TERMPOL REVIEW PROCESS

2019 Edition

TP 743 E

July 2019

Transport Canada Transports Canada

Canada

Responsible Authority	Approval
The Executive Director, Navigation Safety and Environmental Programs is responsible for this document, including any changes, corrections or updates.	**"Original signed by"** **Naim Nazha** Executive Director, Navigation Safety and Environmental Programs Transport Canada Marine Safety and Security **Date signed: July 22, 2019**

Original Date Issued: February 1977 **Date Revised: July 2019**

Front Cover: Photograph courtesy of Chevron Canada Limited

Cette publication est aussi disponible en français sous le titre Processus d'examen TERMPOL, Édition 2019

TP No. 743 E

PDF

Cat. No. T29-120/2019E

ISBN 978-0-660-31426-6

TP 743 E / TC-1006356 – 5th Version TERMPOL Review Process

Foreword

History of TERMPOL

1970s

Almost all major marine oil terminals in Canada were built and operating before the 1970s. In February 1970, the oil tanker Arrow ran aground in Chedabucto Bay enroute to Point Tupper, Nova Scotia. It eventually spilled about 10,330 tons of Bunker C. This was the most significant oil spill off Canada's east coast.

An interdepartmental committee reviewing marine pollution issues saw the need to assess navigational risks associated with marine terminals for large oil tankers. They wanted measures that went beyond the legislative and regulatory requirements for navigation and ship safety. This led to the publication of the *Code of Recommended Standards for the Prevention of Pollution in Marine Terminal Systems* (TERMPOL Code, first edition) in 1977.

1980s

In 1983, after a number of TERMPOL assessments were successfully completed, Transport Canada published a second edition of the TERMPOL Code. The department expanded the Code to include proposals for marine terminals designed to handle bulk shipments of:

- liquefied natural gas (LNG)
- liquefied petroleum gas (LPG)
- chemicals

The review process was used to determine the navigation and pollution risks and the environmental impact at an early stage of the project.

Following the *Exxon Valdez* oil spill disaster in 1989, the Public Review Panel on Tanker Safety and Marine Spill Response Capability produced recommendations that led Canada to improve how we prevent, prepare for and respond to marine pollution.

1990s

In 1995 the *Canadian Environmental Assessment Act (CEEA)* entered into force. This made the environmental component of the TERMPOL Code irrelevant. The Canadian Coast Guard, which made navigation impact assessments under the *Navigable Waters Protection Act (NWPA)*, joined the Department of Fisheries and Oceans (DFO).

2000s

After considering various options, Transport Canada issued a third edition of the Code in 2001. This edition focused on the navigation safety of vessels transporting pollutants or hazardous and noxious substances in bulk to and from marine terminals.

In 2012, Canada updated the *CEEA* and replaced the *NWPA* with the *Navigation Protection Act (NPA)*. With a growing public interest in TERMPOL as well as program and regulatory changes, Transport Canada published a new edition in 2014 to:

- focus on navigation safety and marine pollution prevention
- ask the proponents (people, companies or groups who request a TERMPOL review) to engage local waterway users, particularly Indigenous groups

2016: Oceans Protection Plan

As part of the Government of Canada's commitment to a world-leading marine safety system under the Oceans Protection Plan (OPP), Transport Canada and its partners began to strengthen and possibly expand the TERMPOL review process.

TC created the OPP Enhanced Navigation Safety Assessment Regime initiative to explore all options for a modernized TERMPOL process, including the possibility of making the program mandatory. As of the 2019 edition, this initiative is ongoing.

Learn more about the Oceans Protection Plan.

TERMPOL Agreements

TERMPOL's popularity prompted TC to look using cost recovery as a way to continue to support the growing needs of industry and stakeholders. On June 20, 2017, the Governor General in Council, authorized the Minister of Transport to enter into official Agreements with proponents to defray costs of providing the review service[1].

Transport Canada bases Agreements on the resources needed to complete the review and the complexity of the project. Before entering into an Agreement for a proposed project, TC works closely with proponents to set the cost and timelines of each review.

2019 Edition

Transport Canada produced this new edition of the TERMPOL Review Process in consultation with the Canadian Coast Guard, Environment and Climate Change Canada, Fisheries and Oceans Canada, Natural Resources Canada, Port Authorities and Pilotage Authorities.

[1] The Governor General in Council authorized the Minister to enter into these Agreements under section 48 of the *Canada Transportation Act*. For more information, see section 1.6: Cost Recovery.

Contents

Part 1: The TERMPOL Review Process

1.1 Introduction

When a marine terminal or transshipment site is built, modified or re-commissioned, this changes regional shipping activity. Vessels carrying cargoes like oil, chemicals and liquefied gases may also threaten the environment or communities along their routes. The TERMPOL Review Process (TRP) considers these potential changes and threats to safety.

TRPs are technical reviews of proposed marine terminals and transshipment sites. Each review focuses on:

- a design vessel's route in waters under Canadian jurisdiction to its berth at a proposed terminal or site
- the process of cargo transfer between design vessels, or from design vessels to shore or vice versa, including single point mooring (SPM) systems

TRPs apply to:

- proposed marine terminal systems and transshipment sites for bulk shipments of :
- oil
- chemicals
- liquefied gas, and
- any other cargoes Transport Canada believes may pose a marine transportation safety issue, or a risk to public safety or the marine environment
- existing marine terminals or transshipment sites for these substances, when proposed changes would significantly change their operations

Who conducts the reviews?

The TERMPOL Review Committee, which is made up of subject matter experts from departments and authorities with marine regulatory, program and service responsibilities.

1.2 Purpose of the TERMPOL review

The TERMPOL Review Process is a voluntary, cost-recovered process. During the review, the TERMPOL Review Committee assesses the marine transportation aspects of a proponent's project at an early planning stage.

The TRP objectively appraises:

- operational vessel safety
- route safety
- cargo transfer operations associated with the proposed marine terminal system or transshipment site

The intent of the review process is to improve, where possible, parts of a proposed project that could threaten the integrity of the design vessel's hull and its cargo containment system:

- while navigating in waters under Canadian jurisdiction

- during cargo transfers alongside the proposed marine terminal or at a designated transshipment site, including SPM systems

The review is designed to help the proponent:

- assess risks
- identify potential problems
- find ways to enhance marine safety beyond the current regulations

What does a TERMPOL review include?

The proponent considers a range of subjects, including:

- navigational safety of the design vessel‘s route(s)
- services available to help with safe navigation, such as:
- fixed and floating aids
- vessel traffic services
- electronic position fixing systems
- requirements for pilotage, tug escort and radio communications along the route(s)
- if the design vessel is well suited to navigating the proposed route(s) and docking at the design vessels’ berth
- operational safety of the design vessel’s cargo containment and handling
- adequacy of the design vessel’s berth and related terminal service requirements
- possible effects of increased shipping activity on regional shipping networks, including fishing, recreational boating and vessels not required to carry an automatic identification system (AIS)
- concerns related to pollutant cargoes carried by the additional vessels
- risks to communities along the route(s)
- marine contingency planning, pollution prevention measures and emergency response

Part 3 of this TERMPOL manual guides proponents on information to consider as they plan their project.

Research studies help proponents assess and show how they will carry out the marine transportation parts of the project safely. Proponents must take into account the current Canadian legislative and regulatory framework, industry best practices, and marine programs and services.

Through studies, proponents demonstrate that they have:

- identified major incident hazards in the context of their proposed operation
- evaluated risks of these hazards
- evaluated how to acceptably reduce those risks, using the best available technology and practices

The TERMPOL Review Committee analyzes the proponent’s studies, then provides a report which includes findings and recommendations.

1.3 TERMPOL exclusions and overlaps

1.3.1 Marine terminal

The TERMPOL Review Process **does not**:

- set out detailed standards for the marine terminal's site, design, construction or operation
- assess the terminal's land-based shore installations, hinterland cargo handling or storage facilities

However, the review **does** address parts of the terminal's operation and contingency planning that apply to the design vessels using the terminal.

1.3.2 Environmental impact assessments

The TERMPOL review is a stand-alone process, separate from any environmental impact assessment. It does not examine potential environmental effects that may result from the project, including those caused by accidents, malfunctions and cumulative environmental effects.

Sometimes, a regulatory process under a federal or provincial authority may also apply to the project. If this is the case, the TERMPOL Review Committee expects the proponent to:

- Consider how the TERMPOL review can help inform that assessment process (and align their timelines, if possible)
- Provide their submission(s) to the lead authority and the public, according to the filing and timing requirements of that regulatory process[2]

1.3.3 Transport Canada's Navigation Protection Program

The Navigation Protection Program administers the *Navigation Protection Act* requirements through a separate review process.

Proponents must apply for an approval if they want to construct, place, alter, repair, rebuild, remove or decommission a major work in, on, over, under, through or across any navigable water. The project must not interfere with the safety of navigation in that navigable water.

In contrast, the TERMPOL review process looks at the marine transportation components of a proposed project.

1.3.4 Marine security

Vessel and terminal security requirements are administered through national and international regulatory frameworks beyond the scope of the TERMPOL review. The review process **does not** consider intentional acts that could cause a release of cargo.

---

[2] Throughout the review, the TERMPOL Review Committee will try to keep in mind the regulatory timeline requirements for other regulatory permitting processes. However, the TRP ultimately depends on the timing and quality of the proponent's submission.

However, the federal government has an effective, risk-based approach to threats that affect marine vessels and facilities. All vessels and terminals must comply with Canadian legislation and international frameworks for vessel and terminal security.

This includes the:

- *Marine Transportation Security Act*
- *Marine Transportation Security Regulations*
- *International Ship and Port Facility Security Code*

1.4 Status of the TERMPOL review process

Transport Canada Marine Safety and Security (TCMSS) coordinates the TERMPOL Review Process. Participating departments and authorities also contribute observations and recommendations, as per their expertise.

The TERMPOL Review Process is not a regulatory instrument. It is not mandatory. The Government of Canada does not issue approvals or permits issued as a result of the Review Process.

No one should interpret any TERMPOL Review Report as a statement of government policy, or assume the government endorses the project proposal in whole or in part. Report conclusions and recommendations are not binding on any department, authority, group or person. Departmental executives or the proponent may act on any recommendation.

Government authorities and other agencies can use a TERMPOL Review Committee's work and report to identify:

- potential problems and ways to improve marine safety
- the impact, if any, on marine services and programs

For example, opportunities for improvement could lead to:

- recommended measures, guidelines or standards
- industry best practices
- a review of marine services and programs
- a regulatory review

TERMPOL report recommendations never exempt a proponent and the vessel(s) associated with their project from fully complying with the law. This includes all Canadian legislation related to shipping safety and environmental protection.

Proponents and vessels must always comply with all applicable laws, including:

- *Canada Shipping Act, 2001*
- *Arctic Waters Pollution Prevention Act*
- *Fisheries Act*
- *Oceans Act*
- *Canada Marine Act*

- *Marine Transportation Security Act*
- *Marine Liability Act*
- *Pilotage Act*
- *Navigation Protection Act (Canadian Navigable Waters Act)*
- *Canadian Environmental Assessment Act, 2012 (Impact Assessment Act)*

1.5 Proponent's participation

The success of the review depends on the proponent's submission, and the quality of its data and analysis. The proponent is responsible for ensuring the studies meet the highest industry and international standards.

1.6 Cost recovery

Since 1977, the TERMPOL Review Process has been recognized as a voluntary process. TERMPOL is not:

- a funded program
- a requirement under any other federal or provincial regulatory review process

In the past, TERMPOL reviews were infrequent. Transport Canada could manage associated costs through existing budgets and workload.

Recently the number of proposed marine terminals has steadily risen and the demand for TERMPOL technical reviews has increased. As well, some environmental assessments have required proponents to go through a TERMPOL review and follow the resulting recommendations.

In order for Transport Canada to continue providing this service, on June 20, 2017, the Governor General in Council authorized the Minister of Transport to enter into Agreements with proponents requesting a TERMPOL review. TERMPOL Agreements include fees based on the complexity of the project.

Transport Canada is using cost recovery for the short term. However, the department is also looking at a longer-term solution under the Ocean Protection Plan. This may include making the TERMPOL Review Process mandatory under federal government regulatory review requirements.

1.7 Overview of the TERMPOL review process

Before proponents request a TERMPOL review, they have a discussion with a TCMSS regional representative to discuss the review and the cost recovery process.

If the proponent wants to go ahead, he or she formally requests a TERMPOL review in writing.

The Transport Canada Regional Director then assesses whether to go ahead with the review. The director considers:

- resources
- applicability

- necessity
- timeframe
- existing information about the project

If the review goes ahead, the proponent and TCMSS enter into an official Agreement for services related to the TERMPOL review process. This includes terms and conditions, and monetary considerations.

The Regional Director then appoints a chair, who convenes a TERMPOL Review Committee. The review committee and proponent meet soon after, to:

- confirm the geographical scope of the review
- agree on the studies the proponent will conduct
- agree on the submission's conditions and format
- agree on a schedule of progress meetings and lines of communication between committee and proponent

During the review, the committee may identify information gaps, or may need to know more about data the proponent provides. If the committee needs to ask for more information, they use the procedures agreed upon during the initial meeting.

When the review is complete, Transport Canada provides a TERMPOL Review Report. It is available in both official languages to the public.

To give Canadians complete context, the TERMPOL Review Committee expects the proponent to make its submission available to the public, through its website or other means.

The following table shows the general stages a TERMPOL review follows. Part 2 of this manual describes the process in more detail. Part 3 describes the various studies the review committee may request.

Figure 1: Stages of a TERMPOL Review Process

STAGE	ACTIVITY
1 TCMSS convenes TERMPOL Review Committee (TRC)	**1.1 Proponent sends a formal request for a TERMPOL Review Process (TRP).**
	1.2 TCMSS Regional Director assesses the request and reviews proposed project description.
	1.3 The proponent and TCMSS enter into an official TERMPOL Review Agreement for services related to the review, including terms and conditions and monetary considerations.
	1.4 TCMSS appoints a Chair, who convenes a TRC and holds a kick-off meeting.
2. TRC meets with proponent	**2.1 TRC and proponent agree on scope and depth of the studies, as well as conditions and format of the submission.**

	2.2 TRC informs proponent of the departmental information resources available.
	2.3 TRC establishes administrative lines of communication and agrees on a schedule of progress meetings.
3. Proponent prepares TERMPOL studies	**3.1 Proponent prepares the TERMPOL studies.**
	3.2 TRC members may participate in hazard identification workshops or simulations.
	3.3 TRC Chair receives proponent's submission and distributes it to TRC.
4. TRC begins review process	**4.1 TRC begins reviewing the submission and identifies any need for information or details.**
	4.2 TRC meets with proponent's representatives (if necessary).
	4.3 TRC may seek expert advice on matters raised in proponent's submission.
	4.3 When review is complete, TRC provides technical feedback and analysis and summarizes material.
5. TRC submits final draft report	**5.1 TRC prepares draft report for review by participating departments and authorities on the TRC.**
	5.2 TRC submits final draft report to the RD, who forwards it to the Director General, TCMSS.
	5.3 Report reviewed by TC headquarters, legal services and plain language and sent for translation.
	5.4 Director General, TCMSS approves final report for publication.
6. Regional Director, TCMSS sends report to proponent	**6.1 Regional Director, TCMSS forwards TERMPOL Review Report to proponent and participating departments and authorities.**
	6.2 TERMPOL Review Report is made available to the public.

Part 2: TERMPOL Review Committee

2.1 Introduction

Who participates in the TERMPOL Review Committee?

Representatives from:

- Transport Canada, for:
    - marine safety
    - environmental protection
    - dangerous goods
    - navigable waters
    - harbours and ports
- the Canadian Coast Guard, for:
    - marine communication and traffic services
    - aids to navigation
    - marine pollution response
    - waterways management
    - icebreaking
- the Canadian Hydrographic Service
- Environment and Climate Change Canada, for:
    - meteorology
    - environmental emergencies
- Pilotage Authorities
- Port Authorities, when the proposed project is in a port administered under the *Canada Marine Act*

Representatives from other departments or authorities with marine regulatory, program or service responsibilities may join too. This depends on where the proposed marine terminal or transshipment site is located and the nature of the cargo. Other representatives may be from:

- Public Services and Procurement Canada
- Natural Resources Canada
- Crown-Indigenous Relations and Northern Affairs Canada
- the St. Lawrence Seaway Management Corporation, when the proposed terminal is located within the Seaway region
- the provincial department of the environment
- any other department or organization, depending on the circumstances

The committee may also invite a subject matter expert to inform them on a particular subject, if needed.

2.2 TERMPOL chair

The TERMPOL Chair is responsible for:

- the nature of the submission
- the provisions of the review process
- who sits on the Committee
- how the review and cost recovery are administered

One or more representatives from TCMSS Headquarters or from other relevant departments may, at the chair's request, assist in the review. Based on the project proposal, executives from participating departments or authorities select the remaining committee members.

2.3 Committee responsibilities

The TERMPOL Review Committee carries out the project proposal review. Its responsibilities are to:

- determine the scope of the review and the studies needed to support it
- review the proponent's submission
- determine any missing or vague information, and inform the Chair of any additional information they may need from the proponent
- advise the Chair of their departments' perspectives and/or related departmental policies
- help the Chair produce the interim and final reports, or the executive summary, as needed
- inform their departments or authorities about the review process

2.4 Scoping considerations

The scope of the TERMPOL Review Process will vary according to the nature and location of the proposed project. The TERMPOL Review Committee designs each review to address the project's circumstances. Considerations affecting the review's scope may include:

- geographical area
- relevant studies
- elements within those studies

Other considerations:

- Is the project a terminal handling bulk oil, chemicals, liquefied gases or other noxious and hazardous cargoes?
- Is the project a new marine terminal?
- Is the project proposed for an area that is not already a well-established shipping route?
- Are the design vessels proposed for the project larger than vessels currently calling in the area?
- Is this a new cargo, not currently shipped out of the area?
- Is the project located outside the boundaries of a Canada Port Authority?
- Is this the first TERMPOL review for the region?
- Are the operations, vessels and/or cargo different from previous TERMPOL reviews in the region?

- Is there an increase in vessel traffic as a result of proposal?

The TERMPOL Review Committee will look to the proponent to propose a scope for the review, with rationale. The committee may agree or suggest changes.

Note: The proponent should not begin the studies until the committee confirms the scope.

Topic areas are likely to include:

- a general overview of the marine terminal
- vessel design and operation
- navigational and physical characteristics of transit routes and approaches to the terminal
- cargo transfer
- risk and accident analysis along the transit route and at the marine terminal, and related measures to lessen these risks
- pollution prevention measures
- contingency plans

If sailing to the Great Lakes or entering certain Canadian coastal ports involves a transit through waters not under Canadian jurisdiction, the proponent should contact the appropriate Administration for any additional requirements that may affect the transit of their vessels.

2.5 TERMPOL review report

The TERMPOL Review Committee determines the format and contents of the final TERMPOL Review Report.

What does the review report include?

- an executive summary, analysis, findings and recommendations
- reports on specific topics deemed necessary to the review

When the review is done, the committee submits the final report to the Regional Director, TCMSS, who forwards it to the Director General, TCMSS, and representatives of the participating departments or authorities.

Senior managers of all departments and authorities represented on the committee review and approve it before Transport Canada sends the report to the proponent.

Part 3: TERMPOL Studies

3.1 Introduction

The following information is for proponents requesting a TERMPOL review. Technical data and studies for the TERMPOL review are described in the following sections:

- Vessel information
- Route information
- Terminal operations
- Risk analysis
- Contingency planning
- Oil spill preparedness and response
- Hazardous and noxious substances

Before you review Part 3 of this manual in detail, read Part 1 and Part 2. They provide an overview of the TERMPOL Review Process and who is involved.

Statistics and data to inform the review process

Participating in a TERMPOL review of a new, modified or recommissioned marine terminal or transshipment site requires you, the proponent, to compile and analyze diverse data sets. This data will ultimately help you develop:

- the safest criteria for vessel operation, and
- a robust pollution prevention program

Statistics and other data for the studies identified here could come from a number of sources. The manual identifies potential data sources throughout each subsection of Part 3. Early on, you should also make informal contact with relevant federal, provincial and territorial authorities to get access to pertinent data, policies and guidelines.

Use your judgment in selecting sources of required data and applying them. Keep in mind, the TERMPOL Review Committee may ask you for more information on any topic. In some cases, you may need to compile primary data rather than relying on existing information.

Your studies **must verify** that your proposed project complies with all marine safety regulations that apply. In addition, studies should identify and take into account the applicable standards, procedures, codes, protocols, recommendations and best practices recognized by international authorities and associations[3].

You will need to present this data in a form the TERMPOL Review Committee can easily use.

Note: The TERMPOL Review Committee is not necessarily limited to the data you supply. Departmental databases or other sources of information may help the committee verify your submission and identify potential problems with it.

---

[3] Refer to Appendix 1 for a list of some of the main organizations and associations.

Public engagement

Early in the process, as you begin conducting studies, we encourage you to engage local waterway users, such as:

- Indigenous groups
- fishing associations
- recreational boaters
- commercial passenger vessel operators
- community associations

We especially recommend Indigenous engagement. The studies may deal with matters of interest to Indigenous groups who have important local and traditional knowledge.

To learn more about Transport Canada's recommended approach to Indigenous engagement in a TERMPOL review, refer to Appendix 2.

3.2 Vessel information

This study helps you, the proponent, assess the suitability of the design vessel(s). You should provide the TERMPOL Review Committee:

- plans and technical documents of the design vessel(s): see detailed list below
- the tanker vetting procedures

The TERMPOL Review Committee will be interested in:

- overall length, length between perpendiculars, breadth, beam and depth
- light draughts and air draughts
- summer and winter draughts, and corresponding deadweight and displacement
- gross and net tonnages
- vessel classification, including ice class, where applicable, and Classification Society
- capacity of cargo containment and cargo transfer systems
- main propulsion system (type, power, configuration, etc.)
- steering gear arrangements
- main and auxiliary engine cooling systems
- de-icing or re-circulation systems
- vessel stability data, both intact and damaged
- manoeuvring data, including both loaded and ballast conditions, and information in accordance with International Maritime Organization (IMO) standards
- pollution prevention and emergency preparedness information, and response plan and equipment
- shipboard navigational equipment
- radio and internal communications equipment
- crewing and certification standards

Note: This is not an exhaustive list. If you feel more information would be useful, add it to your submission.

The vessel **must comply** with:

- all applicable IMO conventions and initiatives for marine safety and pollution prevention
- the *Canada Shipping Act, 2001*
- the *Arctic Waters Pollution Prevention Act* (where applicable)
- other relevant Canadian legislation
- all applicable regulatory requirements

3.3 Route information

3.3.1 Route analysis, approach characteristics and navigability study

The objectives of this study are for you, the proponent, to assess vessel and route safety. **This is a major component of the review.**

You should consider the survey in terms of:

- the design vessel(s)'s characteristics
- the physical characteristics of the approach route to the terminal or transshipment site
- prevailing atmospheric factors

You are responsible for proving, through simulation or other means, that the routes are suitable for the safe navigation of the design vessel(s) and any supporting vessels.

You must:

- Take into account equipment failure and emergency manoeuvres, and
- Confirm the loaded design vessel(s) can safely navigate the channel, or channels, between the proposed marine terminal or transshipment site and its coastal approaches, or vice versa

You must also identify:

- hydrographic factors that could adversely affect the safety of the design vessel (e.g., tides)
- the suitability, if any, of alternative routes to the proposed marine terminal or transshipment site
- any climatic or oceanographic factors that adversely affect navigational safety, including ice conditions and ice strengthening requirements
- any navigational hazards or vessel manoeuvring difficulties along the route
- any physical limitations along the route (e.g., bridges, power transmission lines, narrows, bars)
- the pilot station's geographical location
- the need for pilotage and pilotage availability
- the regional radio communications infrastructure

- opportunities for improving aids to navigation or vessel traffic services
- the need, if any, for escort or assist tugs
- the geographical locations of suitable emergency and holding anchorages for the design vessel
- any other relevant matters of interest to you or the TERMPOL Review Committee

Data sources could include:

- applicable Canadian nautical charts
- nautical publications, such as:
- annual and monthly editions of the Canadian Notices to Mariners
    - *Radio Aids to Marine Navigation*
    - *Sailing Directions*
    - *List of Lights, Buoys and Fog Signals*
    - *Canadian Tide and Current Tables*
    - *Atlas of Tidal Currents*
    - *Canadian Aids to Navigation System*
    - *Ice Navigation in Canadian Waters*
    - *Joint Industry-Government Guidelines for the Control of Oil Tankers and Bulk Chemical Carriers in Ice Control Zones of Eastern Canada* (JIGs), TP 15163
    - *Winter Navigation on the River and Gulf of St. Lawrence: Practical Notebook for Marine Engineers and Deck Officers,* TP 14335
    - *Guidelines for Navigation under the Confederation Bridge*, TP 13681
    - *MANICE*, published by Environment Canada
- Fisheries and Oceans Canada for oceanographic data
- Environment and Climate Change Canada for climatic data, including ice and iceberg information
- Canada Port Authorities
- Pilotage Authorities
- consultant's reports

Note: If the proposed route involves a transit through waters not under Canadian jurisdiction, you should contact the appropriate administration for any additional requirements that may affect the transit of your vessels.

3.3.2 Special underkeel clearance study

In this study, you must:

- consider all factors that may affect underkeel clearance, and
- demonstrate and ensure the design vessels have an adequate underkeel clearance at all times

The design vessel's minimum underkeel clearance:

- should be 15% of its maximum permissible draught in sheltered waters (after considering squat and other factors), or

- meet the requirements established and published by the appropriate government authority for a specific waterway

The TERMPOL Review Committee might consider a proposal for a minimum underkeel clearance of less than 15% of the design vessel's deepest draught in the approach. But you should support your proposal with explicit operational details and calculations associated with each of the following factors:

- minimum chart datum measurements supplemented with tidal heights over a specified time period
- accuracy of predicted tidal heights, and predicted times of high water and low water
- details of any tidal surges and wind set-up
- allowances for the degree of accuracy in the hydrographic survey (chart datum) and for dredging tolerances
- incidence and degree of channel silting between maintenance dredgings, and identification of all critical depth areas
- increase in effective draught due to the rolling, pitching and heaving of the vessel under wave action within the ship channel and at the terminal or transshipment site
- estimated squat for the design vessel(s) calculated for each critical depth area, based on the maximum permissible operating vessel speed in the area, and the most constricted channel section within the critical depth area
- effects of listing, sagging or hogging
- nominal trim and changes of trim experienced by the design vessel
- draught and trim changes attributed to any changes in water density
- any climatic and related depth anomalies
- nature of the bottom
- allowance for manoeuvrability in shallow water
- identification of any turns on the proposed route that might cause the vessel to heel and allow for the increase in draught
- an operational plan to ensure safe transit

3.3.3 Channel, maneuvering and anchorage study

For this study, assess the suitability of existing channels for the design vessel(s), and identify areas of concern where navigation needs particular attention.

Use the latest versions of:

- the Canadian Coast Guard *Guidelines for the Safe Design of Commercial Shipping Channels*
- the *PIANC Harbour Approach Channels Design Guidelines*
- other relevant documentation

You should depict proposed ship channels, anchorages and other relevant information on large-scale nautical charts or engineering plans.

3.3.4 Transit time and delay study

The “transit time” component of this study helps you assess the safest coastal zone and/or inland waterway speed profile for the design vessels proceeding to and from the proposed marine terminal or transshipment site.

The “delay” component helps you identify probable causes, locations, durations and frequencies of delays in the movements of all marine traffic through a ship channel (or channels), which connect the coastal approaches and proposed marine terminal or transshipment site.

Ways to obtain this information include:

- drawing conclusions from the route analysis, approach characteristics and navigability study
- completing simulated or actual test runs using a vessel(s) similar in characteristics to the design vessel(s)
- requesting data maintained by Canadian Coast Guard Marine Communications and Traffic Services
- getting advice from the applicable Pilotage Authority
- using questionnaires distributed to selected vessel masters

3.3.5 Marine traffic study

This study quantifies and describes all recreational, commercial and any other traffic that forms the regional marine traffic network in the area of the proposed site.

It may help you assess which possible shipping route offers the greatest navigational safety. This can minimize potential risk of an incident, and environmental impacts.

For this study, you must identify:

- details about the types and sizes of vessels operating in the region, particularly those the design vessel(s) will likely encounter enroute to and from the proposed marine terminal or transshipment site
- variations in traffic density statistics, including those projected as a result of the proposed design vessel(s) activities
- special operational areas and their details, including any:
    - naval and airborne exercise areas
    - offshore exploration and exploitation activities
    - seaplane activities
- network focal points, or nodes, which show the geographical locations where close-quarter situations are likely to happen and, particularly, where there is crossing traffic
- major fishing grounds, type of fishing, routes and the periods they are used by fishermen
- major traffic routes, including seasonal variations attributable to climatic influences or other causes
- sensitive biological and human environments along or adjacent to the proposed routes
- sensitive areas where marine mammals protection must be considered
- marine protected areas designated under various jurisdictions

- coastal communities close to the intended route
- possible alternative routes for the design vessel(s), in light of the above information, and an assessment of the experience of similar vessels travelling in the same or similar areas

Possible sources of statistical data can include:

- the Canadian Coast Guard's Marine Communications and Traffic Services records
- the relevant Port Authority, if applicable
- the Department of Fisheries and Oceans
- Statistics Canada
- ferry routes and schedules
- the Pilotage Authority
- local marine associations
- municipal records
- consultants' reports

A marine traffic network consists of one or more finite capacity waterways leading to various marine terminals located in coastal zones or inland waters.

Flow of traffic in the network may be either:

- predictable (flows of regular or predictable vessel transits), or
- unpredictable (flows of unscheduled or random vessel transits)

You may be able to find statistical counts of regional traffic for a particular coastal region's marine network over specified periods.

Other marine activities superimposed on the regional traffic patterns could include:

- seasonal and year-round fishing
- military exercises
- recreational boating and sailing
- seasonal cruise and whale watching expeditions
- offshore exploration and exploitation activities
- ferry routes and schedules
- seaplane activities
- winter activities

You can get counts and supplementary data related to the above from a variety of sources, including several federal departments.

As well, the shipping part of your project will add to actual or estimated vessel counts in some of the ship channels and coastal routes in the regional network.

To estimate this, you should consider:

- the proposed annual loading or receiving throughput for the proposed marine terminal, and
- the mix of design vessel(s), in terms of the minimum number of voyages per year needed to meet the proposed annual throughput volume

The proposed marine terminal may be used for importing or exporting. Therefore, your estimated additional vessel counts (voyages) should include incremental numbers required to transship cargo both to and from the proposed terminal.

Also include a section that focuses specifically on local marine traffic in the immediate geographical area of the proposed marine terminal or transshipment site.

In this section, you should identify:

- the types and sizes of vessels in the area of the terminal
- the types and quantities of potential hazardous cargo
- local fishing operations
- local recreational and other marine activities, including whale watching
- nearby residential and commercial areas
- vessel traffic services in the terminal area and approaches

Note: All of the considerations you note in these studies apply to any proposed transshipment site. This is because any site may limit the waterway's ability to handle traffic.

3.4 Terminal operations

3.4.1 Site plans and technical data

For this study you must demonstrate the suitability of the site with the design vessel's proposed operations and existing installations.

Provide the following:

- **An overall site plan**, showing the location of the proposed structures in relation to existing structures and coastal features in the area
- **A general arrangement plan**, with bottom contours of not less than 3 metres (10 feet) showing the proposed location and size of:
    - all structures, floating and fixed
    - turning basins, manoeuvring areas and proposed anchorage areas
    - separation and distance between adjacent berths, vessels and structures, and berths and navigational channels
    - existing and proposed submarine pipelines, cables and other underwater installations
- **Wind data**, based on the local wind systems in the vicinity of the site
    - Consider doing site-specific climatic (wind) studies if historical data are insufficient or of little value
- **Wave data**, based on the local wave climate in the vicinity of the site or estimated from recorded wind data

You may present this data in the form of wave energy spectra or wave period, height and direction parameters at the locations of the berths and proposed structures[4]

- **Hydrological survey**, including simulations, showing the tide and current variations in depths and directions for each berth and its adjacent manoeuvring area

  This survey should include predicted changes in tidal depths and current directions and velocities attributable to the proposed terminal construction and/or dredging of the terminal area
- **Water temperatures**, including both annual and historical variances
- **Dock water density**
- **Ice data**, including:
  - nature, types, coverage and movement of ice
  - mechanical properties of the ice
  - predicted ice formation, season and duration at the terminal
  - average ice thickness
  - simulation showing its effect on the terminal structures

You should also provide a description and simulation of the design vessel's manoeuvring procedures for docking and undocking, under normal and maximum operating parameters.

You must include the basic terminal design, operating and safety parameters, including, but not limited to:

- principal dimensions of the largest and smallest vessel the terminal is to accommodate
- an analysis, with supporting documentation, of the underkeel clearance and other margins specified in this TERMPOL review process, if different from the recommended nominal values
- design flow rates, pressures, temperatures, and liquid characteristics in different cargo transfer lines and hoses
- descriptions of:
  - the fire protection system
  - lighting at the berth and zones where transfer operations would take place
  - any docking monitoring system
  - any automated mooring system
  - any mooring load monitoring system
  - the control and instrumentation system, the oil leak detection system and the emergency shut-down equipment
  - instrumentation for monitoring the wind, wave and current conditions
  - waste management plan, including waste, garbage, oil and noxious liquids
  - pollution prevention equipment and contingency plans at the marine terminal or transshipment site

[4] Where site-specific information is unavailable, regional averages may be sufficient to estimate likely wind and wave patterns. This information may be available in the Wind and Wave Climate Atlas for the East Coast of Canada, the Gulf of St. Lawrence and the Great Lakes, TP10820 (1993).

    - operational safety procedures and facilities at the marine terminal or transshipment site
- maximum operating parameters assumed in the terminal design, in terms of wind, wave, currents and ice conditions beyond which:
    - docking and undocking should not be attempted
    - cargo transfer operations should stop
    - the vessel should vacate the berth

3.4.2 Cargo transfer systems and procedures

You should demonstrate that the arrangements for transferring the cargo from vessel to shore, from vessel to vessel, or vice versa, are suitable.

Provide the TERMPOL Review Committee with plans and descriptions of the design vessel's cargo containment and transfer systems, including the important shore components.

The following is a list of preferred data for your general information. Provide only what applies to your proposed project:

- general details of cargo arms and flexible hoses connecting the vessel to the terminal
- general details of cargo manifold and loading arm connections
- inspection, testing and maintenance requirements for dock cargo hoses and loading arms
- general details of surge control facilities
- number and size of cargo transfer arms, their height above an identified datum, and their operational envelope
- design flow rates, pressures and temperatures and liquid characteristics in different cargo transfer lines
- intended cargo transfer rate between vessel and terminal
- detailed information on the forces exerted on the manifold by each loading arm
- visual and audible alarms for loading arms when reaching their limiting angle within their operating envelope, including:
    - the point at which the cargo transfer will be automatically stopped, and
    - the specified limit of loading arm envelope when the flange coupler between the vessels manifold and loading arm will be released automatically (emergency release system, powered emergency release coupling), or by means of manual controls
- loading arm and shore manifold warming up and cooling down procedures
- tanker manifold restrictions and compatibility with loading arms
- pre-cargo transfer circulation test
- general details of purging, venting and inerting cargo lines
- visual and audible warning systems at the berth and main control rooms
- monitoring systems from the control room on shore for:
    - loading arms (drift and range alarms), gas sensors and fire detection
    - primary, secondary and emergency communication systems

    - automatic and manual shut down methods following a valve power failure in hydraulic, pneumatic or electric systems
    - cargo pressures, temperatures and transfer rates
    - activating a fixed fire protection device
    - safety equipment storage
- fire detection and protection equipment, including main and auxiliary fire pumps discharge and rate capacity for berth and vessel
- vapour emission control systems: their alarms, number, sensitivity, and the details of continuous and/or intermittent sampling within the berth area
- general details of electrical discontinuity arrangements between the vessel and the terminal
- source of emergency power supply
- general details about reception facilities for ballast and contaminated ballast from oil tankers
- general details about the arrangement to receive tank washings from oil tankers and/or chemical carriers
- special arrangements required by the nature of a particular substance being handled or transferred

If you intend to install an automated stability calculation and cargo transfer control system in the design vessel(s), include an abstract of the system's capability and limitations in your submission. The abstract should outline relevant details of the design vessel's stability characteristics and the approval authority.

The safety of the crew, vessel and the marine terminal berth or transshipment site may be threatened by the simultaneous transfer of certain bulk cargoes and loading of vessel's stores.

How you intend to protect the safety of the crew, vessel and terminal is of particular interest to the TERMPOL Review Committee. Accordingly, submit:

- an outline of proposed bunkering, vessel repair and provisioning schedules in relation to cargo transfer operations
- procedures governing access to vessel during transfer operations
- plans in relation to the safety and security of the vessel and its personnel while alongside the berth

Follow the procedures for a thorough cargo transfer safety check list system, as described in one of the following, or their equivalent:

- the *International Safety Guide for Oil Tankers and Terminals* (ISGOTT)
- the Oil Companies International Marine Forum (OCIMF)

3.4.3 Berthing provisions and procedures

You should assess and show that berthing and mooring arrangements can handle the full range of design vessel(s) the marine terminal or transshipment site is intended to accommodate, under normal operating conditions. This can be demonstrated through simulation or other means.

Refer to and take into account relevant standards, recommendations and guidelines of various international authorities and associations, such as those produced by OCIMF and the World Association for Waterborne Transport Infrastructure (PIANC).

Calculations of the loads imposed on various components and structural elements of the terminal berths should include, but not be limited to, the following forces and appropriate combinations that apply to each structural element:

- dead loads of all piping, mechanical equipment, their liquid contents, superstructures and supporting structures
- berthing forces from normal fender thrusts and horizontal and vertical frictional shear forces
- mooring forces from wind, current, ice and wave pressures on largest vessels in ballast and full displacement conditions, at the maximum operating conditions
- seismic forces from any horizontal direction computed for the dead loads and superimposed static loads, as well as seismic loads transmitted through pipeline anchors[5]
- temperature loads due to thermal expansion and contraction of the structures, including those transmitted through pipeline anchors
- wind load on the structures, superstructures and equipment
- wind, wave and ice pressures on components of the structure[6]
- live loads of moving vehicles and cranes
- earth fill and hydrostatic pressures

Each structural component should be sufficient to resist bending moments and shear forces in two directions, torsional and axial.

Analyze each structure for a combination of permanent loads and transient peak loads. In general, allowable stresses and design procedures should conform to the National Building Code requirements. You may consider increased allowable stresses, depending on the probable recurrence of the loading, the load duration and related risks.

Consider the following as you develop berthing and unberthing procedures:

- Determine the upper limit of wind velocity for design vessel(s) berthing and unberthing operations
- Determine the upper limit of wind velocity that would require the design vessel(s) to vacate the berth
- Ascertain current characteristics and maximum measurements, in the vicinity of the berth, and their effect on berthing operations
- Determine berthing loads and fender system design, including dolphins
- Determine design berthing velocity and normal berthing velocity
- Ascertain tidal range, velocities and directions, and the maximum recorded spring tide measurements

---

[5] Compute seismic forces as per the methods specified in the National Building Code. For piled structures, assume seismic forces to be concentrated at the deck elevation.

[6] Base wind and wave forces on a storm loading with an average expected recurrence of every 50 years.

- Ascertain water levels statistics
- Ascertain prevailing wind statistics in relation to the directional lie of the berth
- Consider the effects, if any, of bathymetry (shallow waters, bank effect) in the vicinity of the berth and its approaches, on berthing strategy
- Consider the use of mooring points, mooring techniques and equipment, such as quick release hooks and mooring line monitoring systems
- Determine the method of berthing and unberthing the design vessel(s) and the number of tugs required, if any
- Consider the number of mooring launches and personnel required for mooring
- Consider the use of a manoeuvring simulator
- Determine any other limiting environmental and/or operational criteria

Also consider providing berthing aid systems, which measure speed of approach and communicate it to the design vessels.

3.4.4 Single point mooring provisions and procedures

You should assess and clearly demonstrate the suitability of a proposed single point mooring (SPM) for the design vessels, and its safe operation in the local environment.

International Standards and Classification Societies have specific guidance on the construction and operation of SPMs. You can best assess an SPM's suitability by using a Classification Society's vetting of plans, procedures and satisfactory surveys, leading to the assignment of a Class notation that certifies adherence to Class Rules in force at that time.

After Class is assigned, you should submit a copy of the Class reviewed *Information Booklet and Maintenance Manual* to the TERMPOL Review Committee.

Once the committee reviews this manual, members may recommend other information to incorporate into it.

3.4.5 Port information book

The Port Information Book (PIB) provides vessel personnel and other interested parties with details about the marine terminal or transshipment site, and the route to it. Much of this information can be found in the studies required for the TERMPOL review.

To make sure your PIB covers all the relevant items, submit a draft version to the TERMPOL Review Committee.

Note: You will need to complete the actual PIB at least six months before operations begin.

Items to cover include, but are not limited to:

- pilot boarding procedures and operational limitations
- tug assistance requirements and tugs information
- port entry information, including:
    - typical transit routes

        - local navigation conditions
        - anchorage procedures
        - underkeel clearance requirements
    - guidance on marine mammals
    - design vessel(s) speed profiles
    - design vessel(s) reporting procedures
    - a terminal description
    - relevant charts and nautical publications
    - requirements for immediate manoeuvring during critical points of transit
    - requirements for fully managed engine rooms prior to pilot boarding and in compulsory pilotage areas
    - checklist for preparing the vessel for ice navigation, if applicable
    - berthing procedures in terms of the design vessel's approach and departure from the terminal berth, including berth equipment and ship-to-shore communications
    - mooring assistance requirements, such as mooring boats, line handlers and the means of communication between them and the design vessel(s)
    - upper limits of berthing operations, in terms of:
        - lateral approach rate to the berth by the design vessel
        - wind velocity
        - wave heights
        - tidal stream velocity
        - ice conditions
        - visibility, and
        - means of measuring and indicating these factors
    - load measurements and limits for mooring lines and dockside bollards used by large vessels
    - vessel machinery and equipment repairs facilities
    - storing and bunkering facilities
    - waste and oily residues reception facilities
    - security and industrial health and safety matters
    - policies, procedures and checklists
    - designated anchorages
    - emergency measures

Vessel personnel and the terminal's cargo transfer staff are separate during much of the preparatory phase of a scheduled cargo transfer operation. The PIB should include an explicit schedule of communications the master of the vessel must initiate.

Transmissions should give the following parties necessary information, in a timely way:

- the marine terminal operator

- the vessel's agent
- the harbour master
- the Pilotage Authority
- the Canadian Coast Guard
- Transport Canada Marine Safety and Security (TCMSS)

Timing of scheduled messages should account for common delays in message handling and distribution, other than during direct vessel-to-terminal communications.

The PIB should also identify all specific Canadian requirements that are not currently part of International Conventions, codes or standards.

3.4.6 Terminal or transshipment site operations manual

The terminal or transshipment site operations manual (TOM) informs and guides the design vessel's personnel and other interested parties on matters affecting:

- the safety of the design vessels, the terminal or transshipment site itself
- the efficiency of the design vessel's cargo transfer operations

A vessel may call at a particular terminal or transshipment site for many years, but the crew can still change frequently. It is the crew who play the primary role in ensuring vessel safety during transfer procedures.

The TERMPOL Review Committee understands the technical reasons for not creating a complete TOM before the terminal or transshipment site has regulatory approvals (and, in the case of a new marine terminal system, before construction begins). However the information contained in the TOM is crucial and it needs your early attention. You must provide an outline of the manual to the committee during the review process. They will make sure your manual covers all the relevant items.

You should complete the Terminal Operations Manual at least than six months before operations begin and submit it to Transport Canada for review.

The items in this list are the minimal content for your TOM:

- design vessel's and terminal's communications and chain of authority
- terminal cargo transfer equipment, including information on inspections, testing and preventative maintenance
- pre-arrival and pre-departure checklists
- operational tests of the design vessel's machinery and equipment
- cargo transfer procedures, including pre-transfer inspections, checklists[7] and meetings
- vapour emission control systems

[7] Refer to the International Safety Guide for Oil Tankers and Terminals (ISGOTT) and Society of International Gas Tanker and Terminal Operators (SIGTTO)'s Ship/Shore Safety Check-List.

- emergency procedures, including emergencies on the vessel and berth, and terminal emergency response and contingency plans
- upper limit of all atmospheric factors that would require stopping cargo transfer operations and/or force the design vessels to depart the terminal
- procedures governing access to the vessel during transfer operations
- security and occupational health and safety policies
- management of hazardous and non-hazardous waste[8] generated by design vessel(s), terminal or transshipment site activities, and cargo transfer operations, including receiving facilities for:
- waste oil
- waste water
- ballast and dirty ballast
- slops
- garbage and ship's refuse
- list of useful contacts

3.5 Risk analysis

3.5.1 Casualty data study

Breaching of a vessel's cargo containment system or hull can be caused by a grounding or a collision. The objective of this study is to determine the likelihood of this happening.

You will do this by analyzing statistical casualty data within terms of:

- the mathematical probability of casualties in the future, taking into account additional traffic within the regional zone of your proposed marine terminal or transshipment site
- inferred vulnerability of the design vessel(s) over a specified period of time

Note: You should not limit casualty data studies involving releases of cargo in bulk and/or marine pollutants to just those attributable to collisions and grounding. Also include a list of small-scale incidents and their effects, as well.

You may apply inferential statistical methodologies to this study.

Sources of casualty data applicable to this study may come from:

- classification societies
- protection and indemnity (P&I) clubs and underwriters
- Transportation Safety Board (TSB) casualty records or summaries

---

[8] See International Waste Directive http://www.inspection.gc.ca/animals/terrestrial-animals/imports/policies/general/2002-17/eng/1321050654899/1323826743862

- Canadian Coast Guard Marine Communications and Traffic Services records, United States Coast Guard casualty records or summaries
- International Maritime Organization (IMO) summaries
- Pilotage Authorities
- consultants' reports

3.5.2 General risk analysis

This study requires you to analyze navigational and operational risks that could result in releases of marine pollutants and/or hazardous and noxious substances, either on the way to or at a terminal or transshipment site.

These risks usually stem from a scenario involving:

- collision
- grounding
- allision
- stranding
- flooding
- foundering
- a cargo transfer incident
- fire or explosion
- hull failure

Note: These are not the only possible scenarios.

Base your predictions on credible worst-case incident scenarios:

- in the marine terminal or transshipment site area, and
- at designated positions along the coastal route

Your risk analysis should include the:

- probabilities of credible incidents that would affect the design vessel's cargo containment system and hull integrity
- risks associated with navigational and operational procedures
- probabilities of a major cargo transfer incident at the terminal
- geographic boundaries of an uncontrolled release of cargo and/or marine pollutant

Also include risks to human populations:

- within coastal zones along the intended route
- at the terminal berth and surrounding area

Do not limit your analysis to a mathematical index (which shows the probability of an incident).

3.5.2.1 Oil and chemicals

When the integrity of a chemical carrier or an oil tanker's cargo containment system and/or hull is breached, the vessel may release cargo and/or marine pollutants.

Your risk analysis should include:

- **Predictive forecast models** of nominal oil spill trajectories on water for credible worst-case incident scenarios, at:
    - the terminal berth
    - a transshipment site
    - designated coastal positions along the navigational route

  Forecast models should take into account the particular circumstances of your project, including but not limited to:
    - ecological sensitive environments
    - human habitation
    - recreational activities
    - local or regional economic considerations
    - aspects of social or cultural significance
- **References to studies of prior incidents** involving identical or chemically similar petroleum products
- **References to lab research** done on the fate and behaviour of the specific petroleum or chemical products in simulated environmental conditions
- **Planned onshore and on-vessel counter-measures** for oil spill containment, clean-up and public safety at the locations identified above

3.5.2.2 Hazardous and noxious substances

When the integrity of a hazardous and noxious substances (HNS) carrier's cargo containment system and/or hull is breached, cargo and/or marine pollutants may be released.

Your risk analysis should include:

- predicted reactions following the mixing of released cargo and/or marine pollutants with:
    - water
    - other chemicals
    - substances required for normal vessel operations
- predicted chemical, biotic or metabolic, and photo-chemical transformations once the released cargo enters the environment
- toxicity of individual cargo chemicals and potential products formed when these chemicals combine with themselves or water
- chemical incompatibility of cargo and/or marine pollutant, and the measures you will take to reduce the risk of potentially dangerous products combining upon release
- your measures for containment and clean up, and where applicable, for public safety:
    - alongside the berth
    - at the transshipment site
    - at appropriate locations along the intended route

You may need to model gas plumes in certain circumstances. The technological basis for modelling large liquefied gas vapour clouds is constantly evolving. When selecting a particular gas cloud model,

you should consult the TERMPOL Review Committee first. Any risk or dispersion model should analyze the sensitivity of varying the assumptions or values input.

Base predictions of specified gas cloud dimensions on defined, credible worst-case incident scenarios involving the release of one cargo tank at selected locations along the shipping route, and at the terminal or transshipment site.

To identify public safety risks in a port selected as the site of a liquefied natural gas (LNG) marine terminal, or surrounding a transshipment site, you should normally determine the following parameters:

- the vulnerability of the LNG carrier's cargo containment system[9] and/or hull after a collision or grounding within the specified marine area
- the probability of a large-scale, uncontrolled LNG release within a specified marine area
- the "nominal" quantity, rate and duration of released LNG, and the dimensions of the resulting vapour cloud
- the proximity of human populations to vapour cloud boundaries, and the positions of possible ignition sources
- impact radius consequences for pool fire ignitions, vapour cloud overpressures and rapid phase transition explosions
- impact radius consequences for asphyxiation, due to:
    - oxygen displacement, and
    - exposure to direct dermal contact that results in frostbite or potential death from freezing
- the vulnerability of adjacent storage tanks to being compromised
- the cumulative volumes of explosive substances in adjacent storage tanks, which could potentially contribute to additional fires and explosions, and thus to larger impact radius consequences

A deflagrating vapour cloud can cause radiation burns, death and property damage in its boundaries. If vapour collects in confined spaces before ignition, detonations with lethal overpressures are possible.

Quantifying and evaluating these risks is a complex process. An acceptable approach is to calculate the risk of fatalities in terms of expected number of people affected at the time of the explosion.

You should seek expert advice on hazards, responses and impacts.

3.5.3 Intended methods of reducing risks

Reducing or mitigating risks is an essential consideration in any TERMPOL submission. You should evaluate ways to reduce these risks. While the particulars will vary depending on your project, it is possible to list a number of examples:

- using safe navigational and operational systems

[9] Refer to the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk.

- developing a pro-active pollution prevention program
- locating the terminal in a remote location, or one that is well separated from urban or suburban communities
- designing and constructing or chartering vessels with the safest possible cargo containment and cargo transfer systems
- adopting recognized and effective maritime mobile radio procedures that enhance safety in international, coastal and inland waters
- routing vessels with hazardous cargoes clear of primary shipping lanes and major shipping focal points when possible, to reduce “close-quarter” situations
- scheduling design vessel(s) movements through congested coastal waters to coincide with periods of low traffic, if possible
- proposing additional aids to navigation that would individually or collectively improve navigational safety along the intended route
- identifying areas where new bathymetric survey data may be needed
- using recognized, effective vessel traffic services that enhance vessel safety in coastal regions, including:
    - monitoring traffic movements
    - regulating speed profiles
    - broadcasting warnings
    - regulating vessel movements in critical portions of the route to provide a clear channel for the design vessel
- imposing limiting environmental or climatic requirements for vessels loaded with pollutant or hazardous cargoes when navigational safety in the terminal zone is an issue
- providing a tug escort
- following prudent berthing procedures and optimal tug assistance
- using an energy-absorbing protective barrier when alongside the terminal
- employing pre-booming procedures before a hazardous product is transferred
- manning vessels with fully competent crews adequately trained for the particular cargo(es) they handle and the design vessel they operate
- keeping enough crew onboard at all times, so the vessel is capable of getting underway with short notice in case of emergency
- mooring a design vessel bow-seaward when the terminal berth is located in a narrow arm of water, so in an emergency the vessel can proceed seaward without delay and without the aid of tugs
- implementing standardized cargo transfer system inspections and safe cargo transfer operations
- raising awareness of standardized safety and cargo transfer procedures by means of terminal operations publications designed to inform crews of vessels serving the proposed marine terminal[10]
- prohibiting the venting of significant quantities of flammable or poisonous gases to the atmosphere in the vicinity of people

[10] For more information, refer to section 3.4.6, “Terminal or transshipment site operations manual”.

- providing appropriate reception facilities at chemical and oil terminals
- scheduling the bunkering and provisioning of the design vessel(s) at a time that does not conflict with the maintenance of vessel and personnel safety during cargo transfer operations
- controlling the access of visitors while the vessel is alongside the dock
- having procedures in place that conform to internationally accepted safe management practices set out in IMO resolutions, ISM and/or ISO standards
- developing and raising awareness about an effective contingency plan for the marine terminal system, and conducting regular exercises of selected procedures described in the plan
- ensuring any vessel you charter:
    - complies with appropriate chartering standards
    - is of the same standard and meets the same requirements of the design vessel(s) described in your submission

3.5.4 Remediation

You should also prepare a study showing:

- the extent to which an incident would likely have an adverse effect upon third-party interests and stakeholders
- how you would address this through remediation and/or compensation

3.6 Contingency planning

A contingency plan gives guidelines and instructions that help with an efficient response to emergency situations. The effectiveness of any contingency plan depends on whether personnel regularly exercise their roles and responsibilities in pre-planned and practical procedures.

The TERMPOL Review Committee expects you to provide a preliminary outline of your intended contingency plan for their review. This draft should relate to a vessel in transit, and also a vessel alongside your proposed marine terminal berth or transshipment site.

The committee's review will allow you to:

- harmonize your contingency plan with existing emergency procedures
- plan for a coordinated response with other key authorities, such as the Canadian Coast Guard

You should complete the Contingency Plan at least six months before operations begin. The contingency plan should address:

- grounding
- collision
- cargo spillage or leak
- marine pollutant spillage or leak
- fire and explosion onboard design vessel(s):
    - underway
    - alongside
    - at anchor

    - at a mooring
    - at an Single Point Mooring
    - at the terminal or transshipment site area, including pipelines in the immediate vicinity of the berth and tank farm
- “abandon ship” procedures
- assistance to a vessel in distress
- ship to ship transfer (in emergency situations)
- ship-to-shore communications
- cargo handling precautions
- inspection, testing and preventative maintenance procedures
- rescue and treatment of casualties
- minimizing property damage and environmental impact
- design vessel and terminal security
- operations monitoring systems
- detection and alarm systems at the design vessel’s berth
- leaks from loading arm due to tidal or current effects
- cargo tanks ruptures due to increased pressure
- neutralizing electrical hazards
- risks and hazards of loss of power supplies
- risks and hazards of equipment failure
- risks and hazards of nitrogen loss
- releases resulting in structural damage and/or personnel injuries
- emergency response procedures for incidents that involve a:
    - discharge of marine pollutant from a design vessel, or
    - discharge of oil from an oil handling facility while loading or unloading a design vessel, that directly or indirectly results in the pollutant entering the water and includes spilling, leaking, pumping, pouring, emitting, emptying, dumping and throwing
- improper operating procedures during cargo transfer or fueling
- emergency shut-down of cargo transfer operations
- loading and/or discharging of dangerous goods
- how to bring an incident under control
- rescue and treatment of casualties
- outline of proposed emergency equipment for personnel at terminal or transshipment site
- emergency procedures for personnel evacuation
- emergency situations that are out of control, such as natural disasters or bad weather, that require evacuation of the design vessel from the berth
- quickly worsening weather requiring evacuation of the design vessel from the berth
- changing ice conditions at the berth
- control of shipping and other movements in the area of the terminal or transshipment site
- maps of port reception facilities, location of hydrants, landing places and beaching sites
- role of local authorities

Note: The above list is not exhaustive. You may need to include other topics specific to your project.

Procedures that tell design vessel personnel what to do during an incident that requires an active response should be:

- specific
- clear and to-the-point
- in the operational language of the vessel

Design vessel personnel should:

- know the terminal-vessel chain of command
- be familiar with emergency drill requirements and procedures
- be able to communicate with the terminal's personnel

Procedures for terminal personnel involved with transshipment operations should also be specific, clear and succinct. Terminal personnel should communicate with the vessel in its operational language.

3.7 Oil spill preparedness and response

The *Environmental Response Arrangement Regulations*[11] define vessels as "oil tankers of 150 gross tonnage or more and any vessel of 400 gross tonnage or more that **carries oil as cargo or as fuel**" as well as "groups of vessels that are towed or pushed, are of 150 gross tonnage or more in total and carry oil as cargo".

The *CSA, 2001,* Subsection 167 (1), requires vessels in Canadian waters south of 60° North latitude to have an arrangement with a certified response organization and have on board:

- a declaration that identifies the vessel's insurer
- confirms the existence of an arrangement with a certified response organization, and
- identifies every individual authorized to invoke the arrangement.

The *Vessel Pollution and Dangerous Chemicals Regulations* require vessels to have on board a shipboard oil pollution emergency plan.

For this study, you must describe how you will comply with the *Canada Shipping Act 2001*, Part 8, sections 167 and 168 (if applicable) and all related regulations, standards and guidelines related to:

- pollution prevention
- emergency preparedness
- response to releases of pollutants.

[11] Response Organization Regulations http://laws-lois.justice.gc.ca/eng/regulations/SOR-2008-275/

Consider including the following when you develop prescribed oil pollution prevention and emergency plans:

A list of environmental issues that could come from an oil spill

A risk assessment of environmental impact of OHF activities and related transport and shipping

At least one scenario for each category of product loaded or unloaded to and from the design vessel Scenarios should take into account factors like:

- the nature of the product being transferred or transshipped
- design vessel(s) types
- tides, currents, predominant weather conditions in the area
- assessment of any environmentally sensitive areas
- OHF geographic location
- preventative measures
- speed at which an effective emergency response can be carried out successfully

Up-to-date documents with all relevant regulations, standards, procedures and policies for areas like:

- response measures
- operation
- maintenance and inspections
- site plans
- record keeping
- permits and certifications
- violations
- compliance
- follow-up

Hazard identification procedures should identify the OHF's activities with the potential for causing a discharge. These procedures should cover:

- hazards related to the vessel
- berthing
- oil transfer operations
- staffing of key positions
- equipment failures

Responsibilities for managing all types of pollution incidents, including alerting mechanisms to ensure any spills are reported promptly to authorities

Up-to-date, comprehensive (scientific) understanding of all products you propose to be shipped, and their potential fate and behaviour(s), including:

- the specific gravity of all products to be shipped, and
- the weathering and biodegradation of those products in any water environments that may be affected by the discharge of a pollutant at the OHF

Training schedules, simulated spill incident scenarios and exercises for response personnel

Reporting procedures and deployment of spill control equipment to develop a sound knowledge of:

- geographic, environmental risks, and
- how to apply the pollution prevention and emergency response plan in respect of those risks

Include how you will provide specialized oil spill response equipment (for example, containment booms, recovery devices, oil recovery or dispersant application).

A system for measuring and monitoring actual performance against the OHF's prevention and response environmental objectives and targets.

All operators must be prepared to take immediate mitigating action in the event of an oil pollution incident that invokes a Transport Canada-certified response organization. The degree to which you must be prepared to respond is based on:

- oil spill response scenarios for the prescribed OHF, and
- the quantity of oil scheduled to be transferred and/or transshipped, to a maximum of 10,000 metric tons

In plans for prescribed OHFs in waters **south** of the sixtieth parallel of north latitude, you need to outline in detail the people and organizations who would respond to oil pollution incidents at your facility. You must describe your formal arrangement with a Transport Canada-certified response organization.

In plans for prescribed OHFs in waters **north** of the sixtieth parallel of north latitude, consider demonstrating that your facility is prepared to oil pollution incidents:

- for the quantity of oil scheduled to be transshipped, to a maximum of 10,000 tons, and
- which do not involve entering into an arrangement with a Transport Canada-certified response organization

Your emergency plan should thoroughly detail the roles and responsibilities of people and organizations who would respond to an oil pollution incident at your prescribed oil handling facility. Ensure you address all essential activities of emergency response. Include people who will be working at the prescribed oil handling facility in the event of an oil pollution incident.

OHF personnel must be fully trained in pollution prevention and emergency preparedness and response. Their training should include:

- safe operational requirements
- safe use and maintenance of equipment
- knowledge of shut down and restart procedures
- knowledge of situational and operational risks that may threaten safe operations

3.8 Hazardous and Noxious Substances

The objective of this survey is for you to describe how you will implement the relevant International Maritime Organization (IMO) instruments on hazardous and noxious substances (HNS).

You should also develop and maintain procedures that include:

- incident preparedness and response training
- an exercise program with local, municipal, provincial and national authorities, including spill response contractors with expertise in dealing with the product(s) handled at the facility

Appendix 1: List of sources of information

The following are the main authorities and associations with standards or guidelines to help proponents develop the various studies required by the TERMPOL Review Committee in Part 3.

1. International Maritime Organization (IMO)
2. International Association of Classification Societies (IACS)
3. International Association of Lighthouse Authorities (IALA)
4. International Association of Ports and Harbors (IAPH)
5. International Cargo Handling Co-ordination Association (ICHCA)
6. International Chamber of Shipping (ICS)
7. International Hydrographic Organization (IHO)
8. International Maritime Pilots Association (IMPA)
9. International Petroleum Industry Environmental Conservation Association (IPIECA)
10. International Shipping Federation (ISF)
11. International Association of Independent Tanker Owners (INTERTANKO)
12. Oil Companies International Marine Forum (OCIMF)
13. Permanent International Association of Navigation Congresses (PIANC) [World Association for Waterborne Transport Infrastructure]
14. Society of International Gas Tankers and Terminal Operators Ltd. (SIGTTO)
15. Classification Societies
16. International Labour Organization (ILO)
17. Canadian Standards Association (CSA)

Appendix 2: Recommended approach for indigenous engagement

Why engage?

Indigenous groups who live along shipping routes may want to take part in TERMPOL Review Processes in their areas. TERMPOL reviews are usually associated with projects that involve new or expanded activities, such as transport of a new cargo. Outside of a TERMPOL review, you may also be in the process of engaging Indigenous groups on the project for which the review is being done.

Studies may deal with subjects of interest to Indigenous groups, who have local and traditional knowledge. This knowledge can enhance the review's technical assessment of marine safety. Indigenous groups can be engaged as early as possible, in the studies stage. (Refer to section on public engagement)

How to engage

Transport Canada recommends that proponents:

- provide enough information about the project that Indigenous groups understand its scope
- listen to concerns Indigenous groups raise and, where possible, address them
- give Indigenous groups an opportunity to review and comment on your draft studies of interest, and consider their comments

Document your efforts. For example, use:

- a written communication log
- a written summary of issues you discussed, or that groups raised with you
- a written summary of how you addressed any concerns, as applicable
- a written description of outstanding issues

Provide Indigenous groups with an opportunity to review and validate your written summaries. Also provide Transport Canada a copy of your documentation.

Transport Canada can help you by:

- identifying potentially interested Indigenous groups
- providing information to Indigenous groups about the TERMPOL Review Process

Appendix 3: Definitions

For the purposes of this document, the following definitions apply:

Berth	A wharf, a pier, an anchorage or a mooring buoy. A location where ships are moored for the purposes of loading and unloading cargo.
Design vessel(s)	Class or the prototype of vessel(s) the proponent expects to use at the proposed marine terminal or transshipment site.
Hazardous and Noxious Substances (HNS)	The International Maritime Organization (IMO) defines HNS as "any substance other than oil which, if introduced into the marine environment, is likely to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea." IMO classifies LNG and LPG as hazardous and noxious substances.
Liquefied Natural Gas (LNG)	LNG is natural gas (mainly methane, with some ethane) that has been cooled down to liquid form for ease and safety of non-pressurized storage or transport.
Liquefied Petroleum Gas (LPG)	LPG are flammable hydrocarbons, such as propane and butane, obtained as a by-product from the refining of petroleum or from natural gas.
Marine Terminal System	The vessel's berth, its approaches from seaward, its cargo-handling equipment and related port or terminal infrastructures.
Marine Traffic Network	A network of marine traffic is made up of various types of vessels engaged in different operations, using waterways that give access to and from marine terminals or transshipment sites located in waters under Canadian jurisdiction.
Project	A marine terminal or transshipment site a proponent proposes to build, modify or recommission.
Proponent	Person, company or group that proposes to build, modify or recommission a marine terminal or transshipment site.
Transshipment Site	A designated location for the transfer of cargo between two vessels in transit from one destination to another. This includes anchorage areas.
Waters Under Canadian Jurisdiction	Canadian waters and the waters in the exclusive economic zone of Canada, as set out in the *Oceans Act* and the *Arctic Waters Pollution Prevention Act*.

Appendix 4: Acronyms and abbreviations

CCG	Canadian Coast Guard
CEAA	*Canadian Environmental Assessment Act*
DFO	Department of Fisheries and Oceans
HNS	Hazardous and noxious substances
IGC	International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO publication)
IMO	International Maritime Organization
ISGOTT	International Safety Guide for Oil Tankers and Terminals
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
NPA	*Navigation Protection Act (Canadian Navigable Waters Act)*
OCIMF	Oil Companies International Marine Forum
OHF	Oil handling facility
PIANC	Permanent International Association of Navigation Congresses
PIB	Port information book
RD	Regional Director
SIGTTO	Society of International Gas Tanker and Terminal Operators
SPM	Single point mooring
TCMSS	Transport Canada Marine Safety and Security
TERMPOL	Technical review of marine terminal systems and transshipment sites
TOM	Terminal or transshipment site operations manual
TRC	TERMPOL Review Committee
TRP	TERMPOL Review Process
TRR	TERMPOL Review Report