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TERMPOL Review Process on the Port of Québec Facilities Expansion Project

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FOREWORD

This report was prepared and drafted following the TERMPOL Review by the TERMPOL Review Committee (TRC) in relation to the Project submitted by the Québec Port Authority (QPA).

This report was prepared by the following government organizations:

- Transport Canada
- Fisheries and Oceans Canada
- Canadian Coast Guard
- Laurentian Pilotage Authority
- Ministère de la Sécurité publique du Québec
- Ministère des Transports, de la Mobilité durable et de l'Électrification des transports du Québec

This report, issued by a TERMPOL Review Committee (TRC), should neither be interpreted as a statement of government policy, nor should it be inferred that the government endorses the report in whole or in part. It reflects only the opinion of the TRC members.

This report does not relieve the QPA or the operator(s) of the new facilities of their obligation with regards to compliance with legislation and enforcement of regulations in force.

DISCLAIMER: The English version is a translation of the original in French. In case of any inconsistency or ambiguity, the French version shall prevail.

GLOSSARY AND ACRONYMS

CCG – Canadian Coast Guard: A Special Operating Agency within the Department of Fisheries and Oceans that is responsible for services and programs that contribute to the safety, security and accessibility of Canada's waterways.

CEAA – Canadian Environmental Assessment Agency: The Agency administers the *Canadian Environmental Assessment Act (2012)* (CEAA 2012). The Agency is responsible for managing the environmental assessment process for projects where an environmental assessment may be necessary.

CEAA 2012 – *Canadian Environmental Assessment Act, 2012*: The CEAA 2012 and its Regulations establish the legislative basis for the federal practice of environmental assessment in most regions of Canada.

Classification Society: Classification societies are private organizations with the expertise to establish and apply technical standards for the construction and operation of merchant ships.

CPBSL – Corporation des pilotes du Bas Saint-Laurent: The primary mission of the CPBSL is to ensure, in the public interest, the safe operations of vessels between Quebec City and Les Escoumins, including the Saguenay River.

CSA 2001 – *Canada Shipping Act, 2001*: The CSA 2001 is the principal legislation governing safety of marine transportation and recreational boating, as well as protection of the marine environment.

Design vessel(s): The class or classes of vessel the proponent intends to use to ship cargo of the nature contemplated by the TERMPOL Review Process, or the prototype of the vessels the proponent expects to use at proposed marine terminals or transshipment sites.

DFO – Department of Fisheries and Oceans: Federal department with the lead federal role respecting the management of Canada's fisheries and the protection of its waters.

ECCC – Environment and Climate Change Canada: Federal department with the mandate of preserving and enhancing the quality of the natural environment; conserving renewable resources; conserving and protecting Canada's water resources; forecasting weather conditions and warnings; enforcing rules relating to boundary waters; and coordinating environmental policies and programs.

IMO – International Maritime Organization: As a specialized agency of the United Nations, IMO is the global standard-setting authority for the safety, security and environmental performance of international shipping.

ISM Code – International Safety Management Code: The ISM Code is an international standard for the safe operation of ships and for pollution prevention. Chapter IX of the *International Convention for the Safety of Life at Sea* (SOLAS Convention) requires compliance with the ISM Code.

ISPS Code – International Ship & Port Facility Security Code: Adopted by the International Maritime Organization (IMO) (Chapter XI of the SOLAS Convention), the

purpose of the ISPS Code is to develop an international framework to prevent and detect threats and take appropriate measures to respond to security incidents.

LPA – Laurentian Pilotage Authority: The LPA's mandate is to operate, maintain and manage, in the interest of navigation safety, an efficient pilotage service in Canadian waters for the Laurentian Region.

Marine Traffic Network: A network of marine traffic that comprises various types of vessels engaged in different operations, using the various waterways that provide access to and from marine terminals or transshipment sites located in waters under Canadian jurisdiction.

Marine Transportation Security Act: The Act governs security issues involving ships, persons on board, cargo handling, vessel procurement and access, and terminals and port facilities.

MARPOL Convention – International Convention for the Prevention of Pollution from Ships (MARine POLlution): The primary objective of the MARPOL Convention, with its annexes and successive amendments, adopted under the aegis of the IMO, is to set out technical measures to prevent pollution, specifically through ship design and crewing.

MCTS – Marine Communications and Traffic Services: Part of the CCG, MCTS provides communications and traffic services to the marine community. MCTS is a cornerstone of the marine information collection and dissemination infrastructure.

MDDELCC – Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques: The MDDELCC is the Quebec department of sustainable development, the environment and the fight against climate change. It is responsible for protecting the environment, preserving biodiversity, and fighting climate change.

MTQ – Ministère des Transports, de la Mobilité durable et de l'Électrification des transports du Québec: The MTQ is the Quebec department of transport, responsible for ensuring sustainable mobility of people and goods throughout the province, using efficient and safe transportation systems that contribute to development in Quebec.

National Oil Spill Preparedness and Response Regime: Transport Canada is the federal regulatory organization responsible for the Regime, which is built on a partnership between government and industry. As part of this regime, TC sets the guidelines and regulatory structure for the preparedness for and response to marine oil spills.

OHF – Oil handling facility: A facility, including an oil terminal, that is used or that will be used in the loading or unloading of petroleum in any form, including crude oil, fuel oil, sludge, oil residue and refined products, to or from vessels.

Operator: Person, business or group authorized by the QPA to use the new marine facilities proposed under the Project.

Project: A marine terminal or transshipment site that a proponent proposes to construct, modify or recommission.

Proponent: Person, company or group that proposes to construct, modify or recommission a marine terminal or transshipment site. In this Project, the QPA is designated as the proponent.

PSC – Port State Control: PSC is a vessel inspection program whereby foreign vessels entering a sovereign state's waters are boarded and inspected to ensure compliance with various major international maritime conventions.

QPA – Québec Port Authority: The mission of the Québec Port Authority is to promote and develop maritime trade, to serve the economic interests of the Quebec City area and of Canada, and to ensure that it is profitable while respecting both its community and the environment.

RO – Response Organization: Organization accredited by the Transport Canada Marine Safety Branch to respond in case of pollution under the provisions of the *Canada Shipping Act 2001* (CSA 2001).

SMM – Safety Management Manual: Safety management manual developed by businesses for their staff in order to effectively apply safety and environmental protection policies.

SMS – Safety Management System: SMS enable businesses to identify, assess and mitigate safety risks. The ISM Code requires implementing an SMS and developing a safety management manual.

SOLAS Convention – International Convention for the Safety of Life at Sea (Safety Of Life At Sea): The primary objective of the SOLAS Convention, in its successive forms, adopted under the aegis of the IMO, is to set out minimum merchant ship construction and operation standards to ensure the safety of crews, passengers and vessels.

TC – Transport Canada: Federal department responsible for transportation policies and programs.

TCMSS – Transport Canada Marine Safety and Security: TCMSS's mission is to develop, maintain and implement an effective, efficient regulatory regime; promote education and awareness; and ensure enforcement.

TP 743: TC publication entitled *TERMPOL Review Process*.

TRC – TERMPOL Review Committee: The TRC is composed of relevant departments and authorities with marine regulatory, programs and services responsibilities.

TRP – TERMPOL Review Process: The *Technical Review Process of Marine Terminal Systems and Transshipment Sites* is a federal government initiative that assesses the safety and risks associated with oil/gas tanker movements to, from and around Canada's marine terminals.

TSB – Transportation Safety Board of Canada: The TSB is an independent agency that advances transportation safety by investigating occurrences in the marine, pipeline, rail and air modes of transportation.

Waters under Canadian jurisdiction: Canadian waters and the waters in the exclusive economic zone of Canada.

1. INTRODUCTION

1.1. PROJECT DESCRIPTION

According to the presentations and documents submitted by the QPA, the Port of Québec is operating at full capacity. Traffic at the public wharves is four times higher today than it was 10 years ago. Consequently, the QPA must frequently deal with vessels waiting to dock. Expanding the port facilities at Quebec City would be a logical response to the traffic issue.

The QPA Project entitled "PROJECT BEAUPORT 2020," submitted for TERMPOL review, consists in expanding the Beauport facilities in two phases:

Phase 1: Construction of a new wharf, Wharf 54.

The new wharf will be a 610-metre extension of the current wharf line. The rear of the wharf would also be backfilled to increase the available surface area to 18.5 hectares. The work would provide a depth of 16 metres at chart datum along the berths.

During this first phase of development, in addition to constructing a seawall that will be part of Wharf 54, a breakwater will be constructed to protect the Beauport beach.

Figure 1: Phase 1 facilities[1]

The new port infrastructure would be able to accommodate two Suezmax and/or Capesize vessels at the same time[2].

The new Wharf 54 would be used for handling dry cargo, solid bulk, and/or liquid bulk cargo.

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[1] Figure from the QPA PowerPoint presentation "Termpol, Projet Beauport 2020," February 26, 2015, p. 10.

[2] See Appendix 3 for vessel categories.

At the time this report was written, there was no designated operator for these new facilities.

Phase 2:

According to the documents submitted, Phase 2 of the Project involves the construction of another wharf at the mouth of the Saint-Charles River.

This dolphin jetty will be able to simultaneously accommodate a Suezmax vessel on the outer side and a Handymax vessel on the inner side.

The new wharf will be dedicated to handling liquid bulk cargo.

Figure 2: Phase 2 facilities[3]

At the proponent's request, phase 2 will not be reviewed under this TRP. This phase of construction has been postponed to a later date and will be examined at a suitable time as applicable.

[3] Figure from the QPA PowerPoint presentation "Termpol, Projet Beauport 2020," February 26, 2015, p. 12.

1.2. TERMPOL PROCESS AND REVIEW REPORT

1.2.1. THE TERMPOL PROCESS[4]

The TERMPOL Review Process (TRP) refers to the Technical Review Process of Marine Terminal Systems and Transshipment Sites. The TRP focuses on a design vessel's selected route in waters under Canadian jurisdiction to a berth at a proposed marine terminal or transshipment site, and on the process of cargo handling between vessels and off-loading from vessel to shore or vice-versa. The TRP applies to:

- specialized procedures and equipment required at proposed terminals for handling bulk oil, chemical, liquefied gas and any other cargoes identified by Transport Canada, Marine Safety and Security (TCMSS);
- proposed transshipment facilities for these substances; and
- any planned changes to the existing terminals or transshipment sites or facilities for these substances.

For the purposes of this TRP, a marine terminal refers to the vessel's berth, its approaches on the seaward side, and the associated port or terminal infrastructure. A transshipment site refers to a designated location where cargo is transferred from one vessel to another, such as oil, chemicals or liquefied gases in bulk, as well as other goods that, according to the TCMSS, pose hazards to the vessel, the public and the environment.

The intent of the TRP is to improve, where possible, those elements of a proposal which could, in certain circumstances, threaten the integrity of the vessel's hull and its cargo containment system, and consequently the environment on board the design vessel while it is navigating in waters under Canadian jurisdiction or performing transfer operations at the proposed terminal and at any given transshipment site. The TRP applies to operational safety measures intended to address site-specific circumstances and those along the associated navigational route(s).

Under a TERMPOL Review, the proponent's submission should demonstrate that:

- the operator's or owner's safety management system is in accordance with recognized safe management procedures;
- arrangements are in place to conduct ongoing operation audits of the safety management system;
- major accident hazards in the context of the proposed operation have been identified; and
- the risks from these hazards have been evaluated and measures to reduce those risks to an acceptable level using the best available technology have been identified and evaluated.

[4] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2001, Chapter 1.1.

1.2.2. OBJECTIVE OF THE TERMPOL REVIEW PROCESS[5]

The purpose of the TERMPOL process is to analyze and formulate recommendations for the construction or operation of a marine terminal (new, modified or recommissioned) for handling oil, chemicals, liquefied gases, or any other designated substances, leading to changes in regional shipping activity.

The analysis looks at:

- the potential effects of increased shipping activity on existing regional shipping networks;
- perceived risks to communities along the route to the terminal or transshipment site in the case of ships carrying commodities such as, but not limited to, those considered in this document which may pose a concern to public safety or health;
- the navigational safety of ship route(s) leading to a proposed marine terminal or transshipment site;
- the level of services required to facilitate safe navigation;
- the suitability of the design vessels;
- the design vessels' manoeuvring characteristics, navigation and radiocommunications equipment, their cargo containment and handling systems in terms of operational safety;
- the adequacy of the design vessel's berth and related terminal service requirements;
- pollution prevention programs; and
- marine contingency planning and related emergency countermeasures.

1.2.3. SCOPE OF TERMPOL

The analyses, comments and advice contained in this report are based on information provided by the QPA and the existing documentation and technology at the time the report was written.

The TRP is not intended to approve the studies submitted by the QPA, but to use their content to review the Project as a whole and make recommendations regarding marine safety.

This report was drafted by TC and reviewed by the following departments and agencies:

- Fisheries and Oceans Canada
- Canadian Coast Guard
- Laurentian Pilotage Authority
- Ministère de la Sécurité publique du Québec
- Ministère des Transports, de la Mobilité durable et de l'Électrification des transports du Québec

[5] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2001, chapter 1.3.

2. METHODOLOGY

This report follows the analysis of documents submitted under the provisions of the TERMPOL guide (TP 743, 2001).

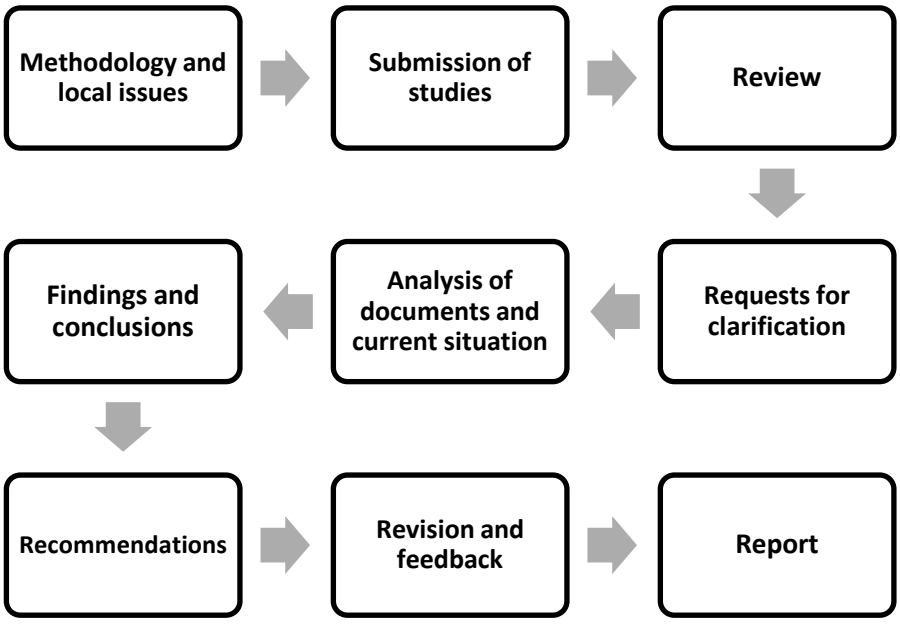

Figure 3: TERMPOL process

The TRP was begun in the fall of 2013 at the request of the QPA, the Project proponent.

On February 26, 2015, the QPA submitted a set of revised documents in electronic format (refer to Appendix 4) as part of the TRP.

On July 21, 2015, the QPA asked the TRP members to focus the TERMPOL analysis only on phase 1, because phase 2 was postponed to a later date for strategic development reasons.

Phase 1

- Extension of wharf line and reinforcement of recreational beach. This phase is the subject of the TRP.

Phase 2

- Construction of a dolphin jetty. Deferred to a later date.

The QPA sent TC the latest studies and documents for phase 1 of the Project as part of the TRP in July 2015.

3. ANALYSIS

The TERMPOL analysis focuses essentially on the following elements: vessels, their routes, the terminal, and the terminal-vessel interface.

With regard to operations and safety, merchant vessels in the global fleet are governed by national and international laws, regulations, conventions, rules and practices.

In Canada, the *Canada Shipping Act, 2001* (CSA 2001) governs maritime transportation safety, while the *Pilotage Act* governs compulsory pilotage areas.

The documents submitted by the QPA were studied and analyzed to ensure that:

- the safety management system put in place is in accordance with recognized procedures;
- arrangements are planned to conduct ongoing audits of the safety and management system;
- major accident hazards in the context of the proposed operation have been identified; and
- the risks therefrom have been evaluated and measures taken to reduce those risks to an acceptable level using the best available technology.

The QPA requested the services of several groups to perform analyses and a full assessment of the expansion Project. The purpose of these analyses is to describe and quantify risks, as prescribed by the provisions of the TRP.

Recommendation 1

The QPA must inform the responsible authorities if it plans to make any changes to its Project or commitments as indicated in the submitted surveys.

3.1. VESSEL INFORMATION

According to the studies submitted by the QPA, the new marine facilities at the Port of Québec will accommodate vessels with characteristics similar to those indicated in the table below.[6]

Vessel Name	*DWT*	*Length Overall (m)*	*Length Between Perpendiculars (m)*	*Breadth (m)*	*Maximum Draught (m)*
Cap Diamant	160,044	277.3	266	53	15.62
Cap Romuald	146,639	274.1	264	47.9	16.12
Difko Bertha	80,040	228.6	218.7	32.3	16.1
Jana Desgagnés	10,550	123.7	117.6	17.7	8.36
Clipper Legacy	10,031	118.4	112	19	8.2
Federal Leda	37,180	199.9	192	23.9	11.3
CSL Assiniboine	33,309	225.5	222.6	23.8	9.25

Finding 1

The vessels cited in the above table are in fact mathematical vessel models that were used for the simulation exercises.

The design vessels for the new facilities are not explicitly defined. However, similar vessels are frequently transiting on the St. Lawrence River.

Recommendation 2

In the event that a future operator uses vessels other than those that are analyzed in this survey, the TRC members recommend that the stakeholders:

- *evaluate the risk areas; and*
- *analyze the hydrographic characteristics that may have negative effects on the safety and navigability of the vessel used.*

Finding 2

Vessels sailing on the St. Lawrence River must meet the requirements of Canadian legislation and regulations in addition to the provisions of the different applicable international statutes and conventions. Additional requirements also apply in certain locations on the St. Lawrence River.

Recommendation 3

The TRC members recommend that when the vessels that will be using the new facilities are identified, this part of the TERMPOL survey should be completed by providing the following information:

- *maximum vessel dimensions;*
- *summer and winter draughts and corresponding deadweight and displacement;*
- *tonnages – gross and net;*

[6] Study submitted by the QPA, section 3.9, "Spécifications des navires," p. 93.

- *vessel classification and classification society;*
- *ice class, where applicable;*
- *cargo capacity;*
- *cargo containment and cargo transfer systems;*
- *main propulsion system (brief description);*
- *steering gear arrangements;*
- *main and auxiliary engine cooling systems;*
- *de-icing or recirculation systems;*
- *ship stability data, both intact and damaged;*
- *manoeuvring data and information in accordance with IMO standards;*
- *intended shipboard navigational equipment;*
- *intended radio and internal communications equipment to be installed; and*
- *intended crewing and certification standards.*

3.2. ROUTE INFORMATION

3.2.1. GENERAL

To analyze worst-case scenarios, the QPA used a design vessel of 160,044 dwt[7] with a length of 277.3 metres, a breadth of 53 metres and a maximum draught of 15.62 metres on the Les Escoumins-Quebec City sector.

The studies as submitted did not review fishery resources, which will be evaluated by environmental assessments. There is no offshore exercise or oil industry activity on the sector analyzed.

3.2.2. ORIGIN, DESTINATION AND VOLUME OF MARINE TRAFFIC

In light of the studies submitted, the new facilities will be used primarily for vessels arriving from or going to the open sea. It is estimated that these facilities would create an annual increase in traffic of approximately 150 vessels or 300 transits. This increase represents approximately one vessel every 2.43 days or one transit every 1.21 days.

The annual average traffic for the area between Quebec City and Les Escoumins is estimated at 4,759 transits[8] (from 2004 to 2014), or 13.04 transits per day. An additional 300 transits would increase the average to 13.86. Note that for this area pilotage is compulsory for certain vessels as per section 4 of the *Laurentian Pilotage Authority Regulations*.

Traffic in this area consists primarily of the following:

- general cargo vessels and bulk carriers
- container vessels
- passenger vessels

[7] Deadweight tonnes.

[8] Statistics provided by the Laurentian Pilotage Authority for upbound and downbound vessels in the St. Lawrence River from 2004 to 2014 (reference point: Cap Brûlé).

- tugs and barges
- liquid bulk carriers (oil tankers and chemical tankers)

Approximately half of the upbound oil tankers in this area are travelling to the Valero refinery in Lévis.

In the summer and the fall, traffic is greater for the following reasons:

- a portion of the St. Lawrence Seaway, extending from Montréal to the Great Lakes, is open and accessible; and
- there are more cruise ships.

This area is also popular with pleasure craft in the summer.

Finding 3

Based on the submitted surveys, the TRC members are of the view that the addition of 300 transits generated by the new facilities at the Port of Québec will not have a significant impact on traffic in the area between Quebec City and Les Escoumins.

3.2.2.1. ROUTE

The documents submitted by the QPA show that the route analysis focuses on the Cabot Strait and the Belle Isle–Quebec City sectors. The studies conducted by DNV-GL, "HAZID for Beauport Liquid Bulk Terminal,"[9] define the boundaries of this area as follows:

- to the northeast, a line joining the Ouelle River to Cap-aux-Oies; and
- to the southeast, a line crossing the river 4 km upstream from the Port of Québec.

[9] DNV-GL, "Appendix: HAZID for Beauport Liquid Bulk Terminal," December 20, 2013.

Figure 4: Studied area[10]

Finding 4

The surveys submitted by the QPA and DNV-GL do not have the same geographical limits; however, they are complementary.

The HAZID risk assessment work, conducted in consultation with the different industry stakeholders, identified the Cap-aux-Oies–Quebec City sector as having the greatest risk. As a result, the survey conducted by DNV-GL "HAZID for Beauport Liquid Bulk Terminal"[11] *focuses only with this sector.*

An overview of the route followed by merchant vessels in the designated sector prepared by TC for purposes of comprehension is provided in Appendix 4.

This report was written by the TRP following the analysis of the area as defined by DNV-GL.

[10] Figure from the document submitted by the QPA, in Appendix 2: DNV-GL, *Termpol Study Report*, Element 3.15, "Risk Assessment," p. 8.

[11] DNV-GL, "Appendix: HAZID for Beauport Liquid Bulk Terminal," December 20, 2013.

3.2.2.2. OTHER ROUTES

Route upstream of Quebec City

According to the most recent version of the documents submitted, the QPA is planning for operations with vessels coming from or going to ports upstream of Quebec City.

Finding 5

No surveys were submitted by the QPA for the routes upstream of Quebec City.

Recommendation 4

If the operator or the proponent uses vessels transporting goods destined for or originating from ports upstream of Quebec City, the TRC members recommend that a complementary TRP be conducted.

Alternate route

The documents submitted discuss an alternative route downstream of the area under consideration.

Finding 6

There are no alternative routes in the area surveyed. The analyzed route, although very busy, remains safe within the limits and under the rules established by the CCG.

In addition:

- *The channel is marked with buoys, dredged and maintained at a depth of 12.5 metres;*
- *Pilotage is compulsory; and*
- *Vessels are inspected regularly to check their compliance with the provisions of the applicable regulations.*

3.2.2.3. PHYSICAL LIMITS AND CONSTRAINTS

The route as defined in the DNV-GL studies has the following physical limits:

- depth maintained at 12.5 metres
- minimum breadth of 0.16 nautical miles (305 metres)

In addition, according to the studies submitted, the area has certain constraints:

- intersection with two ferries:
    - ferry from Isle-aux-Coudres downstream of the new facilities
    - Quebec City–Lévis ferry upstream of the new facilities (note: ferry crossings are very unlikely given its geographical position in relation to the new facilities)
- currents from 4 to 8 knots, depending on the tide
- silting
- two-way traffic

- winter navigation
- pleasure craft navigation in the summer

3.2.2.4. CHANNELS

Access to the new port facilities at the Port of Québec will be via the St. Lawrence River. The dimensions of the navigation channel in the St. Lawrence River meets the needs of vessels that will use the new facilities.

Finding 7

The Canadian Coast Guard is responsible for managing marine traffic on the St. Lawrence, and not the port authorities. The QPA is responsible for managing traffic within the port's limits, but does not seem to have additional requirements.

3.2.2.5. ANCHORAGES

According to the documents submitted by the QPA, the Port of Québec has enough anchorages to meet the needs of vessels waiting for short or long periods.

Standby anchorages

- Rasades
- Pointe-au-Pic
- Sault-au-Cochon

Emergency anchorages

- Saint-Nicolas
- Pointe Saint-Jean
- Saint-Vallier

Anchorages near port facilities

- Maheu River 1, 2 and 3
- "En haut des câbles" (electric cables)
- Trou Saint-Patrice
- Alpha (A)
- Bravo (B)
- Charlie (C)
- Delta (D)

In its TERMPOL studies, the QPA submitted a document entitled "Fiches techniques des mouillages" [Anchorage Technical Data Sheets] for its sector.

Finding 8

The TRC members find that some of the data on the anchorage technical sheets submitted is inadequate for certain vessel sizes.

Recommendation 5

The TRC members recommend that the anchorage positions intended primarily for large vessels be identified based on the vessel's overall length in addition to maximum draughts.

Recommendation 6

The TRC members also recommend adequate procedures to be established for winter anchorage positions.

Recommendation 7

The TRC members also recommend that procedures for the waiting areas be developed, taking into consideration the transit rules in the Traverse du Nord channel for deep-draught and wide-beam vessels.

3.2.3. NAVIGABILITY AND VESSEL OPERATION

The Port of Québec is frequently served by deep-draught vessels.

3.2.3.1. DEPTH RESTRICTIONS AND UNDER KEEL CLEARANCE

Given that the depth maintained in the area is only 12.5 metres at the Traverse du Nord, deep-draught vessels must transit with the tide.

The table below, provided by the QPA, shows the draught restrictions at the Traverse du Nord.

Draft restrictions in North Traverse [12]	
Tide Conditions	***Draft (m)***
Low tide	*12.5*
High tide (winter, inbound)	*15*
High tide (summer, inbound)	*15.5*
High tide (winter, outbound)	*14.5*
High tide (summer, outbound)	*15*

Finding 9

Based on the table above, it is not clear if under keel clearance was taken into consideration for safe transits.

[12] Study submitted by the QPA, in appendix: DNV-GL, *Termpol Study Report*, Element 3.15, "Risk Assessment," July 17, 2014, p. 8.

Recommendation 8

In addition to industry requirements and practices with respect to the development of voyage plans,[13] the TRC members recommend that an appropriate under keel clearance be taken into consideration when developing travel plans to ensure safe trips, as specified in the Charts and Nautical Publications Regulations (1995) *and the Sailing Directions.*

Finding 10

On the Traverse du Nord sector, the flow of marine traffic is influenced by weather conditions and the available water column.

Recommendation 9

In order for vessels to transit safely in this sector, the TRC members recommend that the CCG install in situ observation instruments in known strategic positions.

According to the documents submitted by the QPA, generally speaking, design vessel squats[14] do not cause any concerns with regard to under keel clearance and thus contact with the riverbed. Squat information is known by vessel masters and pilots and is taken into consideration when operating the vessel and setting the vessel speed accordingly.

The documents submitted by the QPA with regard to under keel clearance refer to a table developed by the CCG.

Finding 11

The document submitted on the under keel clearance is a version that applies only for the Montreal-Quebec City sector.

Finding 12

The QPA identified the following areas as critical in terms of depth:

- *The channel west of L'Île Rouge;*
- *West of the haut-fond Morin;*
- *The passage of L'Île-aux-Coudres; and*
- *The channel of the Traverse du Nord.*

Recommendation 10

The TRC members recommend that the QPA take into consideration the under keel clearance data contained in the most recent version of the Sailing Directions ATL 111 (St. Lawrence River, Île Verte to Québec and Fjord du Saguenay).

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[13] IMO, Resolution A.893(21), *Guidelines for Voyage Planning*, adopted November 25, 1999.

[14] *Squat:* A reduction in water pressure under a vessel's hull as a function of its speed, causing it to settle deeper than its static mean draught. (Reference: Government of Canada's terminology and linguistic data bank, *Termium Plus*).

Finding 13

The QPA defers to the obligation of pilots and crews to establish the safety margins for depth restriction. Legally, the master has the ultimate responsibility for vessel safety at all times.

Finding 14

Due to continual silting-up in the area as defined, the channel of the Traverse du Nord, maintenance dredging is carried out annually. When shoals are reported, the information is broadcast in Notices to Shipping and published by the CCG in Notices to Mariners.

Recommendation 11

Based on the findings and the prevailing practices in the area, the TRC members recommend that stakeholders:

- *Reassess the concept of under keel clearance if the characteristics of its vessels operating in the area are different from the existing characteristics;*
- *Take all current or future requirements on transit restrictions into account;*
- *Comply with the passage or transit windows of opportunity with the tide, if applicable;*
- *Operate their vessels within recommended trim values;*
- *Calculate the under keel clearance with the draught for fresh water for increased safety;*
- *Develop berth-to-berth voyage plans as required by the IMO;*[15] *and*
- *Take into account sagging and hogging during loading and unloading, based on the available wharf depth.*

3.2.3.2. PILOTAGE

Under the *Pilotage Act*[16]and the *Laurentian Pilotage Authority Regulations*,[17] the St. Lawrence River from Les Escoumins upbound is a navigation area where vessels are subject to compulsory pilotage.

According to these Regulations, one licensed pilot or holder of a pilotage certificate is required at all times on board a vessel; however, two licensed pilots or holders of pilotage certificates may be required, depending on circumstances.

Finding 15

Based on the pilot assignment rules in effect, the TRC members are of the view that the current services are suitable for the future operations of the new facilities.

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[15] IMO, Resolution A.893(21), *Guidelines for Voyage Planning*, adopted November 25, 1999.

[16] *Pilotage Act* (R.S.C., 1985, c. P-14).

[17] *Laurentian Pilotage Authority Regulations* (C.R.C., c. 1268), section 35, "Minimum Number of Licensed Pilots or Holders of Pilotage Certificates."

3.2.3.3. WINTER NAVIGATION

Navigation on the St. Lawrence River takes place year-round, including during the winter. Winter navigation has its own specific constraints due to strong winds, low temperatures and the presence of ice.

Finding 16

There is no ice class requirement for vessels sailing on the St. Lawrence River. However, the Marine Machinery Regulations[18] *stipulate that*

> *For ships required to operate in ice-covered waters where ice may choke sea-water inlets, maintenance of essential sea-water supply shall be maintained by*
>
> *(a) diversion arrangements for warmed cooling water from overboard discharges into sea-water inlet boxes;*
>
> *(b) means to clear sea-water inlet boxes, preferably by steam that has a pressure not in excess of the design working pressure of the sea-water inlet boxes and that is vented to the upper deck by means of a valved pipe; and*
>
> *(c) ensuring sea-water inlet strainers have*
>
> *(i) perforations approximately 20 mm in diameter to prevent ingestion of large ice particles; and;*
>
> *(ii) a strainer perforated area approximately 5 times the total cross-sectional area of the inlet pipes being served to ensure full fluid flow in slush ice conditions.*[19]

Given the winter conditions and the low water temperature in the St. Lawrence, this requirement is crucial to reducing the risk of mechanical failures.

Recommendation 12

The TRC members recommend that the QPA ensure that the operator or operators use vessels that meet the regulatory requirements for equipment and facilities for ice navigation.

The Charts and Nautical Publications Regulations (1995)[20] *require vessels navigating in ice-covered Canadian waters to have the most recent edition of the Fisheries and Oceans Canada* Notices to Mariners *on board.*

Furthermore, ships "making a voyage during which ice may be encountered"[21] *must have the Fisheries and Oceans document* Ice Navigation in Canadian Waters *on board.*

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[18] *Marine Machinery Regulations*, SOR/90-264, Schedule VII, Steering Systems, Shipside Components and Windlasses, Division IV.

[19] *Marine Machinery Regulations*, SOR/90-264, Schedule VII, Steering Systems, Shipside Components and Windlasses, Division IV.

[20] *Charts and Nautical Publications Regulations*, 1995 (SOR/95-149), paragraph 6(1)(b).

[21] *Charts and Nautical Publications Regulations*, 1995 (SOR/95-149), item 2 of the Schedule.

Recommendation 13

The TRC members also recommend that the following documents be on board:

- *TP 14335,* Winter Navigation on the River and Gulf of St. Lawrence Practical Notebook for Marine Engineers and Deck Officers
- *TP 15163,* Joint Industry – Government Guidelines for the Control of Oil Tankers and Bulk Chemical Carriers in Ice Control Zones of Eastern Canada *(2015)*
- *Checklist for preparing the vessel for ice navigation*

3.2.4. MARINE TRAFFIC CONSIDERATIONS

3.2.4.1. TRANSIT

Finding 17

Besides the mandatory pilotage rules, on December 1, 2009, The Canadian Coast Guard established rules [22] *that govern the traffic of Post-Panamax ships heading to locations upstream from the Traverse du Nord sector of Île d'Orléans by adding the concept of combined breadth.*[23]

1. *Passage (encounter) and overtaking of two (2) vessels, each with a combined breadth equal to or higher than 81.3 metres, shall not be authorized in the dredged channel of Traverse du Nord, between Buoys K-136 and K-92.*
2. *Should a vessel be required to slow down or stop to avoid encountering within the limits of the dredged channel, the vessel with a following current (stern) shall have priority to maintain course (ref.* Collision Regulations, *Rule 9, Section K).*
3. *The Marine Communications and Traffic Services Officer (MCTSO) shall inform the vessels concerned sufficiently in advance in order for the vessels to make appropriate arrangements to abide by these measures.*
4. *The vessels concerned shall inform the MCTS Officers of their agreed arrangements in order for MCTS to advise relevant traffic accordingly.*[24]

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[22] Fisheries and Oceans Canada, *Annual Edition April 2015 to March 2015 – Notices to Mariners 1 to 46*: Guidelines for the Transit of Wide-Beam Vessels and Long Vessels, Transit of Vessels with Combined Breadth Equal to or Higher than 81.3 metres in the Traverse du Nord Sector of Île d'Orléans. (Official Canadian Coast Guard publication, 2015) Part C, Notice 27A, p. 6 of 6.

[23] Sum of the breadths of the vessels that meet. Breadth means the "greatest breadth" of the vessel as stated in the International Regulations for Preventing Collisions at Sea 1972 (the COLREGS), Part A, Rule 3(j). It is the maximum distance (in metres and centimetres) between the outside edges of the shell plating of the ship, including fenders and bridge wing.

[24] Fisheries and Oceans Canada, *Annual Edition April 2015 to March 2015 – Notices to Mariners 1 to 46*: Guidelines for the Transit of Wide-Beam Vessels and Long Vessels, Transit of Vessels with Combined Breadth Equal to or Higher than 81.3 metres in the Traverse du Nord Sector of Île d'Orléans. (Official Canadian Coast Guard publication, 2015) Part C, Notice 27A, p. 6 of 6.

Recommendation 14

The TRC members recommend that all parties, such as Transport Canada, the Canadian Coast Guard and the pilotage services, continue to coordinate trips, meeting points or overtaking areas for upbound and downbound vessels in the Traverse du Nord sector of Île d'Orléans.

3.2.4.2. TRANSIT TIME AND DELAYS

Given that the distance between the pilot station at Les Escoumins and the Port of Québec is 122 nautical miles and the average transit speed specified in the documents submitted by the proponent is between 10 and 15 knots depending on the vessel, the TRP calculated the following transit times:

Transit Times *(Les Escoumins–Quebec City)*	
Average Speed (knots)	*Time (hh-mm)*
10	*12 h 12*
11	*11 h 06*
12	*10 h 10*
13	*09 h 23*
14	*08 h 43*
15	*08 h 08*

Finding 18

Currently, wide-beam vessels with deep draughts transit safely in the area with the tide.

Recommendation 15

The TRC members recommend that the QPA coordinate with the pilotage services the vessel departure and arrival times, as well as expand their current procedures to the vessels that will be using the new facilities.

3.3. TERMINAL OPERATIONS

3.3.1. MARINE TERMINAL

3.3.1.1. GENERAL LAYOUT

The document below, submitted in the appendix by the QPA, shows the general layout of the new facilities.

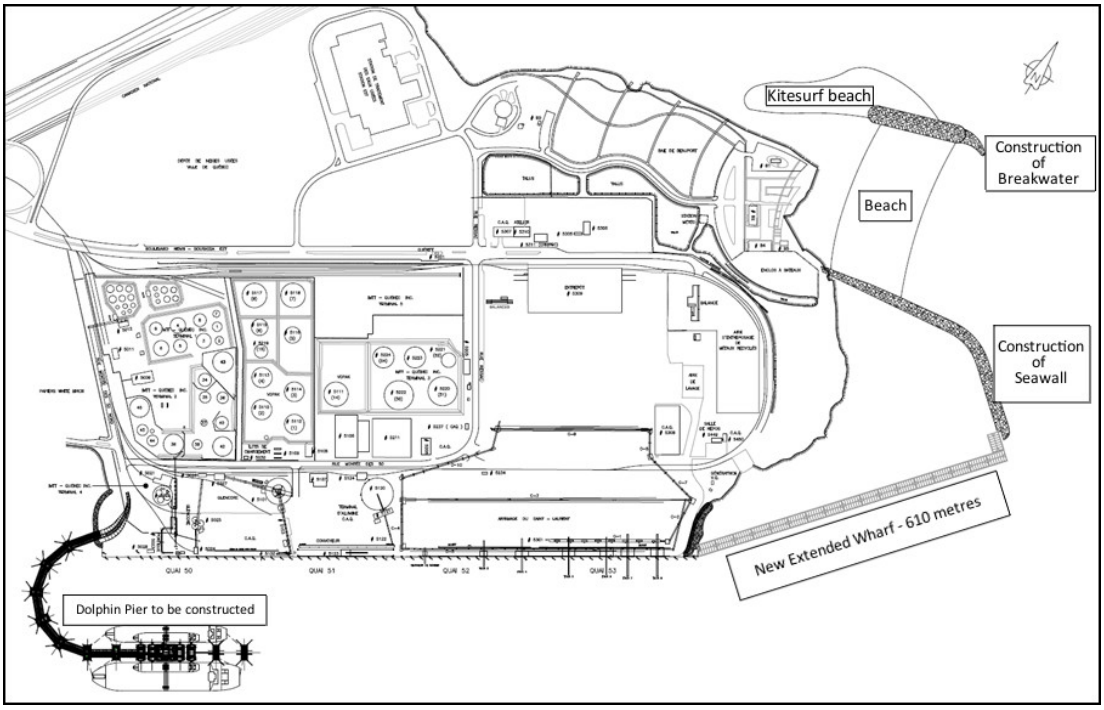

Figure 5: General layout of new facilities[25]

Finding 19

Given that the cargoes being handled have not yet been identified in the Project, the plans and figures submitted as part of the Project serve only to situate the expansion Project geographically by illustrating phases 1 and 2. They cannot be used to evaluate the facilities and equipment in detail.

Recommendation 16

As part of the expansion of the facilities, the TRC members recommend that the QPA provide details on the following points:

- *floating facilities, if applicable, and their locations*
- *location of the new underwater facilities related to the Project, if applicable*
- *location, size of the manoeuvring areas and the turning basins in the event that phase 2 (construction of the dolphin jetty) is carried out*

[25] Document submitted by the QPA, in appendices: "a-11 Plan projet," 2014.

Finding 20

As part of dredging and sediment treated according to the solidification and stabilization technique, the QPA shall obtain environmental authorizations, if applicable.

3.3.1.2. STRUCTURAL LAYOUT PLAN AND TECHNICAL DATA

As part of the new facilities, in addition to a bathymetric survey, the QPA tasked certain groups with directing and completing the following surveys related to the Project:

Groupe-Conseil LaSalle

- "Impacts de l'extension du secteur portuaire de Beauport sur les conditions hydrosédimentologiques locales," Report No. 1605, April 28, 2006
- "Modélisation numérique des conditions hydrauliques," Report No. 1657, August 2007.

SNC-Lavalin

- "Liquid Bulk Berth Mooring Analysis," 2014
- "Engineering Report, Quay Extension Mooring Analysis," 2014
- "Devis de construction. Ingénierie détaillée - groupe 1," Document No. 615534-0000-40EG-0002-00, 2014
- "Devis de construction. Ingénierie détaillée - groupe 2," Document No. 615534-0000-40EG-0003-00, 2014
- "Devis de construction. Ingénierie détaillée - groupe 3 », Document No. 615534-0000-40EG-0004-00, 2014
- "Quai 54. Extension du quai - Caissons de béton. Vue en plan des fondations des caissons," Drawing No. 615534-2000-42D1-0001-01, 2014
- "Quai 54. Extension du quai - Caissons de béton. Vue en plan mur de couronnement," Drawing No. 615534-2000-42D1-0002-01, 2014
- "Quai 54. Extension du quai - Caissons de béton. Élévation des caissons en béton," Drawing No. 615534-2000-42D1-0003-01, 2014
- "Zones de dragage," Drawing No. 615534-3000-4YD2-0001-00, 2014
- "Liste des lignes," Document No. 615534-0000-46EL-0001, 2014
- "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Procédé," Drawing No. 615534-1000-46D1-0001-00, 2014
- "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Procédé et services," Drawing No. 615534-1000-46D1-0002-00, 2014
- "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Protection incendie," Drawing No. 615534-1000-46D1-0003-00, 2014
- "Quai de transbordement de liquides en vrac. Arrangement de tuyauterie," Drawing Nos. 615534-1000-46D3-0002-00, 615534-1000-46D3-0003-00, and 615534-1000-46D3-0007-00, 2014

Groupe CIMA+

- "Évaluation environnementale stratégique," Project No. Q09912A, May 2010

Maritime Simulation and Research Centre

- *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., March 2013

Recommendation 17

From a technical standpoint, the TRC members recommend that the QPA apply the industry recognized standards, codes and practices.

3.3.1.3. EMERGENCY POWER SUPPLY

The QPA indicated that the emergency power supply (UPS) or generator would power the following:

- lighting
- fire safety system
- motorized shutoff valves

Recommendation 18

For the new facilities, the TRC members recommend that the QPA apply existing industry standards and carry out a risk assessment to

- *determine the sources of emergency power:*
    - *number*
    - *location*
    - *power*
    - *autonomy*
- *identify vulnerable systems that need to be protected:*
    - *surveillance*
    - *alarms*
    - *communication*
    - *emergency stop*
    - *any other vulnerable system or equipment*

3.3.1.4. MOORING LOAD MONITORING SYSTEM

SNC-Lavalin was tasked with conducting this study for both phases using the OPTIMOOR software program. These data are appended to the QPA studies.

The QPA states that the mooring system for the new Wharf 54 is designed for steel lines with a capacity of 100 tonnes. Loads are limited to 55% of the breaking load. The bollards on the wharf are T-shaped and have a capacity of 125 tonnes.

In addition, according to another section of the documents submitted, another mooring system is planned. The selected mooring system consists of 100-tonne or 125-tonne hooks

with manual release. A capstan on each set of hooks allows the cable to be put in place. The hooks are not remote-controlled for the following reasons:

- To ensure that the vessel can free itself in an emergency or cut its mooring ropes attached to the hooks even if the ropes are not accessible from the passageway;
- The very high risk of a possible unintentional release;
- If a control cable breaks or does not work properly, remote-controlled hooks may not operate properly in an emergency; and
- The high maintenance requirements for remote-controlled hooks.

Remote controls are useful when vessel movements are very frequent, which is not the case for the expansion Project presented in this document.

SNC-Lavalin used a bulk carrier with the following characteristics[26] for the mooring load studies:

Data	**Value**
Deadweight Tonnage (DWT)	125,000 tonnes
Overall Length (LOA)	295 m
Length Between Perpendicular (LBP)	282 m
Depth	22.9 m
Draft (minimum)	9 m
Windage area above deck side	1 000 m^2
Windage area above deck end	500 m^2

Finding 21

According to the documents submitted, there is no automatic mooring load monitoring system on wharf 54 and there seems to be a lack of consistency in the choice of mooring system to be used.

Finding 22

The mooring load survey was conducted using a bulk carrier with specifications that are different from the oil tanker design vessel.

Recommendation 19

The TRC members recommend that the QPA equip the new wharf with mooring systems that meet industry standards and best practices. These systems must be adapted to the types of vessels that will use these facilities.

[26] Study submitted by the QPA, in appendix: SNC-Lavalin, *Engineering Report, Quay Extension Mooring Analysis* (2014), p. 1.

3.3.1.5. CONTROL AND INSTRUMENTATION SYSTEM

According to the documents submitted, the QPA is planning a control room that would be accessible via an airlock with a full fire protection system, a transshipment equipment control system and a mechanical room.

Document 615534-1000-46D1-0001-00, "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Procédé," prepared by SNC-Lavalin and submitted by the QPA as part of the TERMPOL review process, illustrates the entire bulk liquid cargo transshipment system with emergency shutdowns.

Finding 23

According to the document "Devis de construction. Ingénierie détaillée - groupe 1 (615534-0000-40EG-0002-00)," *a control room is planned for the phase 2 facilities. There is no indication that it would be used for the phase 1 facilities.*

Finding 24

According to the document "Devis de construction. Ingénierie détaillée - groupe 2 (615534-0000-40EG-0003-00)," *no control room appears to be planned for the phase 1 facilities.*

Recommendation 20

For the phase 1 facilities, the TRC members recommend that the QPA plan for a control room equivalent to the one planned for the dolphin jetty (phase 2).

Recommendation 21

The TRC members recommend that the QPA apply the applicable standards, codes and regulations for control systems, alarm systems, leak detection and emergency shutdown equipment.

Recommendation 22

The TRC members recommend that the QPA ensure that these control and instrumentation, alarm, leak detection and emergency shut-down systems be operational at all times (24/7), ergonomic and sufficient in number and operated by duly trained personnel.

Recommendation 23

The TRC members recommend that the QPA incorporate procedures relating to the operation of the control and instrumentation, alarm, leak detection and emergency shutdown systems be incorporated into the port safety management manuals.

3.3.1.6. WASTE MANAGEMENT (WASTE AND RESIDUAL MATERIAL)

According to the documents submitted by the QPA, waste management at the grounds of the Port of Québec is subcontracted to a third party.

Recommendation 24

The TRC members recommend that the QPA make sure that a waste management plan is developed.

Recommendation 25

The TRC members recommend that the QPA ensure that a plan be developed for the new facilities to manage wastewater discharged by berthed vessels, as applicable.

3.3.1.7. POLLUTION PREVENTION PROGRAM

According to regulatory provisions, oil handling facilities (OHF) are categorized according to their maximum oil transfer rate, measured in cubic metres per hour, in respect of each single oil product loaded or unloaded to or from a vessel, as follows:

Levels of Facilities[27]	
Category of Oil Handling Facility	***Maximum Oil Transfer Rate***
Level 1	150 m^3/h
Level 2	750 m^3/h
Level 3	2 000 m^3/h
Level 4	More than 2 000 m^3/h

The following is the minimum size of an oil pollution incident in respect of each single oil product loaded or unloaded to or from a ship, for which a response needs to be described in the oil pollution emergency plan:

Spill Sizes[28]	
Category of Oil Handling Facility	***Minimum Spill Size***
Level 1	1 m^3
Level 2	5 m^3
Level 3	15 m^3
Level 4	50 m^3

Part 2 of the *Response Organizations and Oil Handling Facilities Regulations* (SOR/95-405) states that:

> [The] equipment and resources that an oil handling facility shall have for use, in respect of an oil pollution incident at the oil handling facility arising out of the loading or unloading of oil to or from a ship, include the following:
>
> (a) the equipment referred to in paragraph 12(2)(d) that is required to contain and control the oil or, where the oil cannot be contained, to control the quantity of oil involved in the incident, up to the minimum spill size determined in accordance with section 2 of the Oil Handling Facilities Standards, is to be on site during any loading or unloading operation;

[27] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p.1.

[28] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p.1.

(b) the equipment and resources required to contain and control the oil or, where the oil cannot be contained, to control the quantity of oil involved in the incident, up to the minimum spill size determined in accordance with section 2 of the Oil Handling Facilities Standards, are to be deployed on scene within one hour after the discovery of the oil pollution incident, unless deployment within one hour would be unsafe, ineffective or impracticable; and

(c) the equipment and resources required to recover and clean up the oil involved in the incident up the minimum spill size determined in accordance with section 2 of the Oil Handling Facilities Standards are to be deployed on scene within six hours after the discovery of the oil pollution incident.[29]

Under the Regulations, an exercise program carried out over a three-year period must be established and, depending on the OHF category, an agreement must be reached with a response organization.

Furthermore, the operator of the OHF must demonstrate in its oil pollution emergency plan that it can meet the requirements concerning response methods, equipment and resources:

> An oil handling facility's oil pollution emergency plan shall include the following information:
>
> (a) the policies that the operator of the oil handling facility will follow in the event of an oil pollution incident;
>
> (b) in respect of each group of oil products that are loaded or unloaded to or from a ship at the oil handling facility and that, if spilled, would individually require a response similar to the appropriate response for every other oil product in the group, an oil pollution scenario that contains
>
> (i) a description of the response in respect of the spill size determined in accordance with section 2 of the *Oil Handling Facilities Standards*; and
>
> (ii) the assumptions on which each scenario is based, taking into account the factors set out in section 3 of the *Oil Handling Facilities Standards*;
>
> (c) a description of the activities that will be carried out in the event of an oil pollution incident, taking into account the priorities set out in section 4 of the *Oil Handling Facilities Standards*, the time within which those activities will be carried out and the names of the persons responsible for carrying them out;
>
> (d) the types and quantity of equipment for use on scene during a response to an oil pollution incident at the oil handling facility in respect of the spill size that is determined in accordance with section 2 of the *Oil Handling Facilities Standards*;
>
> (e) the name of each person or body from which the equipment and resources will be obtained, in the event of an oil pollution incident,

[29] Response Organizations and Oil Handling Facilities Regulations (SOR/95-405), subsection 13(2).

and the manner in which the equipment and resources will be deployed;

(f) the name or position of the persons who are authorized and responsible for ensuring that the response to an oil pollution incident at the oil handling facility is immediate, effective and sustained;

(g) the name of each person included in the personnel who has received basic oil pollution incident response training or any other training in relation to an oil pollution incident;

(h) a description of the training that the operator of the oil handling facility provides to its personnel in preparation for the responsibilities that they might be requested to undertake in response to an oil pollution incident;

(i) a description of the training that the operator of the oil handling facility plans to provide to its employees and to volunteers whom it might use to respond at short notice to an oil pollution incident;

(j) an oil pollution incident exercise programme established to evaluate the effectiveness of all aspects of the procedures, equipment and resources that are identified in the oil pollution emergency plan, including exercises to be coordinated with ships, response organizations or the Canadian Coast Guard, as the case may be;

(k) a description of the measures that the operator of the oil handling facility will take, in accordance with federal and provincial regulations relating to health and safety, to protect the health and safety of personnel, of volunteers and of other individuals who are involved, at the request of the operator, in responding to an oil pollution incident;

(l) a description of procedures for the updating of the oil pollution emergency plan; and

(m) a description of the manner in which the operator of the oil handling facility plans to respond to an oil pollution incident that involves a quantity of oil that is greater than the spill size referred to in paragraph (d) and that is scheduled to be transhipped, to a maximum of 10,000 t.[30]

With regard to the transfer rate and transfer lines, according to Document 615534-40MB-I-0001, "Compte-rendu de réunion,"[31] submitted by the QPA, "The four lines measuring 16 inches in diameter are replaced with two lines measuring 20 inches in diameter to limit pressure losses. The design rate for the 20-inch lines is still 10,000 barrels per hour."[32]

[30] Response Organizations and Oil Handling Facilities Regulations (SOR/95-405), subsection 12(2).

[31] Document submitted by the QPA in appendix: SNC-Lavalin, "Compte-rendu de réunion," Document No. 615534-40MB-I-0001, November 25, 2013.

[32] Translation by Transport Canada.

Finding 25

According to the documents provided, the transfer rate is established at 1,590 m^3/hour (10,000 barrels/hour) per pipeline. The transfer rate for both pipelines is therefore 3,180 m^3/hour. The facility category would be Level 4.

Recommendation 26

For the new facilities, the TRC members recommend that the QPA establish operational and emergency procedures in accordance with the provisions of the Oil Handling Facilities Regulations *(SOR/95-405).*

Recommendation 27

For the new facilities, the TRC members recommend that the QPA use industry best practices to establish procedures for improving the safety of operations at the terminal by taking the following into account:

- *the type of cargo*
    - *identification of the cargo*
    - *flash point*
    - *true vapour pressure*
    - *precautions to be taken*
- *transfer requirements*
    - *delivery or reception temperature*
    - *tanker venting*
    - *maximum transfer rate*
    - *maximum pressure*
    - *transfer methods*
    - *any other limits that may affect operations*

Recommendation 28

The TRC members recommend that, for an OHF, in developing oil pollution scenarios, the following factors should be taken into account:

1. *the nature of the oil product in respect of which the scenario is developed;*
2. *the types of ships that are loaded or unloaded at the facility;*
3. *the tides and currents that prevail at the facility;*
4. *the meteorological conditions that prevail at the facility;*
5. *the surrounding areas of environmental sensitivities that would likely be affected by an oil spill;*
6. *the measures that will be implemented to minimize an oil pollution incident; and*
7. *the time within which an effective response to an oil pollution incident can be carried out.*[33]

[33] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 1-2.

Recommendation 29

The TRC members recommend that the QPA take the following priorities into account when establishing response strategies:

1. *the safety of the facility's personnel;*
2. *the safety of the facility;*
3. *the safety of the communities living adjacent to the facility;*
4. *the prevention of fire and explosion;*
5. *the minimization of the oil pollution incident;*
6. *the notification and reporting of the oil pollution incident;*
7. *the environmental impact of the oil pollution incident; and*
8. *the requirements for cleaning up the oil pollution incident.*[34]

3.3.2. PORT INFORMATION BOOK

The documents submitted by the QPA do not cover the port information book, but the QPA will make it available to terminal operators once a contractual agreement has been reached with them. The book will also be submitted to Transport Canada, at least six months prior to the start of operations.

Recommendation 30

With respect to the port information book and the terminal operations manual, the TRC members recommend that the QPA include the following elements for the new facilities:

- *berthing plan in terms of the design vessel's approach and departure from the terminal berth; tug assistance requirements; mooring assistance requirements; the upper limit of lateral approach rate to the berth by the design vessel and the means of measuring and indicating wind speed and the vessel's lateral approach rates;*
- *upper limits of berthing operations in term of wind velocity, wave heights, tidal stream velocity, ice cover, visibility, and the means of measuring and indicating these factors;*
- *the upper wind velocity limits which would necessitate the interruption of cargo transfer operations and limit which would require the departure of the vessel from the berth;*
- *load measurements and limits for mooring lines and dockside bollards used;*
- *pilotage service and tug assistance details, mooring procedures and means of communication;*
- *vessel machinery and equipment repairs service providers;*
- *storing and bunkering facilities, if applicable;*
- *general safety measures;*
- *industrial health and safety;*
- *the procedures for authorizing special work on board, such as hotwork;*
- *vessel reporting procedures;*

[34] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

- *pilot boarding and transfer procedures at the port;*
- *vessel/shore communication procedures;*
- *designated anchorages;*
- *emergency measures; and*
- *the details of vessel/terminal personnel communications.*

3.3.3. TERMINAL OPERATIONS MANUAL

At the time this report was being written, the QPA had not submitted an operations manual for its new facilities, but it does undertake to make it available to stakeholders six months prior to the start of operations.

Recommendation 31

With respect to the terminal operations manual, the TRC members recommend that the manual addresses the following elements:

- *inspections, testing and preventive maintenance of terminal berth equipment used by vessels;*
- *pre-arrival and departure operational tests and checks of a vessel's machinery and equipment;*
- *cargo pre-transfer inspections, checklists, and meetings;*
- *vessel-terminal hose-manifold connections; vessel-terminal communications and chain of authority;*
- *cargo handling procedures, including emergency shut-down procedures;*
- *safety precautions and vessel oriented emergency procedures which would be included in the terminal's contingency plans; and*
- *receiving facilities for waste oil, ballast, dirty ballast, slops and garbage.*

3.3.4. APPROACH AND BERTHING PROCEDURES

3.3.4.1. MANOEUVRES

For the new facilities in the Beauport sector, the QPA tasked the Maritime Simulation and Research Centre with conducting studies and simulations[35] for berthing and unberthing.

The simulations were conducted with a variety of scenarios consisting of:

- 28 berthings
- 19 unberthings

The purpose of the simulations was to:

[35] Maritime Simulation and Research Centre, *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., Quebec City, March 2013.

- Verify the feasibility of manoeuvres at the berthing areas on the jetty
- Understand the effects that vessels in these berthing areas would have on manoeuvring vessels at neighbouring wharves
- Verify the feasibility of manoeuvres at the two wharves added to the east of Wharf 53
- Assess the upper limit of winds for all facilities at the mouth of the Saint-Charles River

To accurately reflect the results of the simulations, the facilities were numbered temporarily as follows:

- The two wharves to the east of Wharf 53 were numbered 54 and 55.
- The two additional berthing areas on the jetty were numbered 48 and 49.
- The dolphins were numbered 1, 2, 3, 4, 5 and 6. Dolphin 1 is the furthest east.

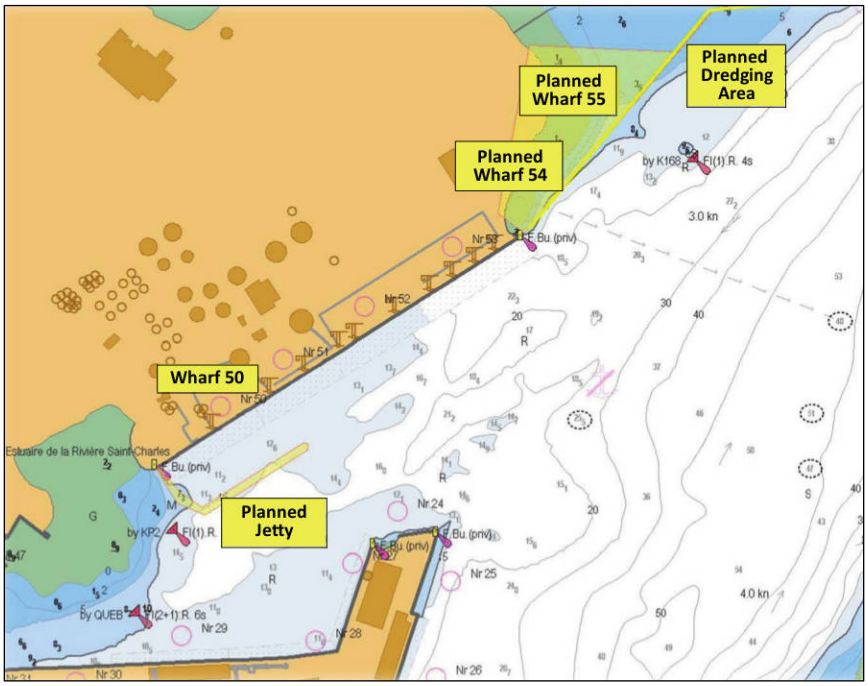

Figure 6: Temporary numbering of facilities[36]

[36] Maritime Simulation and Research Centre, *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., Quebec City, March 2013, p. 4.

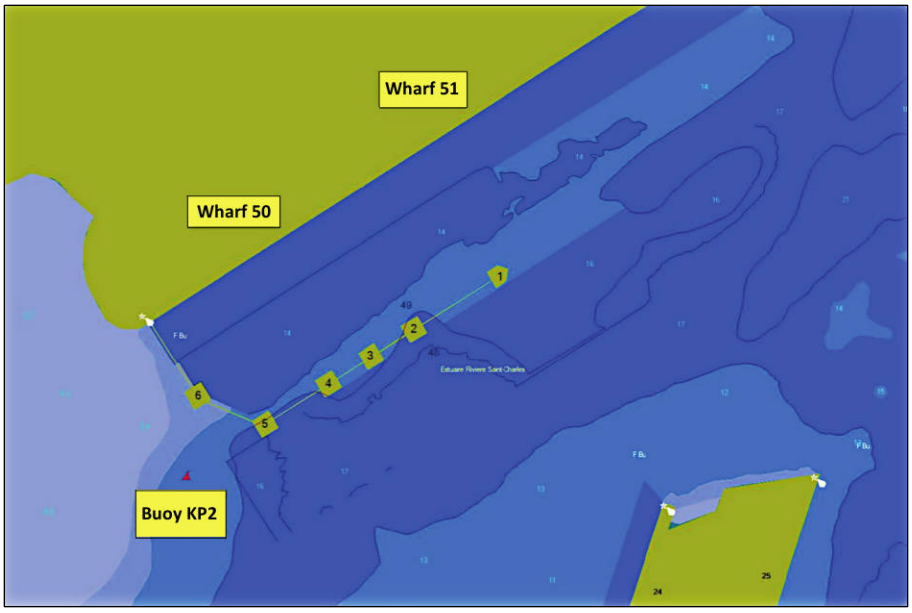

Figure 7: Temporary numbering of facilities[37]

Main Characteristics of Vessels Used for the Study[38]						
Vessel Type	***Model***	***Displacement***	***Deadweight***	***Breadth***	***Forward Draught***	***Aft Draught***
Oil tanker	*TK150P*	*160,780 t*	*274 m*	*48 m*	*15.5 m*	*15.5 m*
Oil tanker	*TK150B*	*76,098 t*	*274 m*	*48 m*	*6 m*	*9.5 m*
Bulk carrier	*BKCS03L*	*184,423 t*	*300 m*	*53 m*	*15 m*	*15 m*
Bulk carrier	*BKCS03B*	*83,140 t*	*300 m*	*53 m*	*7 m*	*10 m*
VLCC[39]	*VLCC14B*	*59,824 t*	*250 m*	*43.8 m*	*5.96 m*	*8.57 m*
Oil tanker	*TKCS02L*	*87,783 t*	*228.6 m*	*32.2 m*	*15 m*	*15 m*
Oil tanker	*TKCS02B*	*38,048 t*	*228.6 m*	*32.2 m*	*6.5 m*	*8.2 m*
Bulk carrier	*BULK06L*	*59,435 t*	*215 m*	*31.8 m*	*11.5 m*	*11.5 m*
Bulk carrier	*BULK06B*	*39,024 t*	*215 m*	*31.8 m*	*6.8 m*	*8.52 m*
Oil tanker	*TANK15B*	*13,854 t*	*144 m*	*23 m*	*5.2 m*	*6.6 m*
Cruise ship	*CRUISE08*	*44,195 t*	*294 m*	*32.2 m*	*8.04 m*	*8.04 m*
Cruise ship	*CRUISE05*	*33,863 t*	*261 m*	*31.5 m*	*7.75 m*	*7.75 m*
Tug	*TUG16*	*600 t*	*30.8 m*	*11.1 m*	*5 m*	*5 m*

Below is a brief summary of the exercises and parameters used for the simulations, as described by the Centre:

> Forty-seven berthing and unberthing manoeuvres were simulated to validate the feasibility of the manoeuvres within the proposed infrastructure.
>
> These manoeuvres were performed in a variety of weather conditions, from normal to extreme.

[37] Maritime Simulation and Research Centre, *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., Quebec City, March 2013, p. 4.

[38] Study submitted by the QPA, section 3.5, "Approches et navigabilité," pp. 6 and 7.

[39] VLCC: very large crude carrier.

> Nine different models of vessel were used and selected based on their configuration and tonnage being similar to those that regularly manoeuvre at the existing facilities. They were assisted by tugs chosen based on their similar bollard pull and propulsion systems to the tugs that assist vessels with their manoeuvres in the Port of Québec.
>
> The tide state was generally chosen so that the current would have the greatest effect on the manoeuvres.
>
> The equipment normally used during port manoeuvres were used by the pilot in accordance with standard operating rules. Tugs were generally used in accordance with current practice at the mouth of the Saint-Charles River.
>
> New ways to position tugs, inspired by the new areas with limited sea room, were tested during specific exercises.
>
> The required number of tugs for certain manoeuvres [was] evaluated on the basis of the available area and environmental conditions.[40]

Following these simulation exercises,

> […] the pilots analyzed these manoeuvres and made the following recommendations:
>
> 1. Establish the wind limit at 30 knots for all berthing and unberthing manoeuvres at wharves 49, 50 and 51 when other vessels are already berthed at the adjacent wharves. The restricted manoeuvring space is the overriding factor.
> 2. Establish the maximum limit of easterly winds at 35 knots for all manoeuvres for all wharves at the mouth of the Saint-Charles River. There are serious risks of violent crashes between pitching and rolling tugs, and the ships' hull.
> 3. Establish the maximum limit of easterly winds at 30 knots for vessels in ballast conditions that are berthed at wharves 48, 49, 50 and 51 so that when unberthing, they must swing by 180°.
> 4. Move the passageway connecting dolphin No. 6 and wharf 50 by at least 50 metres to the west to enable the tug to manoeuvre freely and to be able to prevent any accidental contact between the pipelines and any vessels manoeuvring at wharves 49 and 50.
> 5. If applicable, if the phase 2 Project is carried out, move the entire structure to the west, so that dolphin No. 5 is in the position of buoy KP2.
>
>   This would make it possible to:
>
>   a. Clear space for manoeuvres at wharves 50 and 49;
>   b. Accommodate larger vessels at wharf 49;
>   c. Facilitate turning manoeuvres toward the wharves to the north;
>   d. Gain more sea room for berthing at wharf 28;
>   e. Expand the turning basin used for all of the wharves at the mouth of the Saint-Charles River.

[40] Maritime Simulation and Research Centre, *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., Quebec City, March 2013, p. 25. Translation by Transport Canada.

6. Limit to 23 metres the breadth of a vessel that is heading to wharf 50, if the position of the dolphins remains unchanged and there is a Panamax vessel at wharf 49 and another at wharf 51.
7. Add a third tug for berthing when there is ice between the wharves in the north and in the south: two to assist manoeuvres and one to clear the ice, because the restricted space complicates this essential part of operations. This recommendation does not apply to wharves 52 and 53.
8. Conduct a survey on currents for wharves 54 and 55.[41]

Finding 26

Of all the recommendations made by the Maritime Simulation and Resource Centre following the different simulation exercises, only the last one applies to the new facilities planned in phase 1.

Recommendation 32

The TRC members recommend that the QPA adopt these practices, and include them in its operational procedures.

Finding 27

At the approaches of the new facilities, the St. Lawrence River is wide enough for vessels to manoeuvre safely.

Recommendation 33

The TRC members recommend that the QPA adopt appropriate procedures if vessels will need to manoeuvre within the navigable waterway.

Recommendation 34

The TRC members also recommend that the QPA establish mooring procedures for the new facilities.

Recommendation 35

For the new facilities, the TRC members also recommend that the QPA and the operator plan to secure vessels on the appropriate side to ensure, in the event of an emergency, that these vessels can depart immediately without tug assistance.

Recommendation 36

The TRC members recommend that the QPA and the operator apply the mooring standards in the Mooring Equipment Guidelines[42] *published by the Oil Companies International Marine Forum (OCIMF), or equivalent.*

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[41] Maritime Simulation and Research Centre, *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*, Corporation des pilotes du Bas-Saint-Laurent, inc., Quebec City, March 2013, p. 7. Translated by Transport Canada.

[42] Published in October 2008.

3.3.4.2. MOORING PROCEDURES AND PROVISIONS

The Project as presented consists of extending the wharf by 610 metres with a water depth alongside of 16 metres at low tide. The facade of the new facilities will be noticeably aligned with the general direction of the dominant currents.

The design studies for the new facilities were assigned to SNC-Lavalin in order to calculate the loads placed on various components and structural elements of the berth.

According to current QPA practices, no berthing or unberthing manoeuvres can take place when winds are 40 knots or greater.

The feasibility study of manoeuvres for the installation of dolphins and the addition of wharves 54 and 55, performed by the Maritime Simulation and Resource Centre, covered the following:

- Verifying the feasibility of manoeuvres at the berthing areas on the jetty
- Understanding the effects that vessels in these berthing areas would have on manoeuvring vessels at neighbouring wharves
- Verifying the feasibility of manoeuvres at the two wharves added to the east of Wharf 53
- Assessing the upper limit of winds for all facilities at the mouth of the Saint-Charles River

Recommendation 37

With respect to the design of mooring facilities, the TRC members recommend that the QPA apply current industry codes and practices, as well as the recommendations in the OCIMF's Mooring Equipment Guidelines *(MEG3).*

3.3.4.3. SINGLE-POINT MOORING PROCEDURES AND PROVISIONS

There are no single-point mooring facilities in this Project.

3.3.4.4. TUGS AND ESCORTS

Current QPA procedures and practices state that tugs are mandatory for all oil tankers during berthing and unberthing manoeuvres:

a. Oil tankers of 15,000 tons deadweight tonnage and less, equipped with a bow thruster, do not require the mandatory use of tugs.

b. Oil tankers of 15,000 tons deadweight tonnage and less, without bow thruster, require the mandatory use of one (1) tug, with the exception of oil tankers of under 5,000 tons gross tonnage and less than 5,000 tons deadweight tonnage.

c. Oil tankers from 15,000 to 25,000 tons deadweight tonnage, with bow thruster, require the mandatory use of one (1) tug.

d. Oil tankers from 15,000 to 25,000 tons deadweight tonnage, without bow thruster, require the mandatory use of two (2) tugs.

e. Oil tankers of 25,000 tons deadweight tonnage and over, with or without bow thruster, require the mandatory minimum use of two (2) tugs.[43]

Finding 28

It was found that there were no practices and procedures for tug escorts for oil tankers upon arrival and departure.

Recommendation 38

The TRC members recommend that the QPA develop a policy on escorts and define the limits of escort areas.

Recommendation 39

They also recommend that tugs be assigned based on their bollard pull.

3.3.4.5. DE-ICING

According to the documents submitted, navigation on the St. Lawrence River carries special hazards, such as the presence of batture ice, which is large pieces of ice that detach from the shore and endanger vessels as well as cause bottlenecks that are conducive to flooding. These hazards are known by pilots that embark at Les Escoumins. They have the knowledge and expertise necessary to guide vessels safely to their destinations.

Finding 29

The proponent did not provide the TRC with the details of the de-icing procedures of the new proposed port facilities.

Recommendation 40

The TRC members recommend that the existing practices related to de-icing services be extended to the new facilities.

3.3.4.6. CLOSING THE PORT

Current navigational practices and procedures at the Port of Québec state that berthing, unberthing and moving vessels at wharves under the authority of the QPA are prohibited when there are high winds (average of 40 knots or greater), except in special cases where special permission has been granted by the harbour master.

In situations of reduced or zero visibility, or under unfavourable navigation conditions, berthing, unberthing and moving at wharves under the authority of the QPA may be

[43] QPA, *Practices and Procedures Related to Navigation.* http://www.portquebec.ca/system/resources/W1siZiIsIjIwMTQvMDIvMTIvMTRfNDRfMTdfNTM4XzVfUHJhdGlxdWVzX2V0X3Byb2NfZHVyZXNfZGVfbmF2aWdhdGlvbl9GUl9FTi5wZGYiXV0/5%20-%20Pratiques%20et%20proc%C3%A9dures%20de%20navigation%20-%20FR%20EN.pdf

prohibited. These measures will be publicized via a Notice to Shipping disseminated by MCTS.

Recommendation 41

Based on simulations conducted for the mouth of Saint-Charles River, and as recommended by the pilots, the TRC members recommend that the QPA review the parameters for suspension of berthing and unberthing operations based on the wind speed.

3.3.4.7. NAVIGATIONAL AIDS AT THE NEW FACILITIES

Finding 30

The simulations conducted at the Maritime Simulation and Resource Centre were all conducted during the day and in good visibility conditions. The need for lighted navigational aids was not mentioned in either the Centre's report or the studies submitted by the QPA.

Recommendation 42

The TRC members recommend that the necessary navigational aids be installed for the new facilities, as applicable.

Recommendation 43

The TRC members recommend that the Canadian Hydrographic Service (CHS) include the new facilities, including navigational aids, in its publications.

3.3.5. CARGO TRANSSHIPMENT AND TRANSFER SYSTEMS

3.3.5.1. LIQUID BULK CARGO TRANSSHIPMENT PIPELINES

The document "Liste des lignes," number 615534-0000-46EL-0001, prepared by SNC-Lavalin and submitted by the QPA, details the characteristics of the hoses and pipelines on the grounds of the new facilities.

The studies submitted by the QPA for the new facilities cover the pipeline arrangements on the site. The "Compte-rendu de réunion"[44] prepared by SNC-Lavalin highlights the following elements:

- Provide access for inspection, maintenance, and pipeline repair;
- Plan enough space for welding work;
- Plan for future insulation of uninsulated pipes;
- Plan a minimum of 6 inches of space between uninsulated pipes; and
- Use 3D to 5D elbows preferentially (bend radius 3 to 5 times the diameter of the line).

[44] Document submitted by the QPA in the appendices: SNC-Lavalin, "Compte-rendu de réunion," document No. 615534-40MB-I-0001, November 25, 2013.

With regard to engineering, for the pipelines, the plans submitted state that:

> the following pipes are planned:
>
> - two DN 500 (20-inch) steel pipes that will be insulated and equipped with heater cables
> - three DN 250 (10-inch) stainless steel (316) pipes that will be insulated and equipped with heater cables
> - two DN 300 (12-inch) steel pipes
> - two DN 250 (10-inch) steel pipes[45]

Finding 31

All of the data submitted on the cargo pipelines and hoses connecting the vessel to the marine terminal is related to phase 2 of the Project, i.e., the dolphin jetty.

Recommendation 44

With respect to the transshipment hoses connecting the berth and the tankers of the shore facilities, the TRC members recommend that the QPA use the appropriate standards.

3.3.5.2. TRANSFER RATE OF CARGO PUMPS

The documents submitted illustrate that the transshipment network is designed for a pressure of 10 bars (150 psi).

On the lines, "the planned transfer rates are as follows:

- DN N750 – 20,000 barrels/hour (3,180 m³/h)
- DN 500 – 10,000 barrels/hour (1,590 m³/h)
- DN 300 – 7,000 barrels/hour (1,113 m^3/h)
- DN 250 (steel) – 6,000 barrels/hour (954 m^3/h)
- DN 250 (stainless) – 6,000 barrels/hour (954 m^3/h)"[46]

Finding 32

All of the data submitted on the cargo pumps and hoses connecting the vessel to the marine terminal is related to phase 2 of the Project, i.e., the dolphin jetty.

Recommendation 45

With respect to the cargo pumps connecting the berth and the tankers of the shore facilities, the TRC members recommend that the QPA use the appropriate standards.

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[45] Study submitted by the QPA, section 3.11, "Système de transbordement et de transfert de cargaison," p. 137. Translated by Transport Canada.

[46] Study submitted by the QPA, section 3.11, "Système de transbordement et de transfert de cargaison," p. 138. Translated by Transport Canada.

3.3.5.3. CARGO LOADING ARMS

As stated in the documents submitted by the QPA, six loading arms are planned for the dolphin jetty with four flexible hoses supported by a steel structure for unloading chemical products.

> The general preliminary arrangements for the transshipment systems and the pipelines are shown in drawings 615534-1000-46D3-0002 and 0003 in Appendix 2.3.
>
> The transshipment systems must include but are not limited to the following:
>
> - Pig launcher/receiver systems
> - Sampling systems
> - Control building
> - Loading arm control systems
> - Automatic disconnection system and isolation of loading arm
> - Flexible hoses
> - Vapour recovery hoses[47]

The arms are operated from a control panel situated on the platform or from a portable radio control. Connection is done automatically, with no need for hand tightening.

The QPA plans to install loading arms equipped with two counterweights to provide better equilibrium, particularly when there is great tidal variation.

The loading arms are equipped with an emergency release system. The valves will automatically close when the loading arms exceed their operational envelope.

Finding 33

With regard to connections, collectors, loading arms and alarms, the documents as submitted discuss only the facilities planned for the dolphin jetty.

Recommendation 46

The TRC members recommend the QPA to list the equipment to be installed at the 50s line (sections 50 to 53 and the sections that will be added) for the new facilities, and ensure that this equipment meets industry standards, particularly in terms of cargo manifolds, loading arm connections, their number, size, height, operational envelope and alarms.

3.3.5.4. ELECTRICAL DISCONTINUITY ARRANGEMENTS

The documents submitted by the QPA do not explain the procedures to be followed with regard to the equipment or the method by which electrical discontinuity will be ensured between tankers and the terminal.

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[47] Study submitted by the QPA, section 3.11, "Système de transbordement et de transfert de cargaison," p. 136. Translated by Transport Canada.

Finding 34

As a reminder, TC issued a Ship Safety Bulletin (17/1998)[48] *on the use of the ship/shore bonding cable by terminal. This bulletin recommends discontinuing this practice:*

> *Both the "Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas" published by the International Maritime Organization (IMO) and the "International Safety Guide for Oil Tankers and Terminals" or ISGOTT as it is now known, discourage the use of bonding cables.*[49]

Recommendation 47

With respect to electrical discontinuity between the vessel and the terminal, the TRC members recommend that industry practices be applied; they stipulate that:

> *Due to possible differences in electrical potential between the tanker and the berth, there is a risk of electrical arcing at the manifold during connection and disconnection of the shore hose or loading arm. To protect against this risk, there should be a means of electrical isolation at the tanker/shore interface. This should be provided by the terminal.*[50]

3.3.5.5. PURGING, VENTING AND INERTING OF CARGO LINES

According to the documents submitted by the QPA, a DN 100 pipe is required to clean the pipelines using pigs with nitrogen at a pressure of 150 psi.

However, the two DN 500 (20 inch) pipelines can stay full even if there is no vessel at the wharf.

The documents also state that no vapour recovery system (VRS) will be installed by the QPA. Elsewhere in Section 3.15.5,[51] it is stated that a VRS line will be installed at the dolphin jetty.

Finding 35

Upon reviewing the documents submitted, a vapour collection line is planned. However, it is not clear if this will be installed at wharf 54 and who will install it.

Recommendation 48

The TRC members recommend that the QPA install a vapour collection line at wharf 54 in accordance with industry standards.

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[48] Ship Safety Bulletin 17/1998 https://www.tc.gc.ca/eng/marinesafety/bulletins-1998-17-eng.htm.

[49] Ship Safety Bulletin 17/1998 https://www.tc.gc.ca/eng/marinesafety/bulletins-1998-17-eng.htm.

[50] CCNR/OCIMF International Safety Guide for Inland Navigation Tank-barges and Terminals, Terminal Equipment and Systems, 2010. Chapter 17, "Terminal Systems and Equipment," p. 257.

[51] Study submitted by the QPA, section 3.15. "Étude sur les risques et la réduction des risques," p. 197.

3.3.5.6. ALARMS, DETECTION AND SAMPLING

With regard to instrumentation systems and pipelines, the QPA submitted the following documents to illustrate the various detectors and alarms on the grounds of the new facilities:

- "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Procédé," Drawing No. 615534-1000-46D1-0001-00, 2014
- "Quai de transbordement de liquides en vrac. Diagramme d'instrumentation et de tuyauterie. Procédé et services," Drawing No. 615534-1000-46D1-0002-00, 2014

Finding 36

The documents submitted deal only with the facilities at the dolphin jetty.

Recommendation 49

The TRC members recommend that the QPA produce a detailed plan of the mooring areas of the new facilities showing:

- *location of the temperature sensors*
- *related alarm systems*
- *number of gas alarms*
- *alarm sensitivity*
- *continuous or intermittent sampling*

3.3.5.7. MONITORING SYSTEMS

A control room is planned as part of the facilities expansion in order to monitor all terminal operations, including transshipment activities. The documents submitted briefly describe this room.

Finding 37

With regard to the surveillance and alarm systems, the documents submitted deal only with the dolphin jetty facilities.

Recommendation 50

The TRC members recommend that the QPA develop a detailed plan of the control room for the new facilities, highlighting:

- *surveillance systems*
- *visual and audible alarms*
- *main controls*
- *any other systems or equipment*

3.3.5.8. ACCESS TO VESSEL DURING TRANSFER OPERATIONS

According to the documents submitted by the QPA and current procedures, access to the wharves is controlled by barriers activated remotely or by a swipe card. Access management will be ensured by the QPA or the marine operator.

Finding 38

Since July 1, 2004, access to vessels and marine facilities have been governed by the Marine Transportation Security Regulations *(SOR/2004-144).*[52]

Recommendation 51

The TRC members recommend that procedures for accessing the vessel during transfer operations be prescribed in the security plan to be developed, taking into consideration current policies and procedures at the port.

3.3.5.9. PRE-CARGO TRANSFER CIRCULATION TEST

Finding 39

The documents as submitted do not deal with pre-cargo transfer circulation tests.

Recommendation 52

The TRC members recommend that the QPA ensure that a procedure for pre-cargo transfer circulation tests is developed.

3.3.5.10. VESSEL MAINTENANCE AND SHIP'S SUPPLIES

According to the documents submitted by the QPA, no pipeline is required for bunkering (fuel filling for vessels), because, according to the QPA, the requests from vessels do not justify the additional costs associated with such a system. However, an area will be reserved later on for a future line if there is ever enough demand.

All operations related to repairs on board vessels berthed at the new facilities must be authorized beforehand by port management.

Finding 40

Delivery of vessels' supplies, like access to vessels and port facilities, is governed by the Marine Transportation Security Regulations.[53] *Under these Regulations, the operator of the new facilities must develop a security plan for the new facilities and include security procedures for delivery of ships' stores and bunkers for each MARSEC level.*

3.3.5.11. BALLAST WATER RECEPTION FACILITIES

According to the documents submitted, the QPA does not plan to have reception facilities for ballast water at its new infrastructure.

Under the *Ballast Water Control and Management Regulations* (SOR/2011-237), "ballast water is managed if one or more of the following management processes are employed:

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[52] Marine Transportation Security Regulations (SOR/2004-144), sections 236 and 325.

[53] Marine Transportation Security Regulations (SOR/2004-144), sections 248 and 338.

a) the ballast water is exchanged;
b) the ballast water is treated;
c) the ballast water or any sediment that has settled out of it in the vessel's tanks is transferred to a reception facility; and
d) the ballast water is retained on board the vessel."[54]

Recommendation 53

For berthed vessels, the TRC members recommend that the QPA ensure that a ballast water management service is available as needed.

3.3.5.12. TANK WASHING RESIDUE RECEPTION FACILITIES

According to the documents submitted, chemical cargoes will be transferred via stainless steel pipelines.

Finding 41

Depending on the cargo to be loaded, oil tankers often need to wash their cargo tanks and therefore discharge contaminated washings to be treated ashore.

Recommendation 54

The TRC members recommend that the QPA develop washing procedures for tankers transporting chemicals as well as procedures for managing these washings within its facilities.

3.3.5.13. SPECIAL ARRANGEMENTS

According to the documents submitted, the QPA is unable to provide an exhaustive list of the cargo to be handled at the new facilities, given that the operators are not yet known.

Recommendation 55

The TRC members recommend that the QPA list the cargoes to be handled at its new facilities (once known) and follow the respective safety procedures.

[54] Ballast Water Control and Management Regulations (SOR/2011-237), section 4.

3.4. RISK ASSESSMENT AND CONTINGENCY PLANNING

3.4.1. ANALYSIS OF TSB ACCIDENT DATA

The TSB provides the following definitions in its statistics:

Marine Occurrence

a) any accident or incident associated with the operation of a ship and
b) any situation or condition that the Board has reasonable grounds to believe could, if left unattended, induce an accident or incident described in paragraph a) above.

Reportable Marine Accident

An accident resulting directly from the operation of a ship other than a pleasure craft, where

a. a person sustains a serious injury or is killed as a result of
    i) being on board the ship or falling overboard from the ship, or
    ii) coming into contact with any part of the ship or its contents, or
b. the ship
    i) sinks, founders or capsizes,
    ii) is involved in a collision (which includes collisions, strikings and contacts),
    iii) sustains a fire or an explosion,
    iv) goes aground,
    v) sustains damage that affects its seaworthiness or renders it unfit for its purpose, or
    vi) is missing or abandoned.[55]

[55] Transportation Safety Board of Canada, *Statistical Summary Marine Occurrences 2013* (2014), p. 17 http://tsb.gc.ca/eng/stats/marine/2013/ssem-ssmo-2013.pdf.

The TSB published a statistical summary of marine occurrences between 2004 and 2013:

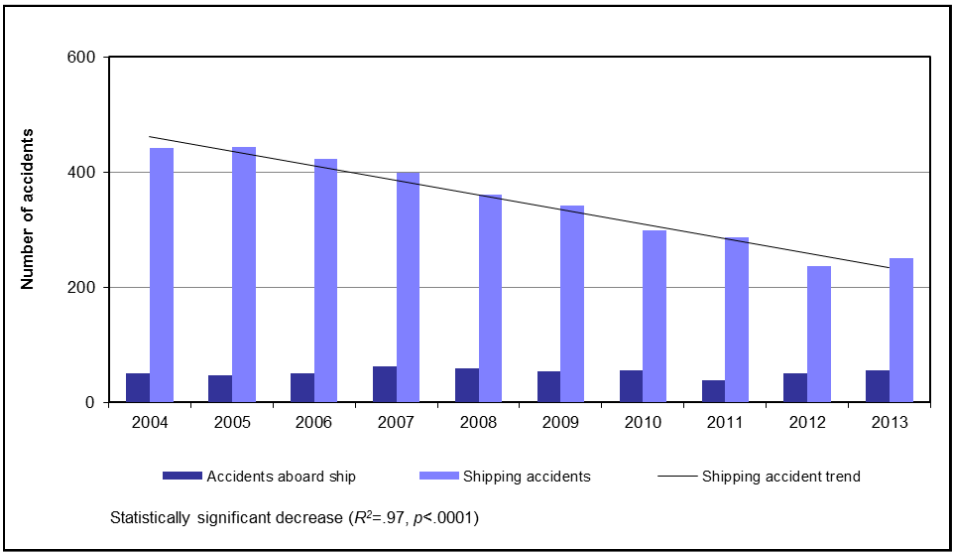

Figure 8: Accidents aboard ship and shipping accidents, 2004–2013[56]

According to this data,[57] a significant decrease in accidents aboard ship and shipping accidents was observed for this period.

The table below gives an overview of shipping accidents by vessel type for the same period.

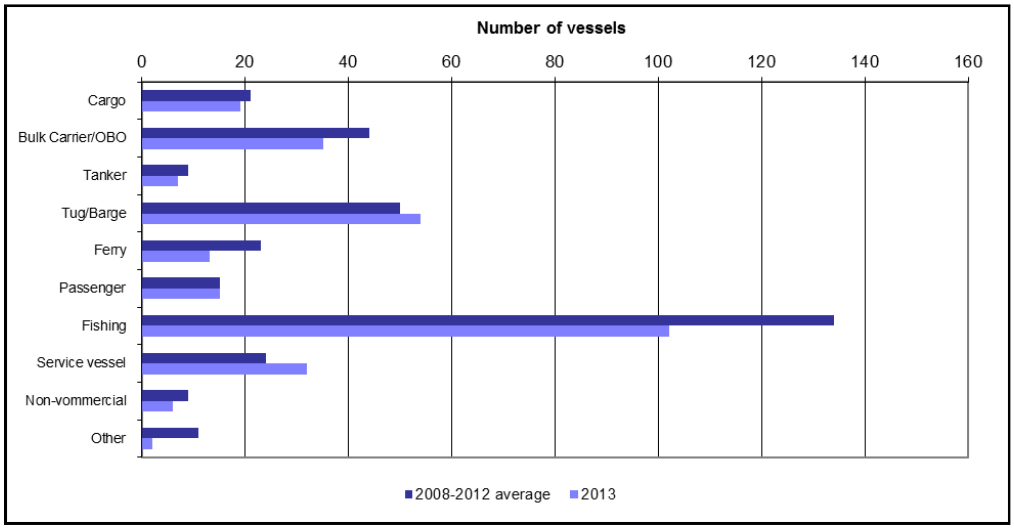

Figure 9: Shipping accidents by vessel type[58]

[56] Transportation Safety Board of Canada, *Statistical Summary, Marine Occurrences 2013* (2014), p. 4 http://tsb.gc.ca/eng/stats/marine/2013/ssem-ssmo-2013.pdf.

[57] Transportation Safety Board of Canada, *Statistical Summary, Marine Occurrences 2013* (2014), p. 4 http://tsb.gc.ca/eng/stats/marine/2013/ssem-ssmo-2013.pdf.

[58] Transportation Safety Board of Canada, *Statistical Summary, Marine Occurrences 2013* (2014), p. 6 http://tsb.gc.ca/eng/stats/marine/2013/ssem-ssmo-2013.pdf.

Finding 42

For the specified period, the number of accidents involving tankers in Canadian waters is very low compared with other types of vessels.

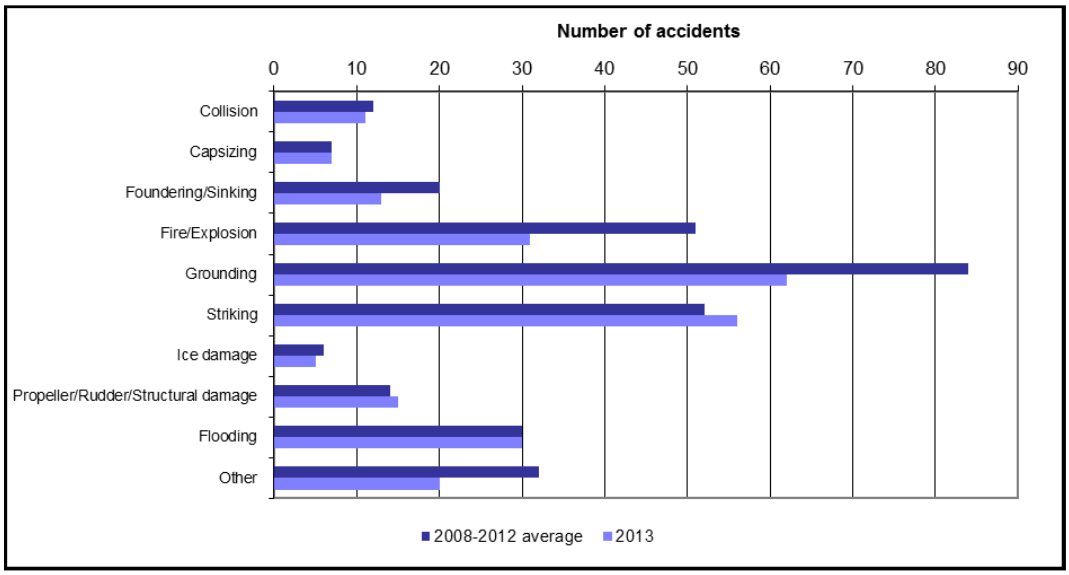

Figure 10: Shipping accidents by accident type[59]

According to the table above, grounding (25%), striking (22%), fire/explosion (12%) and flooding (12%) are the most frequent types of shipping accidents.

Finding 43

Regardless of vessel type, in restricted waters, shipping accidents are often caused by human error. Thus, inattention may lead to a technical malfunction, grounding or collision.

3.4.2. DNV-GL ACCIDENT DATA ANALYSIS

As part of the Project to expand the facilities at the Port of Québec, the QPA tasked DNV-GL with performing studies[60] on accident data[61] (refer to documents submitted in Appendix 2).

[59] Transportation Safety Board of Canada, *Statistical Summary Marine Occurrences 2013* (2014), p. 6 http://tsb.gc.ca/eng/stats/marine/2013/ssem-ssmo-2013.pdf.

[60] Study submitted by the QPA, in appendix: DNV-GL, "Termpol 3.8 Casualty Study, New Port Infrastructure Risk Analysis Liquid Bulk Terminal," November 5, 2014.

[61] In this section, the report uses the terms "accident" and "incident" according to the definitions provided by each organization that provided data.

The incidents are categorized as follows:

- **Total loss**

  The vessel sank following the incident or was declared a total loss because the costs associated with repairing it would exceed its market value.

- **Major incident**

  Any failure or damage sustained on board requiring a tow or outside assistance: examples include flooding, structural failure, and mechanical or electrical failure requiring major repairs before operations can continue. In this context, major incidents do not lead to a total loss.

- **Minor incident**

  Any incident not categorized as a total loss or major incident.

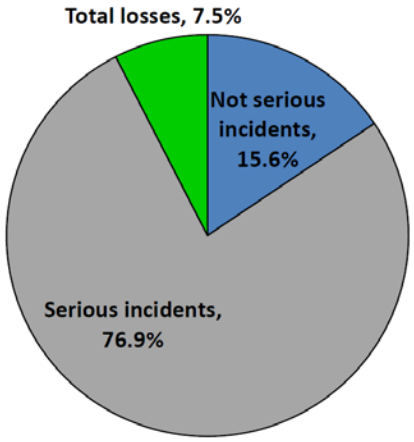

Figure 11: Categories of incidents 2002–2011, IHS database[62]

DNV-GL identifies the following risks in its study:

- Ship-ship collision
- Powered grounding (groundings which occur while the ship has the ability to navigate safely)
- Drift grounding (groundings which occur when the ship is unable to navigate safely due to mechanical failure)
- Structural failure / foundering whilst underway
- Fire / explosion whilst underway
- Powered ship collision with fixed marine structures (platforms or wind turbines)
- Drifting ship collision with fixed marine structures[63]

[62] Study submitted by the QPA, in appendix: DNV-GL, "Termpol 3.8 Casualty Study, New Port Infrastructure Risk Analysis Liquid Bulk Terminal," November 5, 2014, p. 4.

[63] Study submitted by the QPA, in appendix: DNV-GL, "Termpol 3.8 Casualty Study, New Port Infrastructure Risk Analysis Liquid Bulk Terminal," November 5, 2014, p. 6.

3.4.2.1. PROBABILITY OF ACCIDENTS

According to the studies performed by DNV-GL and submitted by the QPA, worldwide, for every 1,000 tankers, 16 incidents were reported for all categories. This corresponds to one incident per vessel every 62.5 years.[64]

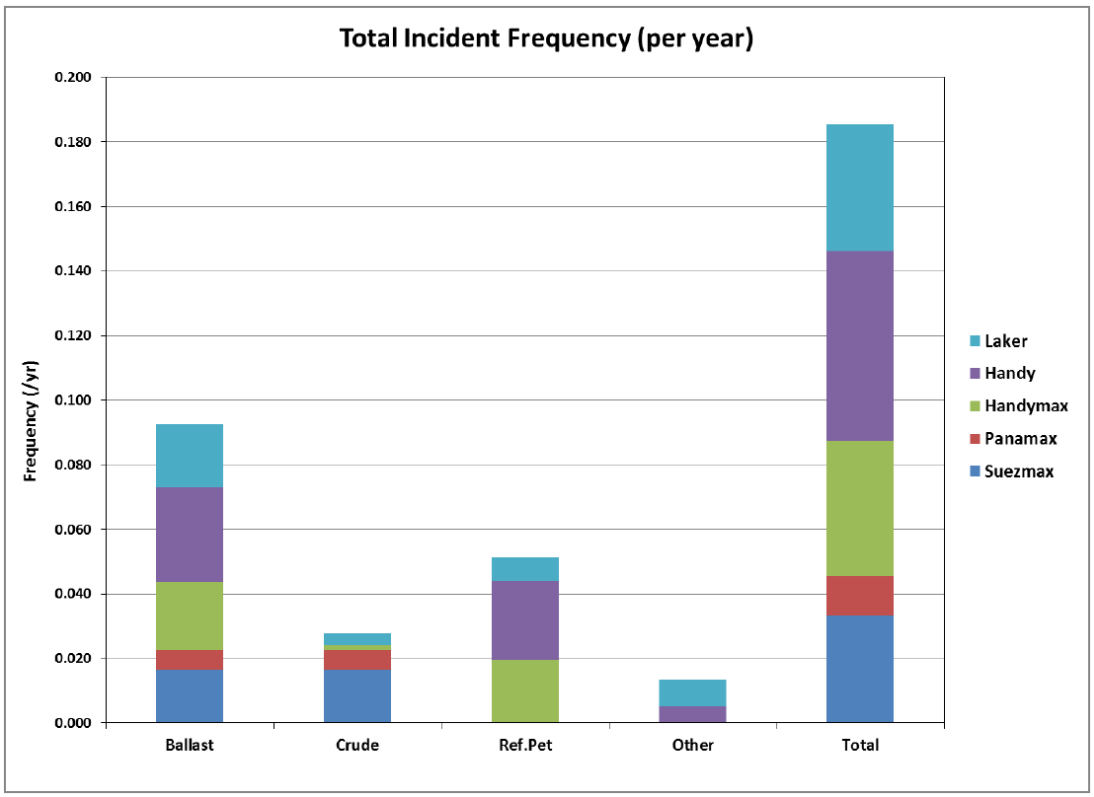

Figure 12: Total Incident Frequency (incidents/year)[65]

As part of the TERMPOL process, according to DNV-GL, the annual frequency of incidents would be 0.185 for all vessels expected at the new facilities. For vessels loaded with crude oil, the annual frequency is reduced to 0.0278, and for refined oil products, the frequency is only 0.0515.

3.4.2.2. ACCIDENT SCENARIOS

The documents submitted by the QPA as part of the TERMPOL review process cover the following accident scenarios:

- collision
- grounding
- collision between a vessel and a fixed object

[64] It is 64 years according to the document submitted by the QPA: DNV-GL, "Termpol 3.8 Casualty Study, New Port Infrastructure Risk Analysis Liquid Bulk Terminal," November 5, 2014, p. 3.

[65] Study submitted by the QPA, ia appendix: DNV-GL, "Termpol Study Report: Element 3.15 Risk Assessment," July 17, 2014, p. 38.

- incident related to improper transfer of cargo
- fire or explosion

3.4.2.3. FREQUENCY OF ACCIDENTS

The studies were performed by DNV-GL using the Safeco MARCS[66] method to determine the ratio of predicted accident frequency.

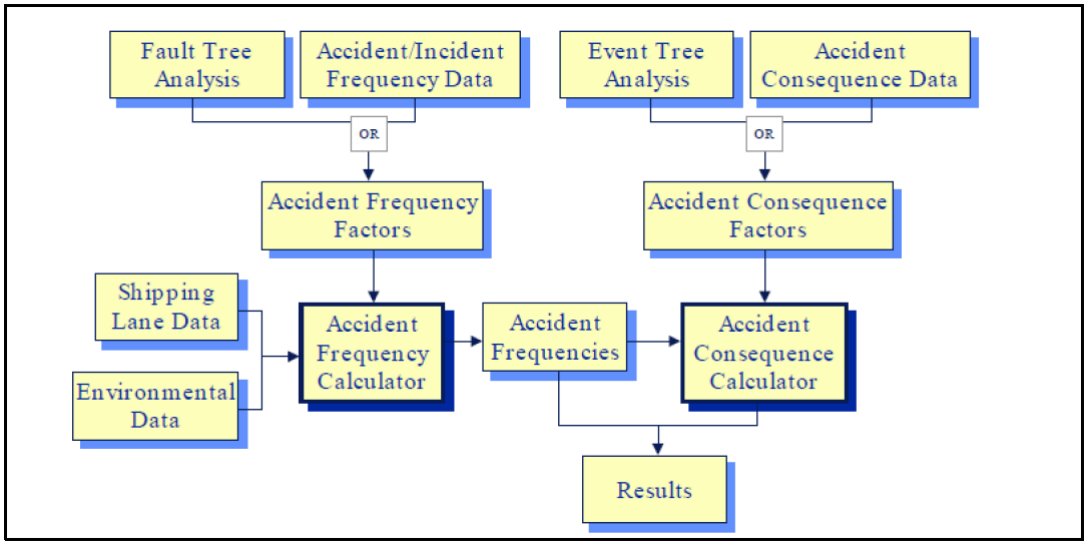

Figure 13: Block Diagram of MARCS[67]

Finding 44

The TRC members are of the view that the surveys presented reflect the downward trend of marine accidents as observed in the TSB statistics.

3.4.3. VULNERABILITY OF DESIGN VESSEL

In the area as defined, as part of the TERMPOL process, the presumed vulnerabilities of the design vessel can be summarized as follows:

- collision
- structural failure / foundering
- fire/explosion
- powered grounding
- drift grounding

To establish the annual frequency of incidents for each accident category, in its studies DNV-GL divided the area into two routes as follows:

- Northeast bound*:* vessels proceeding upbound to Quebec City or downbound from Quebec City

[66] Marine Accident Risk Calculation System.

[67] Annex A of DNV-GL Termpol Study Report: Element 3.15 Risk Assessment, July 17, 2014, p. 4.

- Southwest bound: vessels proceeding upbound from Quebec City or downbound toward Quebec City

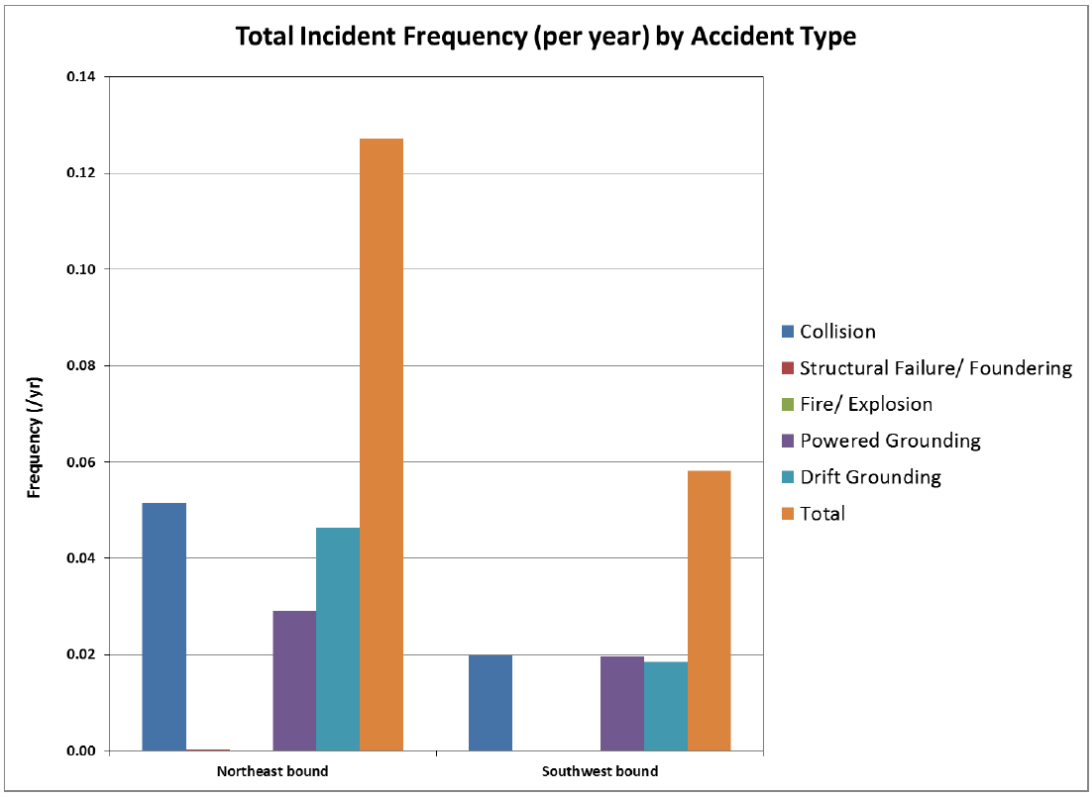

Figure 14: Total Incident frequency (per year) by Accident Type[68]

As per DNV-GL data[69], the table below shows the annual frequency of accidents for current and future traffic, as anticipated (refer to figure above).

	Northeast bound		***Southwest bound***	
	Per year	***Return period***	***Per year***	***Return period***
Powered grounding	0.0291	34.36 years	0.0196	51.02 years
Drift grounding	0.0463	21.60 years	0.0185	54.05 years
Collision	0.0515	19.42 years	0.0199	50.25 years

Recommendation 56

If a new category of vessel is considered, the TRC members recommend that the QPA analyze the risks and identify mitigation methods.

3.4.3.1. RISK INDEX

According to the documents submitted by the QPA, the risk index on the population in the coastal areas along the planned route will not change significantly.

[68] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 40.

[69] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 40.

Finding 45

The surveys submitted do not specifically address the risk index at the berth and the adjacent area.

Generally speaking, the risk index is the product of three factors:

$$RI = P \times S \times E$$

RI = Risk index
P = Probability
S = Severity
E = Exposure

Recommendation 57

The TRC members recommend that the QPA analyze the probabilities of an incident and perceived risks associated with the berth at the terminal and the adjacent area.

Recommendation 58

The TRC members also recommend that the QPA analyze the probabilities of an incident and perceived risks associated with the marine environment, fish and wildlife habitat and submit the results to the Canadian Environmental Assessment Agency.

3.4.3.2. RISK ASSESSMENT

The QPA tasked DNV-GL with analyzing and assessing risks. DNV-GL produced a document entitled "Risk Assessment,"[70] which was submitted for the TRP.

3.4.3.3. NAVIGATION AND OPERATING PROBABILITIES OF INCIDENTS

The table below, provided by DNV-GL, illustrates the risk of spills for each type of accident.

Accident Type	Northeast Bound to Québec	Northeast Bound from Québec	Southwest Bound to Québec	Southwest Bound from Québec
Collision	4.32	13.49	2.65	0.82
Structural failure / foundering	0.07	0.23	0.05	0.01
Fire/explosion	0.17	0.55	0.11	0.03
Powered grounding	0.29	0.91	0.18	0.06
Drift grounding	0.57	1.79	0.17	0.05

[70] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014.

Total	**5.43**	**16.96**	**3.15**	**0.98**

Table 1: Spill Risk (tons/year) by Accident Type[71]

Finding 46

As presented by the QPA, the safety levels and standards applicable to vessels that will use the new port facilities are equivalent to those applicable to vessels transporting liquid bulk cargo and currently transiting on the St. Lawrence River.

Recommendation 59

In the event that a new vessel category is introduced, the TRC members recommend that the QPA assess the probabilities of incidents which may result in the breaching of the vessel's cargo containment system. They also recommend analyzing the risks associated with the navigational and operational procedures specific to this type of vessel.

Recommendation 60

Moreover, the TRC recommends that the same risk assessment be carried out if dangerous goods are shipped through the new facilities.

3.4.3.4. CARGO TRANSFERT INCIDENT PROBABILITY

The studies submitted by the QPA as part of the TRP illustrate the risk of minor and major incidents related to the transfer of cargo.

Cause	Frequency of release per operation	Return period
Failure of arm	7.65^{E-05}	13,072
Failure of quick release connection	7.65^{E-06}	130,719
Failure of the vessel's pipework	8.10^{E-06}	123,457
Operator error	8.10^{E-06}	123,457
Mooring fault	9.00^{E-07}	1,111,111

Table 2: Frequency and Return Period of Cargo Release Incidents per Loading Operation [72]

The table below illustrates the frequency of accidental spills for each year of operation based on 241 operations broken down as follows:

- 62 vessels transporting crude oil (26%)
- 123 vessels transporting refined oil products (51%)
- 56 vessels transporting other products (23%)

[71] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 56.

[72] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 45.

Cause	Return period of any product release	Return period of crude oil release	Return period of refined petroleum product release	Return period of other product release
Failure of arm	54	211	106	233
Failure of quick release connection	542	2,108	1,063	2,334
Failure of ship's pipework	512	1,991	1,004	2,205
Operator error	512	1,991	1,004	2,205
Mooring fault	4,610	17,921	9,033	19,841

Table 3: Return Period of Accidental Cargo Release Incidents for Expected Product Operations[73]

Finding 47

The risk analysis conducted by DNV-GL addressed vessels arriving at or departing from the dolphin jetty.

Finding 48

Based on the changes made to the Project, the number of expected vessels was lowered to 150 per year. The risk analysis identified 241 vessels.

Finding 49

Given the changes made to the Project and the overestimation of the risk based on the initial Project, the TRC members find that the risk analysis as conducted meets the needs of phase 1.

3.4.3.5. RISK OF AN INCIDENT BECOMING "UNCONTROLLABLE"

Currently, in the area defined in the TRP, pilotage is compulsory and all oil tankers are double-hulled and compartmentalized. The cargo capacity is divided into tanks separated by watertight bulkheads.

These vessels are subject to rigorous inspection programs by authorities, classification societies and shippers.

Under section 168 of the CSA 2001, the operator of an oil handling facility of a prescribed class shall have an arrangement with a response organization.

[73] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 46.

Finding 50

In the area defined for the TRP and based on the elements cited above, the risk that an incident becomes uncontrollable is minimal.

3.4.4. RISK MITIGATION

Risk mitigation measures cited in the documents submitted by the QPA include

- pilotage services
- marine communications and traffic services
- tug escorts
- navigational aids on the defined route
- vetting inspections

Recommendation 61

With respect to risk mitigation and under the provisions of TP 743 E (2001), the TRC members recommend that the QPA establish the following procedures:

- *implement a safe operational system and develop a proactive pollution prevention program;*
- *schedule, if applicable, liquefied gas or chemical carrier movements through congested coastal waters to coincide, if possible, with periods when traffic is normally at a minimum;*
- *impose limiting environmental or climatic requirements for vessels loaded with pollutant or hazardous cargoes when navigational safety within the terminal zone is an issue;*
- *use tug escorts;*
- *implement prudent berthing procedures and optimal tug assistance;*
- *employ an energy absorbing protective barrier when alongside the terminal;*
- *keep sufficient crew onboard at all times while a vessel is transferring hazardous cargoes so that the vessel is capable of getting under way at short notice;*
- *moor a vessel transferring hazardous cargoes bow seaward when the terminal berth is located in a narrow arm of water so that in an emergency, the vessel can proceed seaward without delay and without the aid of tugs;*
- *implement standardized cargo transfer system inspections and safety-oriented cargo transfer operations;*
- *promulgate standardized safety and cargo transfer procedures by means of port information publications designed to inform crews of vessels serving the proposed marine terminal. The procedures should include specified upper climatic limits for berthing operations, for stopping cargo transfer operations, and for vacating the berth;*
- *restrict the venting of significant quantities of flammable or poisonous gases to the atmosphere;*
- *provide appropriate reception facilities at chemical and oil terminals;*

- *if applicable, schedule the bunkering and provisioning of vessels transferring hazardous cargoes at a time that does not conflict with the maintenance of vessel and personnel safety during cargo transfer operations;*
- *control the access of visitors while the vessel is alongside the dock;*
- *develop and implement an effective contingency plan for the marine terminal system and the regular exercise of selected procedures described in the plan;*
- *adopt procedures which conform to internationally recognized safe management practices as implemented through IMO resolutions, ISM and/or ISO standards; and*
- *ensure that vessels chartered by the operator comply with the applicable standards.*

3.4.5. CONTINGENCY PLAN

Currently, the Port of Québec has contingency and security plans for its existing facilities and activities, but no contingency plan was submitted for the new facilities.

Recommendation 62

Given the complexity of implementing contingency plans, the TRP members recommend that the QPA ensure that the plans are developed in collaboration with stakeholders, and also ensure that they are in line with all municipal, provincial and federal incident management plans and structures.

Recommendation 63

The TRC members recommend that the contingency plan for the new facilities cover the following points:[74]

- *incidents involving the release of cargo(es)*
- *fire and explosions*
- *operations monitoring systems*
- *terminal-vessel communications*
- *inspection, testing and preventive maintenance procedures*
- *cargo handling precautions applicable to the vessel*
- *neutralizing electrical hazards*
- *detection and alarm systems at the vessel berth*
- *emergency shutdown of cargo transfer operations*
- *emergency response to incidents involving discharge of pollutants*
- *countermeasures to reduce, contain or neutralize the negative effects of a discharge*
- *description of emergency equipment for personnel proposed for the berth area*
- *terminal evacuation procedures*
- *emergency procedures requiring the vessel to evacuate the berth*

When there is a vessel alongside the dock, the plan should cover the following:

- *fire on board*
- *releases resulting in structural damage and/or injury to personnel*
- *equipment malfunctions*

[74] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2001, p. 40-41 (part 3-19).

- *improper cargo transfer*
- *rapidly deteriorating weather or ice conditions that require the vessel to leave the berth*
- *grounding or collision at or near the berth*
- *fires on dockside, pipelines in the immediate vicinity of the berth and the tank farm*
- *any other emergency situation at the terminal*

Recommendation 64

In addition to the points cited above, the TRC members recommend that the QPA take the following factors into account when developing contingency plan scenarios:

a) the nature of the oil product in respect of which the scenario is developed;
b) the types of ships that are loaded or unloaded at the facility;
c) the tides and currents that prevail at the facility;
d) the meteorological conditions that prevail at the facility;
e) the surrounding areas of environmental sensitivities that would likely be affected by an oil spill;
f) the measures that will be implemented to minimize an oil pollution incident; and
g) the time within which an effective response to an oil pollution incident can be carried out.[75]

Recommendation 65

The TRC members also recommend that the QPA take the following priorities into account during a pollution incident response:

a) the safety of the facility's personnel;
b) the safety of the facility;
c) the safety of the communities living adjacent to the facility;
d) the prevention of fire and explosion;
e) the minimization of the oil pollution incident;
f) the notification and reporting of the oil pollution incident;
g) the environmental impact of the oil pollution incident; and
h) the requirements for cleaning up the oil pollution incident.[76]

Recommendation 66

The TRC members recommend that the QPA develop a Port operation continuity plan that would be included as an annex to the contingency plan.

[75] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

[76] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

3.5. PREPARATION AND SPILL RESPONSE

Along the St. Lawrence River and in the area defined under this process, the risk of pollution following these previously mentioned occurrences must be taken into consideration:

- collision
- structural failure / foundering
- fire / explosion
- powered grounding
- drift grounding

The figure below provided by DNV-GL illustrates the annual frequency of occurrences of accidental pollution from cargo.

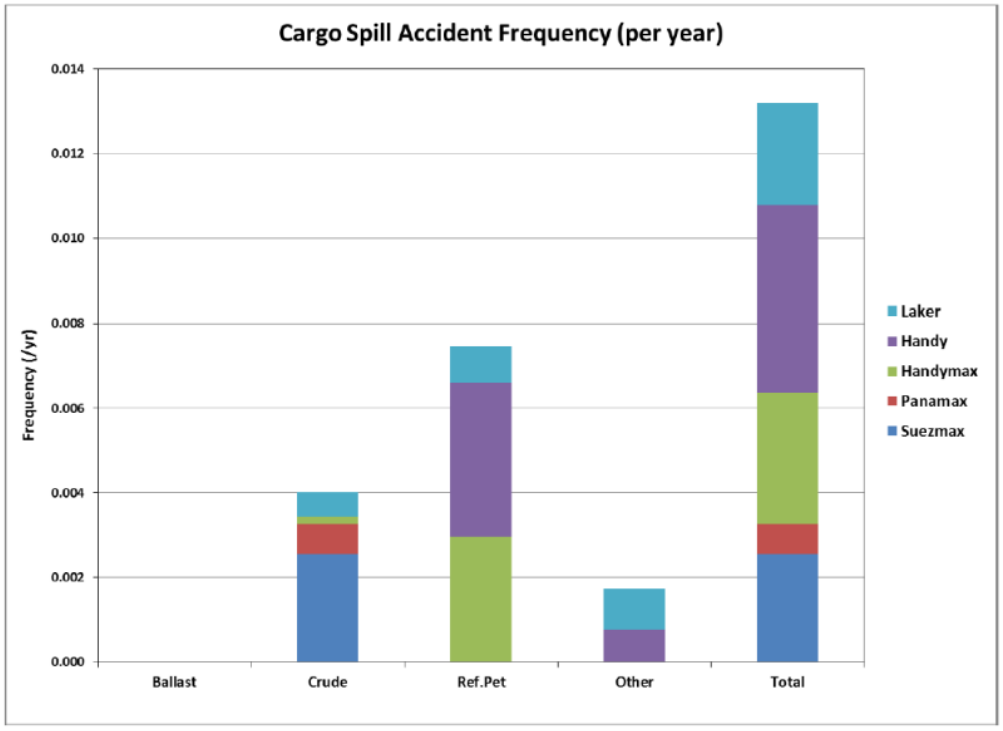

Figure 15: Cargo Spill Accident Frequency (per year)[77]

For the area as defined, the annual frequency of spills is 0.0132 broken down as follows:

- 0.00401 for tankers transporting crude oil
- 0.00747 for tankers transporting refined products
- 0.00172 for other tankers

3.5.1. OIL SPILLS

The documents submitted outline the risk of oil cargo spills according to the following worst-case scenarios with the associated results:

[77] DNV-GL, Termpol Study Report, Element 3.15 “Risk Assessment,” July 17, 2014, p. 42.

Spill of 28,000 m^3 of heavy crude oil at the Traverse du Nord:

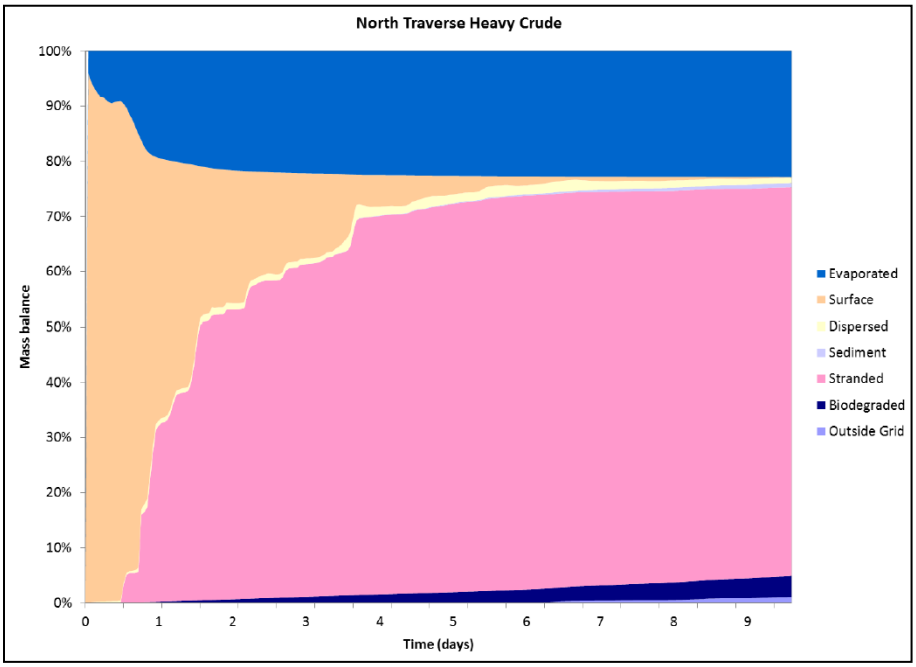

Figure 16: Mass Balance of Oil Over Time for a Heavy Crude Oil Spill in the North Traverse[78]

Spill of 28,000 m^3 of heavy crude oil near the terminal:

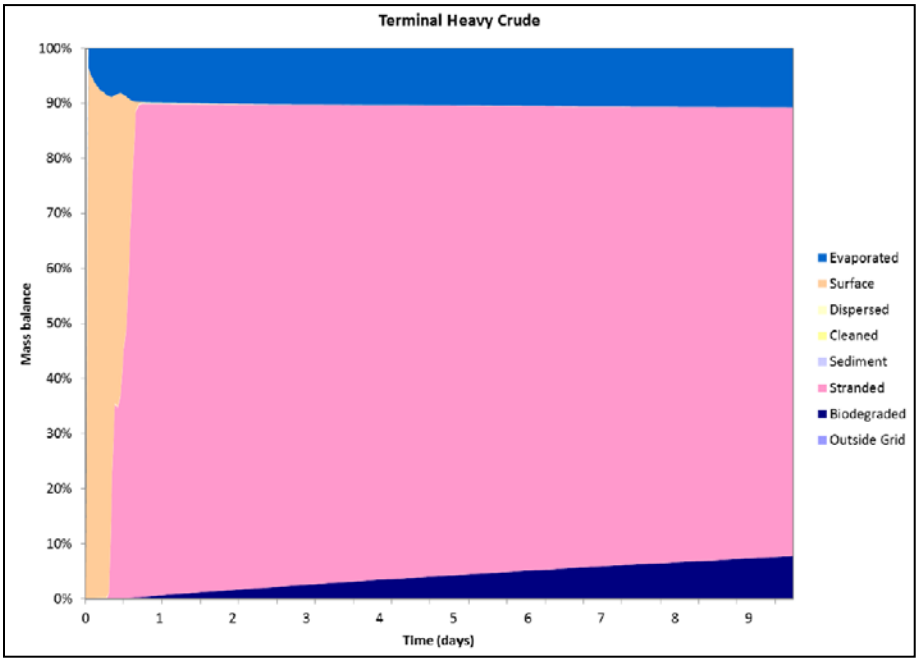

Figure 17: Mass Balance of Oil Over Time for a Heavy Crude Oil Spill Close to the Terminal[79]

[78] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 70.

[79] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 66.

Spill of 28,000 m^3 of light crude oil at the Traverse du Nord:

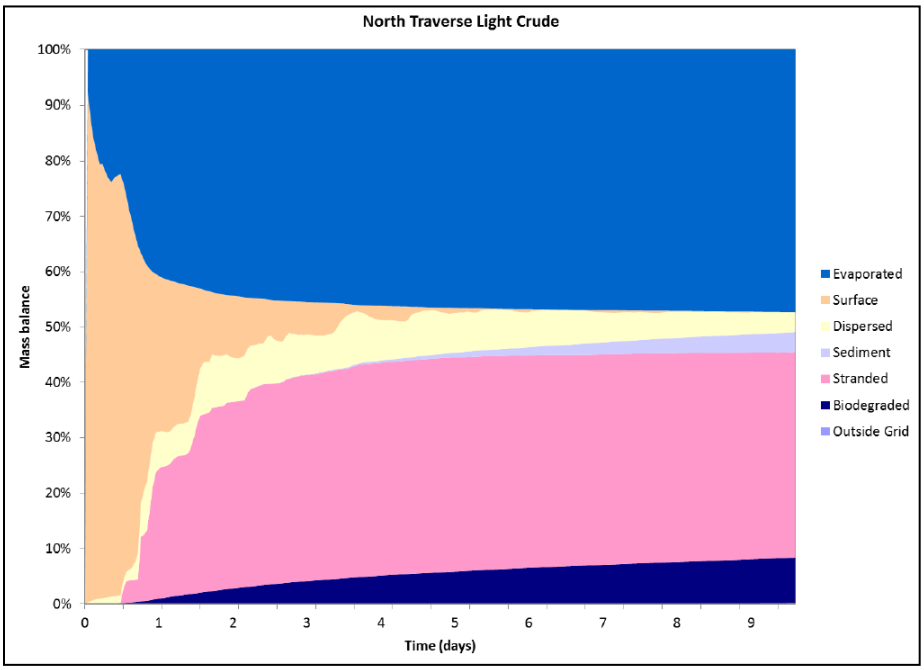

Figure 18: Mass Balance of Oil Over Time for a Light Crude Oil Spill in the North Traverse[80]

Spill of 28,000 m^3 of light crude oil near the terminal:

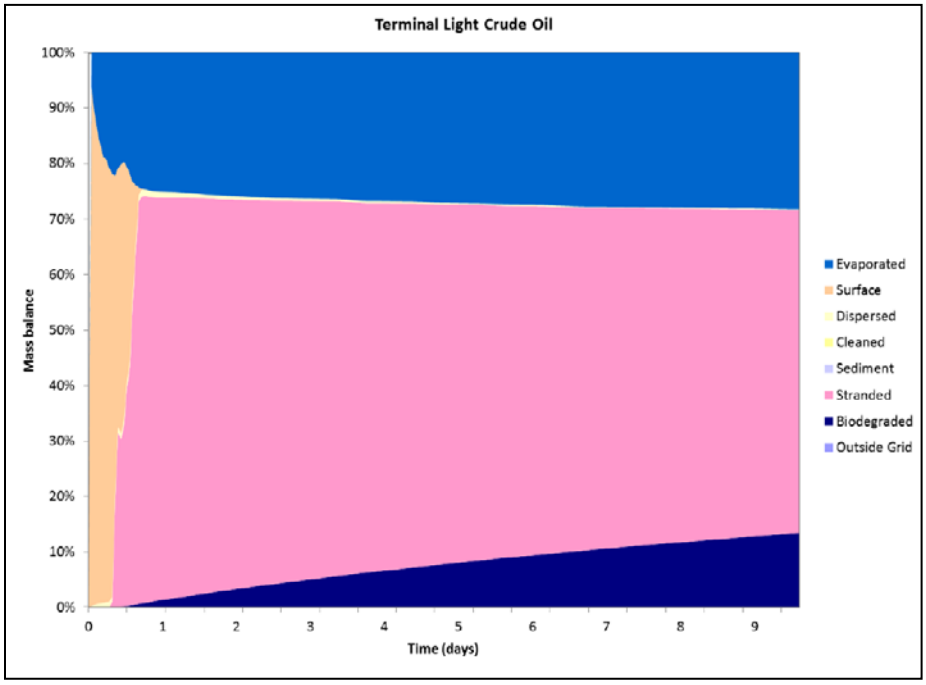

Figure 19: Mass Balance of Oil Over Time for a Light Crude Oil Spill Close to the Terminal[81]

[80] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 71.

[81] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014, p. 67.

Plume dispersion trajectories were prepared for the scenarios described above.

The studies submitted show the following results if there is no response:

- Near the terminal, there is very little difference between a heavy or light crude oil spill. During the first day, most of the spilled product will spread out on the surface or on the neighbouring shores.
- At the Traverse du Nord, light crude oil will disperse more quickly than heavy crude oil. Ten days after the spill:
    - 35% of the light crude will have spread on the shores, 50% will have evaporated, and 10% will have dispersed in the water column
    - 70% of the heavy crude will have spread on the shores, 20% will have evaporated and 2% to 3% will have dispersed in the water column

Finding 51

After a spill, port facility operators and authorized vessel representatives are required to immediately implement their response plans.

Recommendation 67

In the event that a new vessel category is introduced or dangerous liquid bulk cargo is transported, the TRC members recommend that the QPA develop emergency plans by taking the following into account:

- *environments that are particularly sensitive from an ecological standpoint*
- *residential areas*
- *recreational activities*
- *local or regional economic considerations*
- *significant social or cultural aspects*

3.5.1.1. OIL SPILL GEOGRAPHICAL LIMITS

DNV-GL conducted studies and produced a model (the SINTEF-OSCAR model[82]) of oil plume dispersion trajectory following a spill. Using the data from the MoGSL,[83] the SINTEF OSCAR model calculates and records the distribution of oil particles in the following environments:

- surface
- shoreline
- water column
- sediments

To conduct these studies, a spill of 28,000 m^3 was modelled for two locations:

- close to the planned terminal
- at the Traverse du Nord

[82] SINTEF-OSCAR: Oil Spill Contingency and Response

[83] Model of the Gulf of St. Lawrence

A set of results and findings was prepared and is presented in Appendix 2[84] of the documents submitted by the QPA.

3.5.1.2. THREATS TO THE MARINE ENVIRONMENT

The surveys submitted discuss an oil plume dispersion trajectory under the influence of the wind and the current.

Finding 52

The surveys presented by the QPA do not address downwind or crosswind dispersion trajectory of inflammable gas or downwind dispersion trajectory of toxic gas plumes. These surveys also do not address the mixing of chemicals and water, including the applicable chemical reactions and the subsequent dispersion trajectory of chemicals in the water.

Recommendation 68

In the event that a new vessel category is introduced or dangerous liquid bulk cargo is shipped, the TRC members recommend that the QPA assess threats to the marine environment.

3.5.2. LEGAL OBLIGATIONS

Finding 53

Pursuant to the provisions of sections 167 and 168 of the CSA 2001:

> *167(1) …every prescribed vessel or vessel of a prescribed class shall:*
> *(a) have an arrangement with a response organization in respect of a quantity of oil that is at least equal to the total amount of oil that the vessel carries, both as cargo and as fuel, to a prescribed maximum quantity, and in respect of waters where the vessel navigates or engages in a marine activity; and;*
> *(b) have on board a declaration, in the form specified by the Minister, that*
> *(i) identifies the name and address of the vessel's insurer or, in the case of a subscription policy, the name and address of the lead insurer who provides pollution insurance coverage in respect of the vessel,*
> *(ii) confirms that the arrangement has been made, and*
> *(iii) identifies every person who is authorized to implement the arrangement.*
> *168(1) The operator of an oil handling facility of a prescribed class shall*
> *(a) have an arrangement with a response organization in respect of any quantity of oil that is, at any time, involved in being loaded or unloaded to or from a vessel at the oil handling facility, to a prescribed maximum quantity;*
> *(b) have on site a declaration in the form specified by the Minister that*

[84] DNV-GL, Termpol Study Report, Element 3.15 "Risk Assessment," July 17, 2014.

> *(i) describes the manner in which the operator will comply with the regulations made under paragraph 182(a),*
> *(ii) confirms that the arrangement has been made, and*
> *(iii) identifies every person who is authorized to implement the arrangement and the oil pollution emergency plan….*

Finding 54

At the time of writing this report, no operator of an oil handling facility has been identified.

3.5.2.1. OIL HANDLING FACILITY REQUIREMENTS

With regard to OHF requirements, the studies submitted by the QPA briefly outline the following elements:

- oil pollution response procedures
  - obligation to comply with legislation in force
  - equipment and resources on site in the event of a spill during loading and unloading operations
- arrangement with a response organization
- ballast water reception facilities
  - no reception facilities are planned for the new installations
  - ballast water and other waste will be evacuated by specialized trucks

Finding 55

Pursuant to the Response Organizations and Oil Handling Facilities Regulations *(SOR/95-405, Part II), the operator of the oil handling facility must ensure that:*

- *an oil pollution emergency plan is developed in accordance with the provisions of section 12 and reviewed regularly in accordance with the provisions of section 17;*
- *the oil pollution incident procedures, equipment and resources comply with the provisions of section 13;*
- *the oil handling facility's response capability complies with the provisions of section 14;*
- *an exercise program is established in accordance with the provisions of section 15;*
- *four copies of the oil pollution emergency plan are submitted to the Minister in accordance with the provisions of section 16;*
- *the arrangement with a TC-certified response organization is made in accordance with the provisions of section 18 and the provisions of section 168 of the CSA 2001.*

3.5.3. CHEMICAL SPILLS

Finding 56

The documents provided do not address the risk of spills of cargo containing chemicals or other harmful substances.

Recommendation 69

In the event of a new category of cargo containing chemicals or other harmful substances transported in liquid bulk, the TRC members recommend that the QPA develop contingency plans by taking the following into account:

- *predicted reactions following the mixing of released cargo(es) with water, with other cargo chemical(s), or with substances required for normal vessel operations;*
- *predicted chemical, biotic or metabolic, and photo-chemical transformations once the released cargo(es) enter(s) the environment;*
- *toxicity of individual cargo chemicals and potential products formed by the combination of these chemicals with themselves or water;*
- *chemical incompatibility of cargo(es) and the measures that will be taken to reduce the risk of potentially dangerous combination products developing upon release; and*
- *the proponent's countermeasures for containment, clean-up, and, where applicable, public safety alongside the berth, at the transshipment site, and at appropriate locations along the intended route.*[85]

[85] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2014, p. 27.

4. SUMMARY AND CONCLUSION

The studies submitted by the QPA under this process focus essentially on the 610-metre extension of the current wharf line providing:

- a new wharf with a depth of 16 metres at low tide
- lands with an area of 17.5 hectares behind the wharf

As presented, the Project consists in:

- constructing a new wharf with reinforced concrete blocks
- dredging for the foundations of the concrete blocks and the boundary of the navigation area at the new wharf
- filling in the lands behind the wharf
- constructing a seawall and a breakwater for the Beauport beach
- installing of essential equipment on the wharf, such as
    - fenders
    - mooring bollards and bitts
    - emergency and safety equipment

At the time this report was written, no operator had yet been designated for the new facilities. The types of cargoes being handled were also to be determined.

It is up to the QPA to ensure the compatibility of current and future operations, such as the transport, storage and handling of goods.

The TRP members expect the QPA to fulfill its commitments presented in the various studies related to the completion of the Project and the operation of the facilities.

In conclusion, the TRP members are of the view that the Project as presented by the QPA remains safe for the arrival of design vessels, if all of the recommendations in this report are followed.

General recommendations

The TRP members recommend that the QPA extend all of its procedures and practices to cover the vessels that will use the new facilities.

The QPA must ensure that the studies on terminal operations are completed and incorporated into its operating procedures before commencing operations.

APPENDICES

APPENDIX 1: LIST OF FINDINGS AND RECOMMENDATIONS[86]

No.	Finding	No.	Recommendation
3. Analysis			
		01	The QPA must inform the responsible authorities if it plans to make any changes to its Project or commitments as indicated in the submitted surveys.
3.1. Vessel Information			
01	The vessels cited in the above table are in fact mathematical vessel models that were used for the simulation exercises. The design vessels for the new facilities are not explicitly defined. However, similar vessels are frequently transiting on the St. Lawrence River.	02	In the event that a future operator uses vessels other than those that are analyzed in this survey, the TRC members recommend that the stakeholders: • evaluate the risk areas; and • analyze the hydrographic characteristics that may have negative effects on the safety and navigability of the vessel used.
02	Vessels sailing on the St. Lawrence River must meet the requirements of Canadian legislation and regulations in addition to the provisions of the different applicable international statutes and conventions. Additional requirements also apply in certain locations on the St. Lawrence River.	03	The TRC members recommend that when the vessels that will be using the new facilities are identified, this part of the TERMPOL survey should be completed by providing the following information: • maximum vessel dimensions; • summer and winter draughts and corresponding deadweight and displacement; • tonnages – gross and net;

[86] The finding and recommendation numbers are not related. Their sole purpose is to facilitate the report reading.

			• vessel classification and classification society; • ice class, where applicable; • cargo capacity; • cargo containment and cargo transfer systems; • main propulsion system (brief description); • steering gear arrangements; • main and auxiliary engine cooling systems; • de-icing or recirculation systems; • ship stability data, both intact and damaged; • manoeuvring data and information in accordance with IMO standards; • intended shipboard navigational equipment; • intended radio and internal communications equipment to be installed; and • intended crewing and certification standards.
3.2. Route Information			
3.2.2. Origin, Destination and Volume of Marine Traffic			
03	Based on the submitted surveys, the TRC members are of the view that the addition of 300 transits generated by the new facilities at the Port of Québec will not have a significant impact on traffic in the area between Quebec City and Les Escoumins.		

04	The surveys submitted by the QPA and DNV-GL do not have the same geographical limits; however, they are complementary. The HAZID risk assessment work, conducted in consultation with the different industry stakeholders, identified the Cap-aux-Oies–Quebec City sector as having the greatest risk. As a result, the survey conducted by DNV-GL "HAZID for Beauport Liquid Bulk Terminal"[87] focuses only with this sector.		
05	No surveys were submitted by the QPA for the routes upstream of Quebec City.	04	If the operator or the proponent uses vessels transporting goods destined for or originating from ports upstream of Quebec City, the TRC members recommend that a complementary TRP be conducted.
06	There are no alternative routes in the area surveyed. The analyzed route, although very busy, remains safe within the limits and under the rules established by the CCG. In addition: • The channel is marked with buoys, dredged and maintained at a depth of 12.5 metres; • Pilotage is compulsory; and • Vessels are inspected regularly to check their compliance with the provisions of the applicable regulations.		
07	The Canadian Coast Guard is responsible for managing marine traffic on the St. Lawrence, and not the port authorities. The QPA is responsible for managing traffic		

[87] DNV-GL, "Appendix: HAZID for Beauport Liquid Bulk Terminal," December 20, 2013.

	within the port's limits, but does not seem to have additional requirements.		
08	The TRC members find that some of the data on the anchorage technical sheets submitted is inadequate for certain vessel sizes.	05	The TRC members recommend that the anchorage positions intended primarily for large vessels be identified based on the vessel's overall length in addition to maximum draughts.
		06	The TRC members also recommend adequate procedures to be established for winter anchorage positions.
		07	The TRC members also recommend that procedures for the waiting areas be developed, taking into consideration the transit rules in the Traverse du Nord channel for deep-draught and wide-beam vessels.
3.2.3. Navigability and Vessel Operation			
09	Based on the table above, it is not clear if under keel clearance was taken into consideration for safe transits.	08	In addition to industry requirements and practices with respect to the development of voyage plans,[88] the TRC members recommend that an appropriate under keel clearance be taken into consideration when developing travel plans to ensure safe trips, as specified in the *Charts and Nautical Publications Regulations (1995)* and the Sailing Directions.
10	On the Traverse du Nord sector, the flow of marine traffic is influenced by weather conditions and the available water column.	09	In order for vessels to transit safely in this sector, the TRC members recommend that the CCG install in

[88] IMO, Resolution A.893(21), *Guidelines for Voyage Planning*, adopted November 25, 1999.

			situ observation instruments in known strategic positions.
11	The document submitted on the under keel clearance is a version that applies only for the Montreal-Quebec City sector.		
12	The QPA identified the following areas as critical in terms of depth: • The channel west of L'Île Rouge; • West of the haut-fond Morin; • The passage of L'Île-aux-Coudres; and • The channel of the Traverse du Nord.	10	The TRC members recommend that the QPA take into consideration the under keel clearance data contained in the most recent version of the *Sailing Directions ATL 111 (St. Lawrence River, Île Verte to Québec and Fjord du Saguenay).*
13	The QPA defers to the obligation of pilots and crews to establish the safety margins for depth restriction. Legally, the master has the ultimate responsibility for vessel safety at all times.		
14	Due to continual silting-up in the area as defined, the channel of the Traverse du Nord, maintenance dredging is carried out annually. When shoals are reported, the information is broadcast in Notices to Shipping and published by the CCG in Notices to Mariners.	11	Based on the findings and the prevailing practices in the area, the TRC members recommend that stakeholders: • Reassess the concept of under keel clearance if the characteristics of its vessels operating in the area are different from the existing characteristics; • Take all current or future requirements on transit restrictions into account; • Comply with the passage or transit windows of opportunity with the tide, if applicable;

			• Operate their vessels within recommended trim values; • Calculate the under keel clearance with the draught for fresh water for increased safety; • Develop berth-to-berth voyage plans as required by the IMO;[89] and • Take into account sagging and hogging during loading and unloading, based on the available wharf depth.
15	Based on the pilot assignment rules in effect, the TRC members are of the view that the current services are suitable for the future operations of the new facilities.		
16	There is no ice class requirement for vessels sailing on the St. Lawrence River. However, the *Marine Machinery Regulations*[90] stipulate that For ships required to operate in ice-covered waters where ice may choke sea-water inlets, maintenance of essential sea-water supply shall be maintained by (a) diversion arrangements for warmed cooling water from overboard discharges into sea-water inlet boxes; (b) means to clear sea-water inlet boxes, preferably by steam that has	12	The TRC members recommend that the QPA ensure that the operator or operators use vessels that meet the regulatory requirements for equipment and facilities for ice navigation. The *Charts and Nautical Publications Regulations (1995)*[92] require vessels navigating in ice-covered Canadian waters to have the most recent edition of the Fisheries and Oceans Canada *Notices to Mariners* on board. Furthermore, ships "making a voyage during which ice may be encountered"[93] must have the Fisheries and Oceans document *Ice Navigation in Canadian Waters* on board.

[89] IMO, Resolution A.893(21), *Guidelines for Voyage Planning*, adopted November 25, 1999.

[90] *Marine Machinery Regulations*, SOR/90-264, Schedule VII, Steering Systems, Shipside Components and Windlasses, Division IV.

[92] *Charts and Nautical Publications Regulations*, 1995 (SOR/95-149), paragraph 6(1)(b).

[93] *Charts and Nautical Publications Regulations*, 1995 (SOR/95-149), item 2 of the Schedule.

	a pressure not in excess of the design working pressure of the sea-water inlet boxes and that is vented to the upper deck by means of a valved pipe; and (c) ensuring sea-water inlet strainers have (i) perforations approximately 20 mm in diameter to prevent ingestion of large ice particles; and; (ii) a strainer perforated area approximately 5 times the total cross-sectional area of the inlet pipes being served to ensure full fluid flow in slush ice conditions.[91] Given the winter conditions and the low water temperature in the St. Lawrence, this requirement is crucial to reducing the risk of mechanical failures.		
		13	The TRC members also recommend that the following documents be on board: • TP 14335, *Winter Navigation on the River and Gulf of St. Lawrence Practical Notebook for Marine Engineers and Deck Officers* • TP 15163, *Joint Industry – Government Guidelines for the Control of Oil Tankers and Bulk Chemical Carriers in Ice Control Zones of Eastern Canada* (2015) • Checklist for preparing the vessel for ice navigation

[91] *Marine Machinery Regulations*, SOR/90-264, Schedule VII, Steering Systems, Shipside Components and Windlasses, Division IV.

3.2.4. Marine Traffic Considerations			
17	Besides the mandatory pilotage rules, on December 1, 2009, The Canadian Coast Guard established rules [94] that govern the traffic of Post-Panamax ships heading to locations upstream from the Traverse du Nord sector of Île d'Orléans by adding the concept of combined breadth.[95] 1. Passage (encounter) and overtaking of two (2) vessels, each with a combined breadth equal to or higher than 81.3 metres, shall not be authorized in the dredged channel of Traverse du Nord, between Buoys K-136 and K-92. 2. Should a vessel be required to slow down or stop to avoid encountering within the limits of the dredged channel, the vessel with a following current (stern) shall have priority to maintain course (ref. *Collision Regulations*, Rule 9, Section K). 3. The Marine Communications and Traffic Services Officer (MCTSO) shall inform the vessels concerned sufficiently in advance in order for the vessels to make appropriate	14	The TRC members recommend that all parties, such as Transport Canada, the Canadian Coast Guard and the pilotage services, continue to coordinate trips, meeting points or overtaking areas for upbound and downbound vessels in the Traverse du Nord sector of Île d'Orléans.

[94] Fisheries and Oceans Canada, *Annual Edition April 2015 to March 2015 – Notices to Mariners 1 to 46*: Guidelines for the Transit of Wide-Beam Vessels and Long Vessels, Transit of Vessels with Combined Breadth Equal to or Higher than 81.3 metres in the Traverse du Nord Sector of Île d'Orléans. (Official Canadian Coast Guard publication, 2015) Part C, Notice 27A, p. 6 of 6.

[95] Sum of the breadths of the vessels that meet. Breadth means the “greatest breadth” of the vessel as stated in the International Regulations for Preventing Collisions at Sea 1972 (the COLREGS), Part A, Rule 3(j). It is the maximum distance (in metres and centimetres) between the outside edges of the shell plating of the ship, including fenders and bridge wing.

	arrangements to abide by these measures. 4. The vessels concerned shall inform the MCTS Officers of their agreed arrangements in order for MCTS to advise relevant traffic accordingly.[96]		
18	Currently, wide-beam vessels with deep draughts transit safely in the area with the tide.	15	The TRC members recommend that the QPA coordinate with the pilotage services the vessel departure and arrival times, as well as expand their current procedures to the vessels that will be using the new facilities.
3.3. Terminal Operations			
3.3.1. Marine Terminal			
19	Given that the cargoes being handled have not yet been identified in the Project, the plans and figures submitted as part of the Project serve only to situate the expansion Project geographically by illustrating phases 1 and 2. They cannot be used to evaluate the facilities and equipment in detail.	16	As part of the expansion of the facilities, the TRC members recommend that the QPA provide details on the following points: • floating facilities, if applicable, and their locations • location of the new underwater facilities related to the Project, if applicable • location, size of the manoeuvring areas and the turning basins in the event that phase 2 (construction of the dolphin jetty) is carried out

[96] Fisheries and Oceans Canada, *Annual Edition April 2015 to March 2015 – Notices to Mariners 1 to 46*: Guidelines for the Transit of Wide-Beam Vessels and Long Vessels, Transit of Vessels with Combined Breadth Equal to or Higher than 81.3 metres in the Traverse du Nord Sector of Île d'Orléans. (Official Canadian Coast Guard publication, 2015) Part C, Notice 27A, p. 6 of 6.

20	As part of dredging and sediment treated according to the solidification and stabilization technique, the QPA shall obtain environmental authorizations, if applicable.		
		17	From a technical standpoint, the TRC members recommend that the QPA apply the industry recognized standards, codes and practices.
		18	For the new facilities, the TRC members recommend that the QPA apply existing industry standards and carry out a risk assessment to • determine the sources of emergency power: o number o location o power o autonomy • identify vulnerable systems that need to be protected: o surveillance o alarms o communication o emergency stop o any other vulnerable system or equipment
21	According to the documents submitted, there is no automatic mooring load monitoring system on wharf 54 and there seems to be a lack of consistency in the choice of mooring system to be used.		

22	The mooring load survey was conducted using a bulk carrier with specifications that are different from the oil tanker design vessel.	19	The TRC members recommend that the QPA equip the new wharf with mooring systems that meet industry standards and best practices. These systems must be adapted to the types of vessels that will use these facilities.
23	According to the document "*Devis de construction. Ingénierie détaillée - groupe 1 (615534-0000-40EG-0002-00),*" a control room is planned for the phase 2 facilities. There is no indication that it would be used for the phase 1 facilities.		
24	According to the document "*Devis de construction. Ingénierie détaillée - groupe 2 (615534-0000-40EG-0003-00),*" no control room appears to be planned for the phase 1 facilities.	20	For the phase 1 facilities, the TRC members recommend that the QPA plan for a control room equivalent to the one planned for the dolphin jetty (phase 2).
		21	The TRC members recommend that the QPA apply the applicable standards, codes and regulations for control systems, alarm systems, leak detection and emergency shutdown equipment.
		22	The TRC members recommend that the QPA ensure that these control and instrumentation, alarm, leak detection and emergency shut-down systems be operational at all times (24/7), ergonomic and sufficient in number and operated by duly trained personnel.
		23	The TRC members recommend that the QPA incorporate procedures relating to the operation of the control and instrumentation, alarm, leak detection and

			emergency shutdown systems be incorporated into the port safety management manuals.
		24	The TRC members recommend that the QPA make sure that a waste management plan is developed.
		25	The TRC members recommend that the QPA ensure that a plan be developed for the new facilities to manage wastewater discharged by berthed vessels, as applicable.
25	According to the documents provided, the transfer rate is established at 1,590 m^3/hour (10,000 barrels/hour) per pipeline. The transfer rate for both pipelines is therefore 3,180 m^3/hour. The facility category would be Level 4.	26	For the new facilities, the TRC members recommend that the QPA establish operational and emergency procedures in accordance with the provisions of the *Oil Handling Facilities Regulations* (SOR/95-405).
		27	For the new facilities, the TRC members recommend that the QPA use industry best practices to establish procedures for improving the safety of operations at the terminal by taking the following into account: • the type of cargo o identification of the cargo o flash point o true vapour pressure o precautions to be taken • transfer requirements o delivery or reception temperature o tanker venting o maximum transfer rate o maximum pressure o transfer methods

			o any other limits that may affect operations
		28	The TRC members recommend that, for an OHF, in developing oil pollution scenarios, the following factors should be taken into account: 1. the nature of the oil product in respect of which the scenario is developed; 2. the types of ships that are loaded or unloaded at the facility; 3. the tides and currents that prevail at the facility; 4. the meteorological conditions that prevail at the facility; 5. the surrounding areas of environmental sensitivities that would likely be affected by an oil spill; 6. the measures that will be implemented to minimize an oil pollution incident; and 7. the time within which an effective response to an oil pollution incident can be carried out.[97]
		29	The TRC members recommend that the QPA take the following priorities into account when establishing response strategies:

[97] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 1-2.

			1. the safety of the facility's personnel; 2. the safety of the facility; 3. the safety of the communities living adjacent to the facility; 4. the prevention of fire and explosion; 5. the minimization of the oil pollution incident; 6. the notification and reporting of the oil pollution incident; 7. the environmental impact of the oil pollution incident; and 8. the requirements for cleaning up the oil pollution incident.[98]
3.3.2. Port Information Book			
		30	With respect to the port information book and the terminal operations manual, the TRC members recommend that the QPA include the following elements for the new facilities: • berthing plan in terms of the design vessel's approach and departure from the terminal berth; tug assistance requirements; mooring assistance requirements; the upper limit of lateral approach rate to the berth by the design vessel and the means of measuring and indicating wind speed and the vessel's lateral approach rates;

[98] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

			• upper limits of berthing operations in term of wind velocity, wave heights, tidal stream velocity, ice cover, visibility, and the means of measuring and indicating these factors; • the upper wind velocity limits which would necessitate the interruption of cargo transfer operations and limit which would require the departure of the vessel from the berth; • load measurements and limits for mooring lines and dockside bollards used; • pilotage service and tug assistance details, mooring procedures and means of communication; • vessel machinery and equipment repairs service providers; • storing and bunkering facilities, if applicable; • general safety measures; • industrial health and safety; • the procedures for authorizing special work on board, such as hotwork; • vessel reporting procedures; • pilot boarding and transfer procedures at the port; • vessel/shore communication procedures; • designated anchorages; • emergency measures; and • the details of vessel/terminal personnel communications.

3.3.3. Terminal Operations Manual			
		31	With respect to the terminal operations manual, the TRC members recommend that the manual addresses the following elements: • inspections, testing and preventive maintenance of terminal berth equipment used by vessels; • pre-arrival and departure operational tests and checks of a vessel's machinery and equipment; • cargo pre-transfer inspections, checklists, and meetings; • vessel-terminal hose-manifold connections; vessel-terminal communications and chain of authority; • cargo handling procedures, including emergency shut-down procedures; • safety precautions and vessel oriented emergency procedures which would be included in the terminal's contingency plans; and • receiving facilities for waste oil, ballast, dirty ballast, slops and garbage.
3.3.4. Approach and Berthing Procedures			
26	Of all the recommendations made by the Maritime Simulation and Resource Centre following the different simulation exercises, only the last one applies to the new facilities planned in phase 1.	32	The TRC members recommend that the QPA adopt these practices, and include them in its operational procedures.

27	At the approaches of the new facilities, the St. Lawrence River is wide enough for vessels to manoeuvre safely.	33	The TRC members recommend that the QPA adopt appropriate procedures if vessels will need to manoeuvre within the navigable waterway.
		34	The TRC members also recommend that the QPA establish mooring procedures for the new facilities.
		35	For the new facilities, the TRC members also recommend that the QPA and the operator plan to secure vessels on the appropriate side to ensure, in the event of an emergency, that these vessels can depart immediately without tug assistance.
		36	The TRC members recommend that the QPA and the operator apply the mooring standards in the *Mooring Equipment Guidelines*[99] published by the Oil Companies International Marine Forum (OCIMF), or equivalent.
		37	With respect to the design of mooring facilities, the TRC members recommend that the QPA apply current industry codes and practices, as well as the recommendations in the OCIMF's *Mooring Equipment Guidelines* (MEG3).
28	It was found that there were no practices and procedures for tug escorts for oil tankers upon arrival and departure.	38	The TRC members recommend that the QPA develop a policy on escorts and define the limits of escort areas.

[99] Published in October 2008.

		39	They also recommend that tugs be assigned based on their bollard pull.
29	The proponent did not provide the TRC with the details of the de-icing procedures of the new proposed port facilities.	40	The TRC members recommend that the existing practices related to de-icing services be extended to the new facilities.
		41	Based on simulations conducted for the mouth of Saint-Charles River, and as recommended by the pilots, the TRC members recommend that the QPA review the parameters for suspension of berthing and unberthing operations based on the wind speed.
30	The simulations conducted at the Maritime Simulation and Resource Centre were all conducted during the day and in good visibility conditions. The need for lighted navigational aids was not mentioned in either the Centre's report or the studies submitted by the QPA.	42	The TRC members recommend that the necessary navigational aids be installed for the new facilities, as applicable.
		43	The TRC members recommend that the Canadian Hydrographic Service (CHS) include the new facilities, including navigational aids, in its publications.
3.3.5. Cargo Transshipment and Transfer Systems			
31	All of the data submitted on the cargo pipelines and hoses connecting the vessel to the marine terminal is related to phase 2 of the Project, i.e., the dolphin jetty.	44	With respect to the transshipment hoses connecting the berth and the tankers of the shore facilities, the TRC members recommend that the QPA use the appropriate standards.

32	All of the data submitted on the cargo pumps and hoses connecting the vessel to the marine terminal is related to phase 2 of the Project, i.e., the dolphin jetty.	45	With respect to the cargo pumps connecting the berth and the tankers of the shore facilities, the TRC members recommend that the QPA use the appropriate standards.
33	With regard to connections, collectors, loading arms and alarms, the documents as submitted discuss only the facilities planned for the dolphin jetty.	46	The TRC members recommend the QPA to list the equipment to be installed at the 50s line (sections 50 to 53 and the sections that will be added) for the new facilities, and ensure that this equipment meets industry standards, particularly in terms of cargo manifolds, loading arm connections, their number, size, height, operational envelope and alarms.
34	As a reminder, TC issued a Ship Safety Bulletin (17/1998)[100] on the use of the ship/shore bonding cable by terminal. This bulletin recommends discontinuing this practice: Both the "Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas" published by the International Maritime Organization (IMO) and the "International Safety Guide for Oil Tankers and Terminals" or ISGOTT as it is now known, discourage the use of bonding cables.[101]	47	With respect to electrical discontinuity between the vessel and the terminal, the TRC members recommend that industry practices be applied; they stipulate that: Due to possible differences in electrical potential between the tanker and the berth, there is a risk of electrical arcing at the manifold during connection and disconnection of the shore hose or loading arm. To protect against this risk, there should be a means of electrical isolation at the tanker/shore interface. This should be provided by the terminal.[102]

[100] Ship Safety Bulletin 17/1998 https://www.tc.gc.ca/eng/marinesafety/bulletins-1998-17-eng.htm.

[101] Ship Safety Bulletin 17/1998 https://www.tc.gc.ca/eng/marinesafety/bulletins-1998-17-eng.htm.

[102] CCNR/OCIMF International Safety Guide for Inland Navigation Tank-barges and Terminals, Terminal Equipment and Systems, 2010. Chapter 17, "Terminal Systems and Equipment," p. 257.

35	Upon reviewing the documents submitted, a vapour collection line is planned. However, it is not clear if this will be installed at wharf 54 and who will install it.	48	The TRC members recommend that the QPA install a vapour collection line at wharf 54 in accordance with industry standards.
36	The documents submitted deal only with the facilities at the dolphin jetty.	49	The TRC members recommend that the QPA produce a detailed plan of the mooring areas of the new facilities showing: • location of the temperature sensors • related alarm systems • number of gas alarms • alarm sensitivity • continuous or intermittent sampling
37	With regard to the surveillance and alarm systems, the documents submitted deal only with the dolphin jetty facilities.	50	The TRC members recommend that the QPA develop a detailed plan of the control room for the new facilities, highlighting: • surveillance systems • visual and audible alarms • main controls • any other systems or equipment
38	Since July 1, 2004, access to vessels and marine facilities have been governed by the *Marine Transportation Security Regulations* (SOR/2004-144).[103]	51	The TRC members recommend that procedures for accessing the vessel during transfer operations be prescribed in the security plan to be developed, taking into consideration current policies and procedures at the port.

[103] Marine Transportation Security Regulations (SOR/2004-144), sections 236 and 325.

39	The documents as submitted do not deal with pre-cargo transfer circulation tests.	52	The TRC members recommend that the QPA ensure that a procedure for pre-cargo transfer circulation tests is developed.
40	Delivery of vessels' supplies, like access to vessels and port facilities, is governed by the *Marine Transportation Security Regulations*.[104] Under these Regulations, the operator of the new facilities must develop a security plan for the new facilities and include security procedures for delivery of ships' stores and bunkers for each MARSEC level.		
		53	For berthed vessels, the TRC members recommend that the QPA ensure that a ballast water management service is available as needed.
41	Depending on the cargo to be loaded, oil tankers often need to wash their cargo tanks and therefore discharge contaminated washings to be treated ashore.	54	The TRC members recommend that the QPA develop washing procedures for tankers transporting chemicals as well as procedures for managing these washings within its facilities.
		55	The TRC members recommend that the QPA list the cargoes to be handled at its new facilities (once known) and follow the respective safety procedures.

[104] Marine Transportation Security Regulations (SOR/2004-144), sections 248 and 338.

3.4. Risk Assessment and Contingency Planning			
3.4.1. Analysis of TSB Accident Data			
42	For the specified period, the number of accidents involving tankers in Canadian waters is very low compared with other types of vessels.		
43	Regardless of vessel type, in restricted waters, shipping accidents are often caused by human error. Thus, inattention may lead to a technical malfunction, grounding or collision.		
3.4.2. DNV-GL Accident Data Analysis			
44	The TRC members are of the view that the surveys presented reflect the downward trend of marine accidents as observed in the TSB statistics.		
3.4.3. Vulnerability of Design Vessel			
		56	If a new category of vessel is considered, the TRC members recommend that the QPA analyze the risks and identify mitigation methods.
45	The surveys submitted do not specifically address the risk index at the berth and the adjacent area.	57	The TRC members recommend that the QPA analyze the probabilities of an incident and perceived risks associated with the berth at the terminal and the adjacent area.
		58	The TRC members also recommend that the QPA analyze the probabilities of an incident and perceived

			risks associated with the marine environment, fish and wildlife habitat and submit the results to the Canadian Environmental Assessment Agency.
46	As presented by the QPA, the safety levels and standards applicable to vessels that will use the new port facilities are equivalent to those applicable to vessels transporting liquid bulk cargo and currently transiting on the St. Lawrence River.	59	In the event that a new vessel category is introduced, the TRC members recommend that the QPA assess the probabilities of incidents which may result in the breaching of the vessel's cargo containment system. They also recommend analyzing the risks associated with the navigational and operational procedures specific to this type of vessel.
		60	Moreover, the TRC recommends that the same risk assessment be carried out if dangerous goods are shipped through the new facilities.
47	The risk analysis conducted by DNV-GL addressed vessels arriving at or departing from the dolphin jetty.		
48	Based on the changes made to the Project, the number of expected vessels was lowered to 150 per year. The risk analysis identified 241 vessels.		
49	Given the changes made to the Project and the overestimation of the risk based on the initial Project, the TRC members find that the risk analysis as conducted meets the needs of phase 1.		
50	In the area defined for the TRP and based on the elements cited above, the risk that an incident becomes uncontrollable is minimal.		

3.4.4. Risk Mitigation			
		61	With respect to risk mitigation and under the provisions of TP 743 E (2001), the TRC members recommend that the QPA establish the following procedures: • implement a safe operational system and develop a proactive pollution prevention program; • schedule, if applicable, liquefied gas or chemical carrier movements through congested coastal waters to coincide, if possible, with periods when traffic is normally at a minimum; • impose limiting environmental or climatic requirements for vessels loaded with pollutant or hazardous cargoes when navigational safety within the terminal zone is an issue; • use tug escorts; • implement prudent berthing procedures and optimal tug assistance; • employ an energy absorbing protective barrier when alongside the terminal; • keep sufficient crew onboard at all times while a vessel is transferring hazardous cargoes so that the vessel is capable of getting under way at short notice; • moor a vessel transferring hazardous cargoes bow seaward when the terminal berth is located in a narrow arm of water so that in an

			emergency, the vessel can proceed seaward without delay and without the aid of tugs; • implement standardized cargo transfer system inspections and safety-oriented cargo transfer operations; • promulgate standardized safety and cargo transfer procedures by means of port information publications designed to inform crews of vessels serving the proposed marine terminal. The procedures should include specified upper climatic limits for berthing operations, for stopping cargo transfer operations, and for vacating the berth; • restrict the venting of significant quantities of flammable or poisonous gases to the atmosphere; • provide appropriate reception facilities at chemical and oil terminals; • if applicable, schedule the bunkering and provisioning of vessels transferring hazardous cargoes at a time that does not conflict with the maintenance of vessel and personnel safety during cargo transfer operations; • control the access of visitors while the vessel is alongside the dock; • develop and implement an effective contingency plan for the marine terminal system and the regular exercise of selected procedures described in the plan; • adopt procedures which conform to internationally recognized safe management

			practices as implemented through IMO resolutions, ISM and/or ISO standards; and • ensure that vessels chartered by the operator comply with the applicable standards.
		62	Given the complexity of implementing contingency plans, the TRP members recommend that the QPA ensure that the plans are developed in collaboration with stakeholders, and also ensure that they are in line with all municipal, provincial and federal incident management plans and structures.
		63	The TRC members recommend that the contingency plan for the new facilities cover the following points:[105] • incidents involving the release of cargo(es) • fire and explosions • operations monitoring systems • terminal-vessel communications • inspection, testing and preventive maintenance procedures • cargo handling precautions applicable to the vessel • neutralizing electrical hazards • detection and alarm systems at the vessel berth • emergency shutdown of cargo transfer operations

[105] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2001, p. 40-41 (part 3-19).

			• emergency response to incidents involving discharge of pollutants • countermeasures to reduce, contain or neutralize the negative effects of a discharge • description of emergency equipment for personnel proposed for the berth area • terminal evacuation procedures • emergency procedures requiring the vessel to evacuate the berth When there is a vessel alongside the dock, the plan should cover the following: • fire on board • releases resulting in structural damage and/or injury to personnel • equipment malfunctions • improper cargo transfer • rapidly deteriorating weather or ice conditions that require the vessel to leave the berth • grounding or collision at or near the berth • fires on dockside, pipelines in the immediate vicinity of the berth and the tank farm • any other emergency situation at the terminal
		64	In addition to the points cited above, the TRC members recommend that the QPA take the following factors into account when developing contingency plan scenarios: a) the nature of the oil product in respect of which the scenario is developed;

			b) the types of ships that are loaded or unloaded at the facility; c) the tides and currents that prevail at the facility; d) the meteorological conditions that prevail at the facility; e) the surrounding areas of environmental sensitivities that would likely be affected by an oil spill; f) the measures that will be implemented to minimize an oil pollution incident; and g) the time within which an effective response to an oil pollution incident can be carried out.[106]
		65	The TRC members also recommend that the QPA take the following priorities into account during a pollution incident response: a) the safety of the facility's personnel; b) the safety of the facility; c) the safety of the communities living adjacent to the facility; d) the prevention of fire and explosion; e) the minimization of the oil pollution incident;

[106] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

			f) the notification and reporting of the oil pollution incident; g) the environmental impact of the oil pollution incident; and h) the requirements for cleaning up the oil pollution incident.[107]
		66	The TRC members recommend that the QPA develop a Port operation continuity plan that would be included as an annex to the contingency plan.
3.5. Preparation and Spill Response			
3.5.1. Oils Spills			
51	After a spill, port facility operators and authorized vessel representatives are required to immediately implement their response plans.	67	In the event that a new vessel category is introduced or dangerous liquid bulk cargo is transported, the TRC members recommend that the QPA develop emergency plans by taking the following into account: • environments that are particularly sensitive from an ecological standpoint • residential areas • recreational activities • local or regional economic considerations • significant social or cultural aspects
52	The surveys presented by the QPA do not address downwind or crosswind dispersion trajectory of	68	In the event that a new vessel category is introduced or dangerous liquid bulk cargo is shipped, the TRC

[107] Canadian Coast Guard, *Oil Handling Facilities Standards* (TP 12402), 1995, p. 2.

	inflammable gas or downwind dispersion trajectory of toxic gas plumes. These surveys also do not address the mixing of chemicals and water, including the applicable chemical reactions and the subsequent dispersion trajectory of chemicals in the water.		members recommend that the QPA assess threats to the marine environment.
	3.5.2. Legal Obligations		
53	Pursuant to the provisions of sections 167 and 168 of the CSA 2001: 167(1) …every prescribed vessel or vessel of a prescribed class shall: (a) have an arrangement with a response organization in respect of a quantity of oil that is at least equal to the total amount of oil that the vessel carries, both as cargo and as fuel, to a prescribed maximum quantity, and in respect of waters where the vessel navigates or engages in a marine activity; and; (b) have on board a declaration, in the form specified by the Minister, that (i) identifies the name and address of the vessel's insurer or, in the case of a subscription policy, the name and address of the lead insurer who provides pollution insurance coverage in respect of the vessel,		

	(ii) confirms that the arrangement has been made, and (iii) identifies every person who is authorized to implement the arrangement. 168(1) The operator of an oil handling facility of a prescribed class shall (a) have an arrangement with a response organization in respect of any quantity of oil that is, at any time, involved in being loaded or unloaded to or from a vessel at the oil handling facility, to a prescribed maximum quantity; (b) have on site a declaration in the form specified by the Minister that (i) describes the manner in which the operator will comply with the regulations made under paragraph 182(a), (ii) confirms that the arrangement has been made, and (c) identifies every person who is authorized to implement the arrangement and the oil pollution emergency plan…		

54	At the time of writing this report, no operator of an oil handling facility has been identified.		
55	Pursuant to the *Response Organizations and Oil Handling Facilities Regulations* (SOR/95-405, Part II), the operator of the oil handling facility must ensure that: • an oil pollution emergency plan is developed in accordance with the provisions of section 12 and reviewed regularly in accordance with the provisions of section 17; • the oil pollution incident procedures, equipment and resources comply with the provisions of section 13; • the oil handling facility's response capability complies with the provisions of section 14; • an exercise program is established in accordance with the provisions of section 15; • four copies of the oil pollution emergency plan are submitted to the Minister in accordance with the provisions of section 16; • the arrangement with a TC-certified response organization is made in accordance with the provisions of section 18 and the provisions of section 168 of the CSA 2001.		
3.5.3. Chemical Spills			
56	The documents provided do not address the risk of spills of cargo containing chemicals or other harmful substances.	69	In the event of a new category of cargo containing chemicals or other harmful substances transported in liquid bulk, the TRC members recommend that the QPA develop contingency plans by taking the following into account:

			• predicted reactions following the mixing of released cargo(es) with water, with other cargo chemical(s), or with substances required for normal vessel operations; • predicted chemical, biotic or metabolic, and photo-chemical transformations once the released cargo(es) enter(s) the environment; • toxicity of individual cargo chemicals and potential products formed by the combination of these chemicals with themselves or water; • chemical incompatibility of cargo(es) and the measures that will be taken to reduce the risk of potentially dangerous combination products developing upon release; and • the proponent's countermeasures for containment, clean-up, and, where applicable, public safety alongside the berth, at the transshipment site, and at appropriate locations along the intended route.[108]

[108] Transport Canada, *TERMPOL Review Process* (TP 743 E), 2014, p. 27.

4. Summary and Conclusion

The TRP members recommend that the QPA extend all of its procedures and practices to cover the vessels that will use the new facilities.

The QPA must ensure that the studies on terminal operations are completed and incorporated into its operating procedures before commencing operations.

APPENDIX 2: LIST OF DOCUMENTS SUBMITTED BY THE QPA FOR TERMPOL REVIEW

Studies submitted by the QPA

For the purposes of analysis and the TERMPOL process, the QPA submitted the following studies:

3.1 Project introduction and presentation
3.2 Marine traffic origin, destination and volume survey
3.3 Fishery resources survey
3.4 Offshore exercise and offshore petroleum exploration and exploitation activities survey
3.5 Route analysis, approach characteristics and navigability survey
3.6 Special studies relating to under keel clearance
3.7 Transit time and delay survey
3.8 Casualty data survey
3.9 Vessel specifications
3.10 Berthing procedures and provisions
3.11 Cargo containment and transfer system
3.12 Channels, manoeuvring and anchoring surveys
3.13 Berthing procedures and provisions
3.14 Single-point mooring
3.15 Risk and risk reduction survey
3.16 Port information book
3.17 Terminal operations manual
3.18 Contingency plan
3.19 Oil handling
3.20 Hazardous and dangerous liquids

The following documents were submitted in annex, in electronic format:[109]

Annex 1

- Nautical charts
- Arrival notices (Request for berth, 2014)
- Tide tables

[109] Translations of titles of electronic documents as submitted by the QPA.

- Vehicle loads
- Declaration of Security 2014
- Emergency measures plan: Response management strategies
- Safety checklist on board ship at the terminal
- Dangerous goods permit (form 45A-1983)
- Hot work permit
- Winter Navigation on the River and Gulf of St. Lawrence (TP 14335 E), 2011
- General plans of fixed and floating structures
- Infosheet No 30: Modern ship size definitions (Lloyd's Register Foundation)
- Fishing area maps (various species)
- Bathymetry for Beauport area
- Emergency measures plan: command structure
- Emergency measures plan: emergency vs. crisis

Annex 2

- *Étude sur la faisabilité de manœuvres pour le projet ducs-d'Albe et ajout des quais 54 et 55, Port de Québec*
- SNC-Lavalin drawings, plans, studies and summary
- DNV-GL risk analysis study and casualty data
- Groupe-Conseil LaSalle inc. reports: Digital modelling of hydraulic conditions, and: Impacts of extending the port sector of Beauport on local hydrosedimentary conditions
- Wind and Wave Climate Atlas (TP 10820 E), volume 1
- CIMA+ report: Évaluation environnementale stratégique

Annex 3

- Transportation of Dangerous Goods Regulations
- Navigation practices and procedures (QPA)
- Anchorage data sheets (QPA)
- Procedure: Minimum distance between two vessels at dock (QPA)
- Waterways Management Directive (CCG)
- Comité des Mesures d'urgence des Utilisateurs de l'Autorité portuaire de Québec
- Le Comité de Sécurité et Protection de l'Environnement de l'Autorité portuaire de Québec
- Le Comité Stratégique des Mesures d'Urgence de l'Autorité portuaire de Québec
- Le Comité Sûreté Portuaire de l'Autorité portuaire de Québec (CSP)
- Le Comité Sûreté des Utilisateurs de l'Autorité portuaire de Québec (CSU)
- QPA Operations – Strategic and operational committees
- Directive on use of anchorages in inclement weather
- Environmental Assessment Process Managed by the Agency / *Processus d'évaluation environnementale géré par l'Agence* (CEAA)

- Notice to Shipping Q0220/2013, Amendments to the under keel clearance table (CCG)
- Guidelines, *Procédure opérationnelle provinciale de l'alerte lors d'un événement maritime survenant dans la région du Québec* (CCG, MDDEP, MSP)
- *Gestion de crise lors d'un déversement* (QPA)
- Ice Navigation in Canadian Waters (CCG)
- *Instructions concernant la navigation* (CPBSL)
- Safety Standards, Measures and Practices Currently Applicable in District No. 2, 2014 (LPA)
- *Protocole de priorisation des remorqueurs* (QPA)
- *Plan commun de sécurité terre-navire* (QPA)
- *Procédure pour tous les mouvements des navires dans les limites du port* (QPA)
- *Procédure : Dénomination et position des postes d'ancrage* (QPA)
- *Procédure de branchement avec les remorqueurs (Système de pompage – Remorqueur du Groupe Océan, Description narrative (QPA))*
- *Procédure de départ des navires à fort tirant d'eau et de transit dans la Traverse Nord*
- *Procédure opérationnelle, Intervention sur le fleuve (Service de protection contre l'incendie, Ville de Québec)*
- Safeco, Safety of Shipping in Coastal Waters (DNV-GL)
- Traverse Nord decision grid

APPENDIX 3: CATEGORIES AND APPROXIMATE DIMENSIONS OF DESIGN VESSELS

Approximate vessel-size groups referred to in the *Review of Maritime Transport,* according to generally used shipping terminology.

Crude Oil Tankers		*Dry-Bulk and Ore Carriers*	
Category	*Deadweight*	*Category*	*Deadweight*
Very large crude carrier	200,000 dwt[110] plus	Capesize	100,000 dwt plus
Suezmax	120,000-200,000 dwt	Panamax	60,000-99,999 dwt
Aframax	80,000-119,999 dwt	Handymax	40,000-59,999 dwt
Panamax	60,000-79,999 dwt	Handysize	10,000-39,999 dwt

Container Ships	
Category	*Breadth*
Post-Panamax	32.3 metres or more
Panamax	less than 32.3 metres

Source: United Nations Conference on Trade and Development (UNCTAD), *Review of Maritime Transport 2014*, p. x (http://unctad.org/en/PublicationsLibrary/rmt2014_en.pdf).

[110] dwt: deadweight tons.

APPENDIX 4: NAVIGATION ROUTES

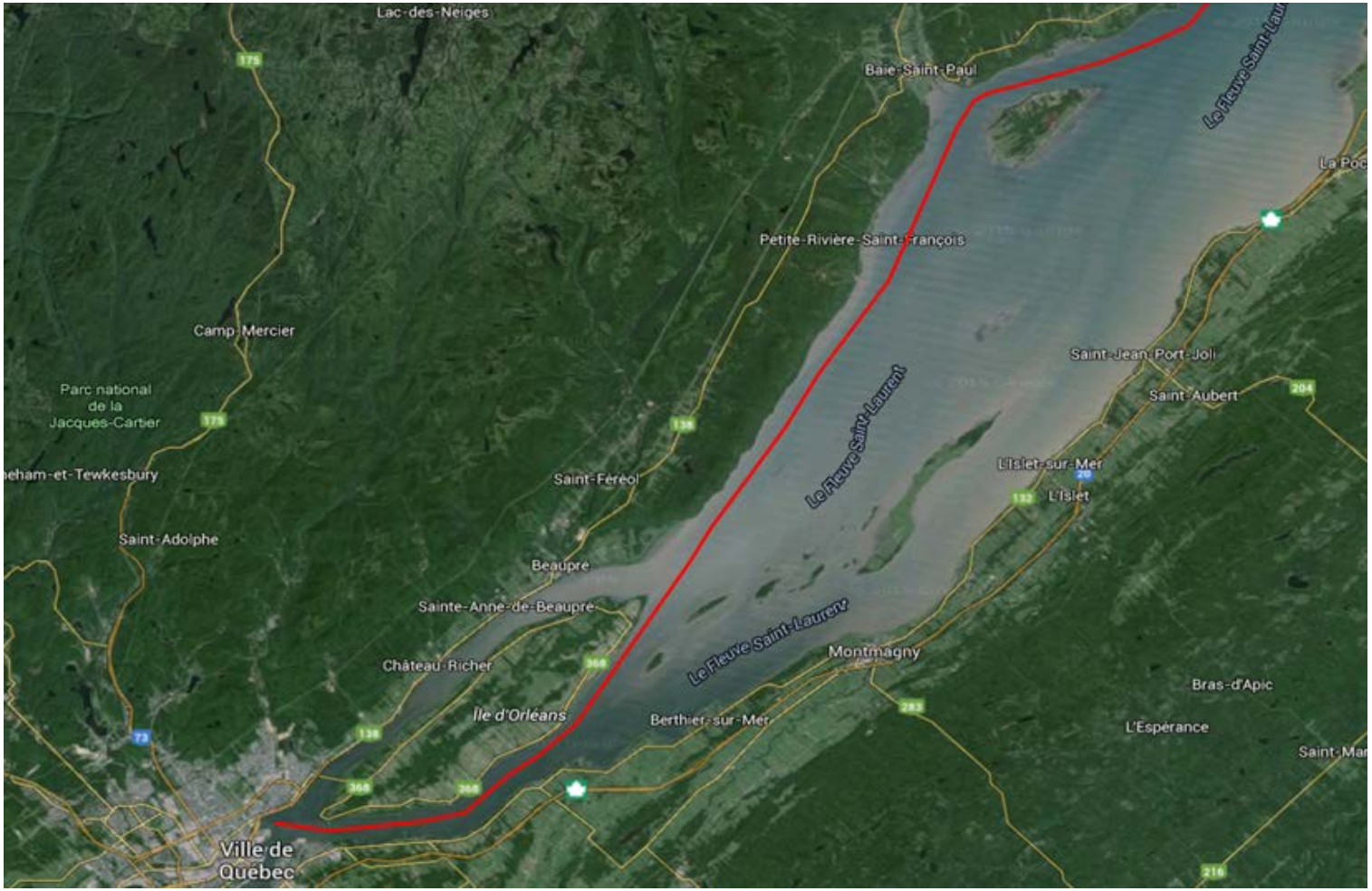

Figure 20: Overview of navigation routes[111]

[111] Routes superimposed on a Google Map: https://www.google.ca/maps/@47.0659203,-70.911923,97777m/data=!3m1!1e3.

APPENDIX 5: NAUTICAL CHARTS

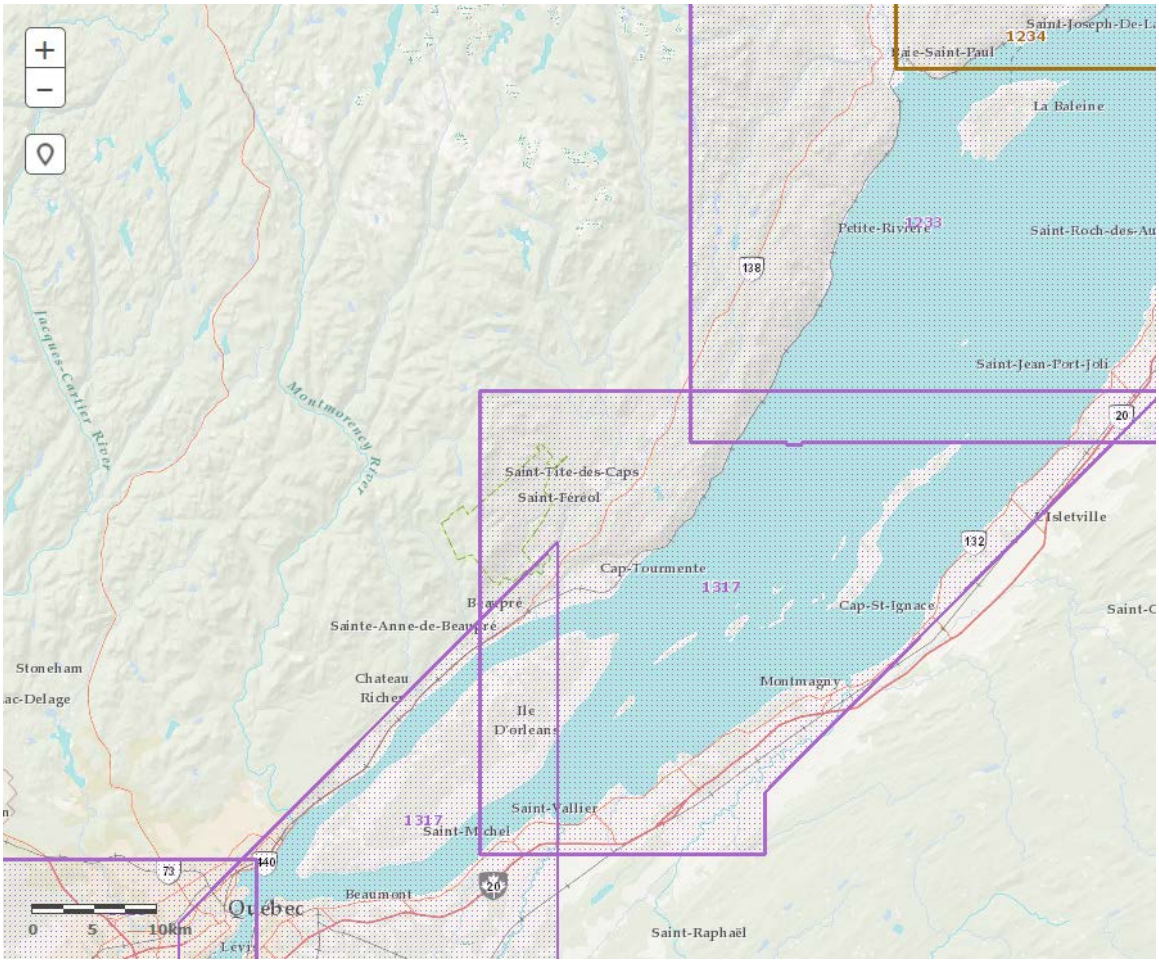

Figure 21: Nautical charts – Coasts and approaches[112]

Nautical Charts	
Number	**Title**
1234	*Cap de la tête au chien au/to Cap-aux-Oies*
1233	*Cap-aux-Oies à/to Sault-au-Cochon*
1317	*Sault-au-Cochon à/to Québec*
1315	*Québec à/to Donnacona*

[112] http://geoportal.gc.ca/eng/Maps/Viewer/9#fc

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