticipated that the escort tugs will be of similar design and capacity to those currently operating in Prince William Sound, where cycloidal propulsion units (classified as Enhanced Tractor Tugs) are used primarily for tethered and close escort operations, and Azimuth Stern Drive (ASD) units (classified as Prevention and Response Tugs) are used for close escort, sentinel, and open water (rescue) towing operations. Both types of tugs are approximately 10,000 horse power (HP) capacity, with bollard pulls ranging from 95 to 195 tonnes (from direct to indirect towing mode), and are also designed and classed as firefighting and first (oil spill) response tugs.
47	TERMPOL Review Process Study 3.5 and 3.12, subsection 2.1.14	The proponent is committed to entering into a contractual arrangement with a qualified towage company who will design and construct a suitable fleet of escort and harbour tugs for the Project. A preliminary analysis of tug operations (which will be refined in future phases of the project) indicates a requirement in the order of five escort tugs of approximately 10,000 HP capacity, and two harbour tugs of approximately 5,000 HP capacity.
48	Application Volume 8A, subsection 4.1.3.7	The proponent will require (under the tanker vetting program) that all tankers nominated to call at the marine terminal are equipped with suitable towing points.
49	Application Volume 8A, subsection 4.1.3.	The proponent will require (under the tanker vetting program) that all tankers nominated to call at the marine terminal are equipped with suitable towing points.

50	TERMPOL Review Process Study 3.7, section 4	<p>Maximum safe speed in confined channels will be governed by safe tethered escorting speeds of 8 to 12 knots.</p> <p>The design vessel(s) as proposed by the proponent, might achieve an overall average safe speed of about 9 knots.</p>
51	Application Volume 8A, subsection 4.3.3	The safe speed profile for the tankers is the maximum allowable speed along the Northern and Southern Approaches for which all of the factors affecting navigational safety can be managed properly and safely. Within the Northern and Southern Approaches, establishing the safe speed profile for the tankers will be dependent on the factors listed in the preceding sections.
52	Force Technology no. 108-29930-ES Version 4.0 Part 1: Executive Summary final report, subsection 4.6	Maximum safe speed throughout the confined channel areas from open sea to the Kitimat Marine Terminal is considered to be 10 to 12 knots. This provides a speed and time for tankers to complete safe and controlled manoeuvres.
53	TERMPOL Review Process Study 3.5 and 3.12, section 10	Figure 10-1 Anchorage Possibilities
54	Application Volume 8A, subsection 4.4	If a suitable anchorage is not available, the tanker may be required to maintain transit within an agreed upon channel. Tankers required to maintain a holding pattern may do so under their own power or with the assistance of an escort tug.
55	Force Technology no. 108 – 29930 – main. Version 1.0, subsection 6.8	The limiting wind speed for all three ship sizes (Aframax, Suezmax, and VLCC) is 50 knots from the prevailing wind directions NW and SE.
56	Application Volume 8A, subsection 2.2	<p>The various navigational passages and routes intersect in many places, creating marine traffic convergence zones or nodes, where encounters with other marine traffic may occur. In addition to marine traffic, visiting vessels need to be aware of other regional activities that may present navigational hazards, including military operations, exploratory work, seaplane activities, commercial fisheries, and environmentally and socio-economically sensitive shoreline features.</p> <p>Wright Sound is the highest density navigational node for marine traffic bound for Kitimat.</p> <p>Wright Sound is the junction of six deep-water navigable channels:</p>
57	TERMPOL Review Process Study 3.15, subsection 15.1	The proponent is committed to confirming that tankers transporting condensate, diluted bitumen and synthetic oil to and from the Kitimat Terminal adhere to high safety standards and operate in an environmentally responsible manner.
58	TERMPOL Review Process Study 3.15, subsections 15.1.5	<p>The collision risk for the proposed tankers is assessed to be low. Therefore, the effect of implementing the traffic scheme would also be low, and the potential effect on oil spill risk very limited.</p> <p>However a traffic separation scheme would make it easier for small</p>

		recreational crafts in the area to keep out of the way of passing larger vessels as they would know which side the tankers would transit.
59	TERMPOL Review Process Study 3.2, subsection 7.5	Fishing openings in the waters of Douglas Channel and Principle Channel may affect the timing of vessel transits.
60	TERMPOL Review Process Study 3.15, subsection 11.4.3	The proponent proposes to establish a Fisheries Liaison Committee that will include Aboriginal, commercial and local fisheries representatives who will provide advice on means to reduce the routine effects of the terminal operations and vessel movements on marine fisheries and other marine users. The committee will also provide a forum for discussion of measures to be taken to mitigate effects of hydrocarbon releases on other marine users.
61	TERMPOL Review Process Study 3.9, subsection 1.1	As terminal operator, the proponent will not directly own or charter the vessels and does not have a role in the selection of particular vessel(s) that will call at the terminal. Nonetheless, the proponent will establish Tanker Acceptance (Vetting) Criteria that will be used review and approve each vessel prior to it being granted permission to call at the terminal.
62	Application Volume 8A, subsection 4.7.14	The Terminal Operations Manual provides the vessel with the rules that are in effect when the vessel is moored at the terminal's berths.
63	TERMPOL Review Process Study 3.9, subsection 4.3	The terminal regulations will also include the following terms: <ul style="list-style-type: none"> • Tanker classification society must be a member of the International Association Classification Societies (IACS). • If requested, the tanker owner must agree to allow Enbridge or its agent access to the tanker for inspection independent of the SIRE Program. • Tanker must have English-speaking officers. • Tanker shall not have any expired or temporary certificates on board. • Tankers must certify it meets all Flag and Port State requirements. • Tanker must agree to allow the proponent to place a representative on-board the tanker for the duration of the discharge operation to observe for safety and pollution prevention.
64	TERMPOL Review Process Study 3.13, subsection 4.6.6	Bathymetric surveys confirm that within the vicinity of the marine terminal, the navigational channel is characterized by steep-sloped sides where the seabed quickly drops off from the shoreline and achieves depths within the manoeuvring area of approximately 100 to 160 m.
65	TERMPOL Review Process Study 3.13, subsection 4.6.8	Oil and condensate tankers operating near the facility within Douglas Channel will be tug assisted. Estimates of the limiting environmental

		<p>operating values are given below:</p> <ul style="list-style-type: none"> • Maximum Wind Speed, Tug Assisted Berthing for smaller tankers: 20 m / s (40 knots) sustained • Maximum Wind Speed, Tug Assisted Berthing for larger tankers: 15 m / s (30 knots) sustained • Maximum Wind Speed, Loading / Unloading Shutdown: 25 m / s (50 knots) sustained • Maximum Wind Speed, Loading / Unloading Arm Disconnect: 30 m / s (60 knots) sustained • Maximum Wind Speed for Vessel to Vacate the Berth: 32.4 m / s (63 knots) sustained • Maximum Depth-averaged Current, Vessel Manoeuvring: 1.0 m / s (2 knots) • Minimum Visibility, Tug Assisted Berthing: 1.0 km
66	Application Volume 8A, subsection 4.7.13	[Port Information Book] - Its main purpose is to provide ship's personnel with all relevant information pertaining to the terminal site and its navigation routes. This book includes information about the general geographical area, navigation procedures, berthing strategy, pilots, tug assistance, vessel services, security and safety procedures, communication procedures, anchorages, weather information, marine mammal protection measures and other information relevant to vessel operations.
67	TERMPOL Review Process Study 3.10, subsection 4.5	Design of the facilities will conform to the most current version of these codes and standards.
68	TERMPOL Review Process Study 3.10, Appendix B	Appendix B – Engineering Standards
69	TERMPOL Review Process Study 3.11, section 4	Cargo transfer operations occur as a series of procedures with the common purpose of achieving a safe and efficient transfer of product.
70	Application Volume 8A, subsection 4.1.6	In addition to the TAP, there will be terminal regulations the tanker will need to abide by.
71	TERMPOL Review Process Study 3.11, subsection 4.1.2	The Terminal Regulations will include mandatory procedures and regulations for the tanker to follow while it is moored at Kitimat Terminal. If the tanker does not follow the regulations, all cargo transfer shall be stopped and the tanker may be required to leave the dock.
72	TERMPOL Review Process Study 3.11, subsection 2.4.2	Under no circumstances can dirty ballast be discharged into Canadian waters. Canadian law requires that dirty ballast must be discharged to a proper treatment facility or retained on board the vessel. Also, if the ballast originated from a foreign harbour or port-of-call, it must be retained on the vessel regardless of whether reception facilities are available or not. Since the Kitimat Terminal will have no dirty ballast treatment facility, oil tankers arriving with dirty ballast will be required to retain it onboard.

73	Application Volume 8A, subsection 4.7.14	The Terminal Operations Manual provides the vessel with the rules that are in effect when the vessel is moored at the terminal's berths.
74	"VLCC" –stands for very large crude carrier	
75	"AFRAMax" refers to average freight rate assessment	
76	MV <i>Infinity</i> , largest cruise ship transiting Grenville Channel	

Appendix 3 PARTICIPANTS

Participants in the TERMPOL Review Process for the Northern Gateway Project

2005 TERMPOL REVIEW COMMITTEE

Organization	Role	Area of Contribution
Transport Canada	TERMPOL Review Committee chair, member and advisor	<ul style="list-style-type: none"> • Nautical expertise • Cargo regulation • Ship-shore interface • Oil pollution response planning and preparedness • Naval architecture • TERMPOL Review Process expertise • Ballast water • Local marine transportation industry • Marine compliance and enforcement, port state control • Environmental assessment • Navigable waters protection • Oil pollution response planning and preparedness • Marine security • Marine engineering • Direction and coordination
Aboriginal Affairs and Northern Development Canada	Observer	<ul style="list-style-type: none"> • Aboriginal affairs authority
British Columbia Coast Pilots	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Pilotage subject matter expert
Canadian Coast Guard	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Oil pollution response • Marine navigation services • Marine communications and traffic services • Waterways development
Fisheries and Oceans Canada	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Environmental response • Nautical charts
Chamber of Shipping of British Columbia	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Shipping in Canada's western waters
Council of Marine Carriers	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Tow boat industry

Department of Justice Canada	Observer	<ul style="list-style-type: none"> • Business and regulatory law • Aboriginal law
District of Kitimat	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Technical advisor
Haisla Nation and Kitamaat Village Council	Consultant, advisor	<ul style="list-style-type: none"> • Advisor
Environment Canada	TERMPOL Review Committee member	<ul style="list-style-type: none"> • Environmental protection, enforcement • Wildlife services • Direction
Parks Canada	TERMPOL Review Committee member	
Public Works and Government Services Canada	TERMPOL Review Committee member	

2011 TERMPOL REVIEW COMMITTEE – CORE DEPARTMENTS

Organization	Area of Contribution
Transport Canada	<ul style="list-style-type: none"> • Marine engineering • Nautical expertise • Cargo regulation • Ship-shore interface • Oil pollution response planning and preparedness • Naval architecture • TERMPOL Review Process expertise • Marine safety advisor • Ballast water • Local marine transportation industry • Marine compliance and enforcement port state control • Marine security • Navigable waters protection • Project management, direction and coordination • Environmental assessment
Fisheries and Oceans Canada	<ul style="list-style-type: none"> • Fish and fish habitat • Fisheries management • Hydrography • Direction
Canadian Coast Guard	<ul style="list-style-type: none"> • Aids to navigation • Communications and traffic • Pollution response

	<ul style="list-style-type: none"> • Waterways • Direction
Pacific Pilotage Authority Canada	<ul style="list-style-type: none"> • Pacific Pilotage Program
Environment Canada	<ul style="list-style-type: none"> • Protection and enforcements • Canadian wildlife • Environmental assessment

2011 TERMPOL REVIEW COMMITTEE – TECHNICAL ADVISORS

Organization	Area of Contribution
Haisla Nation and Kitimaat Village Council	<ul style="list-style-type: none"> • Consultant for the Haisla First Nation
District of Kitimat	<ul style="list-style-type: none"> • Kitimat technical advisor
British Columbia Coast Pilots	<ul style="list-style-type: none"> • Pilotage subject matter experts
Chamber of Shipping of British Columbia	<ul style="list-style-type: none"> • Shipping in Canada's western waters
Council of Marine Carriers	<ul style="list-style-type: none"> • Tow boat industry
Natural Resources Canada	<ul style="list-style-type: none"> • Risk analysis - Methodology

Appendix 4 LIST OF DOCUMENTS SUBMITTED FOR TERMPOL

Northern Gateway Project TERMPOL Review Process Submissions (List of Documents)

Information submitted by the proponent to the TERMPOL Review Committee in support of its explanation of the marine transportation elements of its Northern Gateway Pipelines project.

The TERMPOL Review Process submission of January 20, 2010 includes two volumes. Volume 1 contains surveys, studies and technical data, and Volume 2 contains the supporting reference material. The study associated with the Casualty Data Survey (3.8), was produced April 30, 2010. The Marine Shipping Quantitative Risk Analysis was produced in 2010 to address the TERMPOL Review Process interest in General Risk Analysis and Intended Methods of Reducing Risk (3.15).

In January 2010, the Northern Gateway Project prepared and submitted the following surveys and studies for consideration by the TERMPOL Review Committee.

Volume 1	No. of Pages
3.1 Introduction	18
3.2 Origin, Destination and Marine Traffic Volume Survey	161
3.3 Fishery Resources Survey	133
3.4 Offshore Exercise and Offshore Exploration and Exploitation Activities Survey	23
3.5 Route Analysis, Approach Characteristics and Navigability Survey (<i>ref 3.12</i>)	118
3.6 Special Underkeel Clearance Survey	51
3.7 Transit Time and Delay Survey	31
3.8 Casualty Data Survey (submitted April 2010)	31
3.9 Ship Specifications	37
3.10 Site Plans and Technical Data	93
3.11 Cargo Transfer and Transshipment Systems	33
3.12 Channel Manoeuvring and Anchorage Elements (<i>ref 3.5</i>)	118
3.13 Berth Procedures and Provisions	47
3.14 Single Point Mooring Provisions and Procedures	17
3.15 General Risk Analysis and Intended Methods of Reducing Risk (April 2010)	387

(plus - Marine Shipping Quantitative Risk Analysis (DNV Det Norske Veritas)	151
3.18 Contingency Planning	70
(plus General Oil Spill Response Plan)	116
3.19 Oil Handling Facility Requirements	10

The following reports are excluded from this submission:

- 3.16 Port Information Book: To be developed nearer project start-up
- 3.17 Terminal Operations Manual: To be developed nearer project start-up
- 3.20 Hazardous and Noxious Liquid Substances: Not applicable

Volume 2	No. of Pages
1. Marine Facility Security Overview. (3Si Risk Strategies Inc.) (Confidential Report)	26
2. Manoeuvring Study of Escorted Tankers to and from Kitimat Terminal (FORCE Technology) (plus 52Gbytes simulator data)	64
3. Vessel Wake Study (Moffatt & Nichol.)	19
4. Assessment of Level of Service Requirement for the BC North Coast VTS System – January 2010 – (Worley Parsons Westmar) Further development of navigation aid, communication and radar systems to be deferred to the detailed design phase. (To be developed with Canadian Coast Guard and Canadian Hydrographic Services)	
5. Marine Physical Environment Technical Data Report. (ASL Env. Sciences)	322
6. Weather and Oceanographic Conductions in the Confined Channel Assessment Area and in Queen Charlotte Sound, Hecate Strait and Dixon Entrance Area. Technical Data Report (ASL Environmental Sciences)	58
7. Wind observations in Douglas Channel, Squally Channel and Caamaño Sound. Technical Data Report. (Hay and Company Consultants)	694
8. Coastal Operations and Sensitivity Mapping for the Confined Channel Assessment Area. Technical Data Report. (Polaris Applied Sciences, Inc.)	194
9. Coastal Operations and Sensitivity Mapping for the Open Water Area. Technical Data Report (Polaris Applied Sciences Inc)	170
10. Properties and Fate of Hydrocarbons from Hypothetical Spills in the Confined Channel Assessment Area and at the Marine Terminal. Technical Data Report. (SL Ross)	132
11. Properties and Fate of Hydrocarbons from Hypothetical Spills in the Open Water	44

Area. Technical Data Report. (SL Ross)

12. Marine Shipping Quantitative Risk Analysis (DNV Det Norske Veritas)	151
13. Vapour Cloud Modelling and Conditional Quantitative Risk Analysis (Bercha Engineering Limited)	129
14. General Oil Spill Response Plan (Enbridge, Northern Gateway Pipelines Project)	116

Appendix 5 DESIGN VESSELS

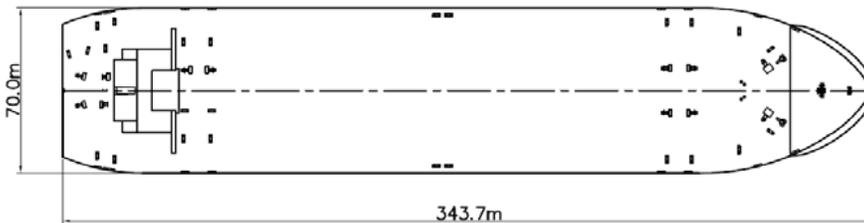
Design Vessels				Example Vessels	
Vessel Particular	Crude Oil	Oil and Condensate		Bulk Carrier	Cruise ship
Vessel Class	VLCC ⁷⁴	Suezmax	AFRAMax ⁷⁵	Current	Large ⁷⁶
Length Overall (m)	343.7	274.0	220.8	183	294
Beam (m)	70.0	48.0	32.2	32.2	32
Draught (m)	23.1	17.0	11.6	13.3	8.0
Deadweight (t)	320,472	160,000	81,408	50,939	
Displacement (t)	365,472	185,000	96,408	81,939	91,000
Hull Type	Double	Double	Double	Double	



AFRAMAX
80,000 DWT (MIN.)



SUEZMAX
160,000 DWT (AVG.)



VLCC
320,000 DWT (MAX)

⁷⁴ “VLCC” – stands for “very large crude carrier”

⁷⁵ “AFRAMax” refers to average freight rate assessment

⁷⁶ MV *Infinity*, the largest cruise ship transiting Grenville Channel

Appendix 6 **PROPOSED SHIPPING ROUTES**

Proposed Shipping Routes

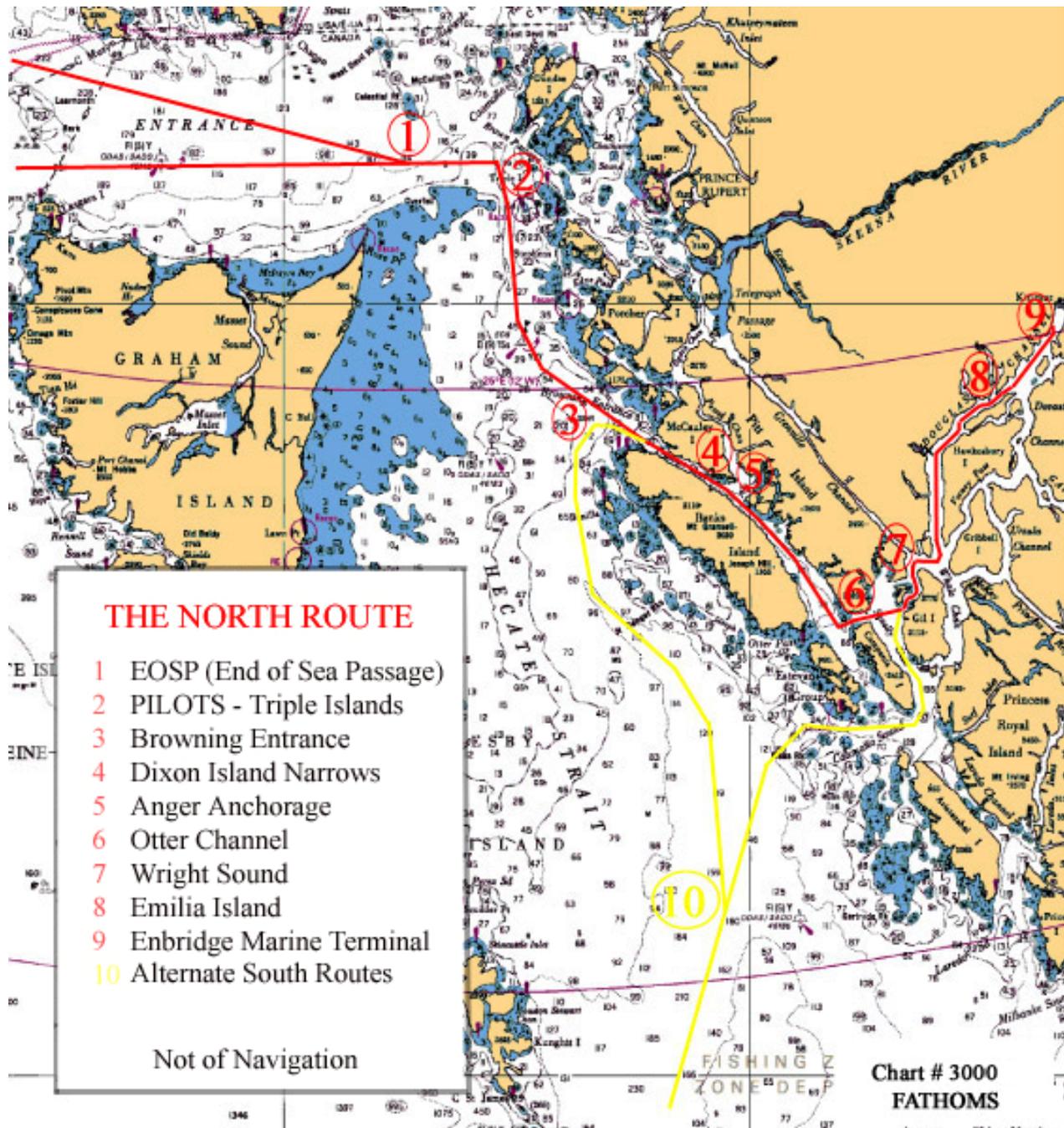
The north route for vessels arriving from or departing to Asian ports.

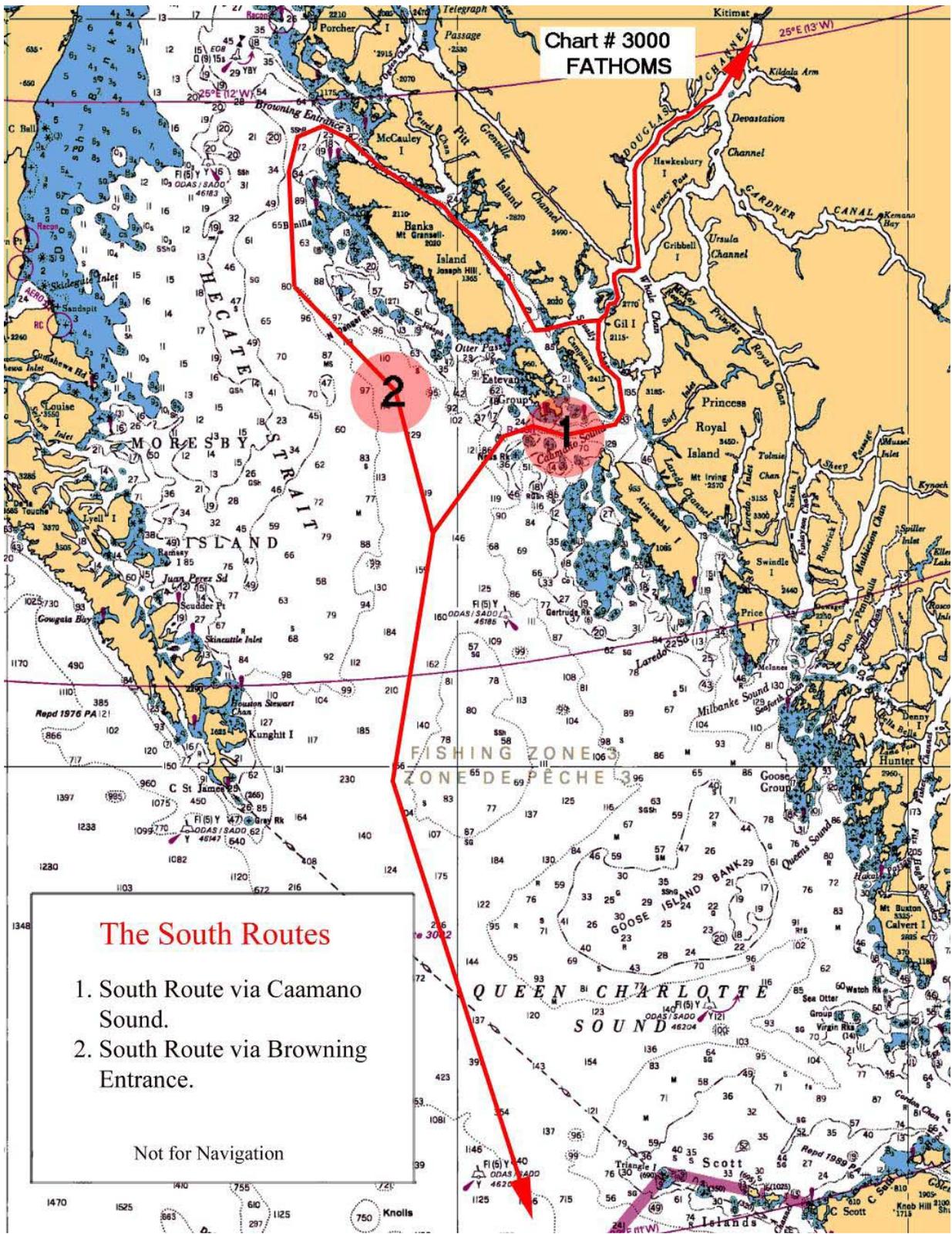
The north route passes Haida Gwaii through Dixon Entrance, and continues via Hecate Strait, Browning Entrance, Principe Channel, Nepean Sound, Otter Channel, Squally Channel, Lewis Passage, Wright Sound and Douglas Channel.

The south route (via Caamaño Sound) for vessels arriving from or departing to West Coast ports south of Kitimat.

The south route passes through Queen Charlotte Sound, and continues through Hecate Strait, Caamaño Sound, Campania Sound, Squally Channel, Lewis Passage, Wright Sound, and Douglas Channel.

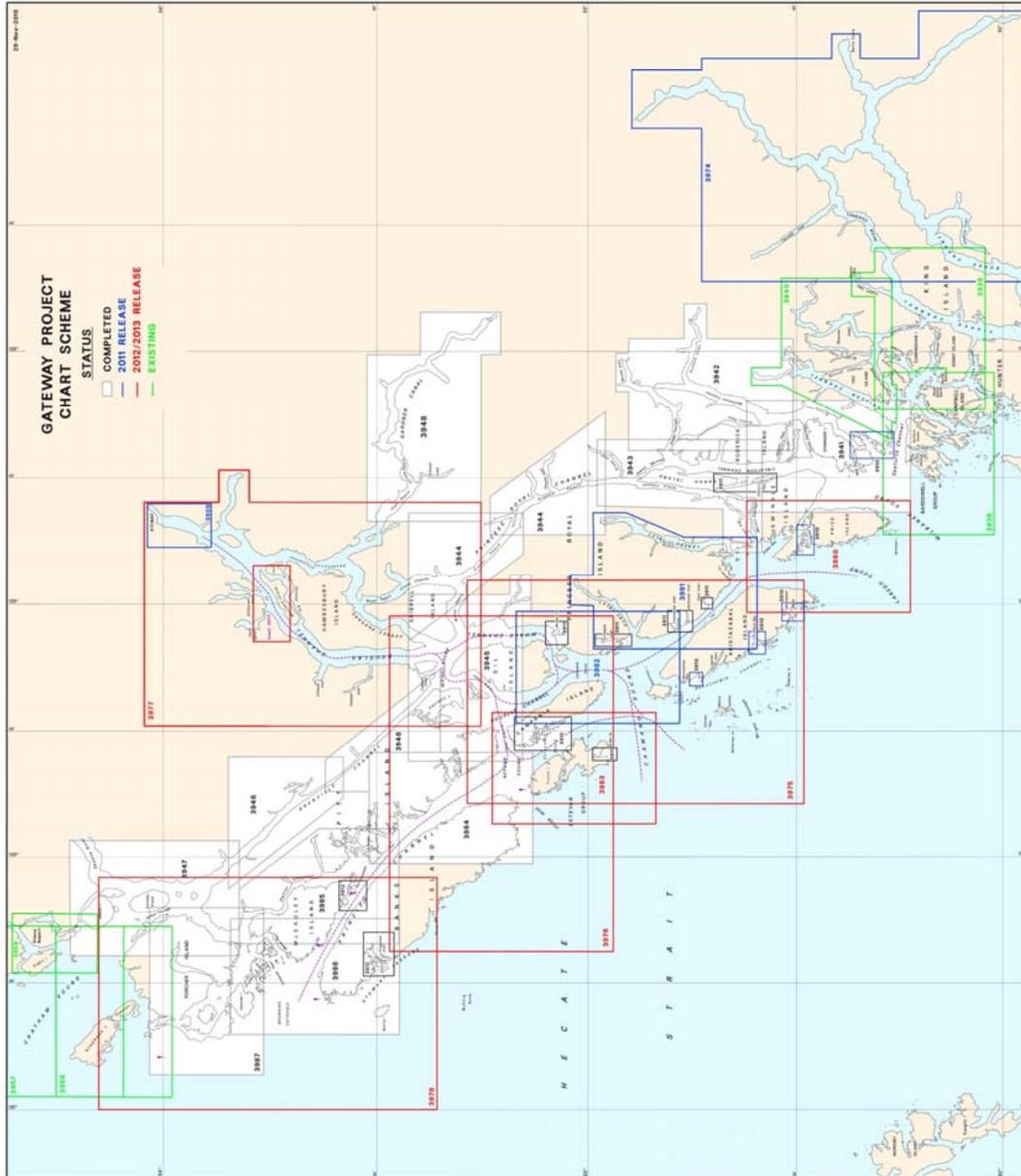
The south route (via Browning Entrance) passes through Queen Charlotte Sound and proceeds north through Hecate Strait, before continuing through Browning Entrance, Principe Channel, Nepean Sound, Otter Channel, Squally Channel, Lewis Passage, Wright Sound, and Douglas Channel





Appendix 7 CHART UP-DATE PROGRAM

Canadian Hydrographic Service Chart Up-date Program



Appendix 8 BIBLIOGRAPHY

Title	Publication Information
<i>International Safety Guide for Oil Tankers and Terminals (ISGOTT)</i>	Witherby & Co. Ltd. 32/36 Aylesbury Street London EC1R 0ET, United Kingdom
<i>Canada Shipping Act, 2001</i>	
<i>Notices to Mariners, Annual Edition</i>	Fisheries and Oceans Canada
<i>International Convention for the Safety of Life at Sea, (SOLAS), 1974</i>	International Maritime Organization (latest Consolidation)
<i>International Convention for the Prevention of Pollution from Ships, as amended (MARPOL73/78)</i>	International Maritime Organization (latest Consolidation)
Public Review Panel On Tanker Safety and Marine Spill Response Capability (Protecting our waters) (Final report September 1990)	Authors; David Brander-Smith, Q.C. Denise Therrien, P. Eng. Stan Tobin ISBN 0-662-18089-5
<i>TERMPOL Review Process 2001 (TP 743)</i>	
<i>National Places of Refuge Contingency Plan and Places of Refuge Contingency Plan Pacific Region (TP14704)</i>	
<i>International Convention on Load Lines, 1966 (as amended)</i>	International Maritime Organization (latest Consolidation)
<i>Convention on the International Regulations for Preventing Collisions at Sea, 1972, as amended</i>	International Maritime Organization (latest Consolidation)
<i>International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, as amended (STCW)</i>	International Maritime Organization (latest Consolidation)
<i>International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM)</i>	International Maritime Organization (latest Consolidation)
<i>A Guide to Canada's Ballast Water Control and Management Regulations</i> TP 13617 E	
<i>West Coast Sailing Directions: PAC 200E Pacific Coast, General Information, 2nd Edition (2006)</i> <i>PAC 205E Inner Passage - Queen Charlotte Sound to Chatham Sound (2002)</i> <i>PAC 206E Hecate Strait, Dixon</i>	Fisheries and Oceans Canada

<i>Entrance, Portland Inlet Adjacent Waters, and Queen Charlotte Islands (2002)</i>	
Risk Assessment Study of Oil Transportation on [sic] the BC Coast	Prepared for Transport Canada, Ottawa, by Robert Allan Ltd. Naval Architects and Marine Engineers. 230-1639 West 2 nd Avenue, Vancouver BC, V6J 1H3 September 9, 2002
West Coast Oil Ports Inquiry, Statement of Proceedings	Andrew R. Thompson, Commissioner
TERMPOL Assessment of the Navigational and Environmental Risks Associated with the Proposal of Kitimat Pipeline Ltd. to construct a Marine Oil Terminal at Kitimat, BC.	TP 851, Transport Canada Coast Guard Report May 1977. (photo copy only)
TERMPOL Report for the Melford Point LNG transfer terminal	Transport Canada Coast Guard Report August 1981 (E copy – PDF)
TERMPOL Report for Grassy Point BC, LNG import terminal	Transport Canada Coast Guard Report May 1992 (photo copy only)
TERMPOL Report for Soligaz LPG Import Project in the Montreal area (Varenes region)	Transport Canada Coast Guard Report September 1990 (photo copy only)
TERMPOL Report for Newfoundland Transshipment Limited, Whiffen Head	Fisheries and Oceans Canada, Canadian Coast Guard July, 1999 (photo copy only)
TERMPOL report for Gros-Cacouna Liquefied Natural Gas Terminal Project	TP 14633, Transport Canada, Marine Report 2006 (E-copy)
TERMPOL report for Rabaska Liquefied Natural Gas Terminal Project	TP 14684, Transport Canada, Marine Report 2007 (E-copy)
TERMPOL report for Bear Head Liquefied Natural Gas Terminal Project	TP 14915, Transport Canada, Marine Report 2009 (E-copy)