TP 13458E

PILOTAGE CERTIFICATE TRAINING FOR THE LAURENTIAN REGION (District II Quebec City-Les Escoumins)

Volume 1
Development of a Training Program

by

Institut maritime du Québec

for

Transportation Development Centre
Transport Canada

June 1999

Institut maritime du Québec
Cégep de Rimouski

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This report reflects the views of the authors and not necessarily those of the Transportation Development Centre of Transport Canada.

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16. Abstract

Following recommendations made in the report entitled *Modernization of the Pilotage Certification Process in the Laurentian Pilotage Region* (TP 13145E), the Institut maritime du Québec has been mandated to develop a training program based on the skills needed to obtain a pilotage certificate.

The process of developing a performance-based training program consists of several steps. The six usual steps are the following:

1. Work environment analysis;
2. Design of the draft training program;
3. Validation of the draft training program;
4. Development of objectives and standards;
5. Development of a training guide;
6. Development of an evaluation guide.

Volume 1 of TP 13458E presents the first four steps in four distinct parts.

1. Work environment analysis (document validated by the participants);
2. Draft training program (document used in step 3);
3. Training program validation;
4. Training program.

Volume 2 presents steps 5 and 6 in two parts, addressing those interested in obtaining a pilotage certificate.

1. Training guide
2. Evaluation guide – general information

Volume 3 (protected document, with restricted distribution) contains the *Evaluation Guide*, which consists of *General Information on Evaluation* and *Evaluation Checklists*.

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Volume 2 : *Guide pédagogique et Guide d'évaluation – Renseignements généraux.*
Volume 3 (protégé) : *Guide d'évaluation*.

16. Résumé

Conformément aux recommandations formulées dans le rapport intitulé *Modernisation du processus de délivrance des certificats de pilotage dans la région de pilotage des Laurentides*, TP 13145F, l'Institut maritime du Québec s'est vu confier le mandat d'élaborer un programme de formation fondé sur les compétences nécessaires à l'obtention du certificat.

Le processus d'élaboration d'un programme de formation, selon l'approche par compétences, comporte plusieurs étapes. Les six étapes habituelles sont les suivantes :

1. L'analyse de la situation de travail;
2. La conception du projet de formation;
3. La validation du projet de formation;
4. La rédaction des objectifs et des standards;
5. La rédaction du guide pédagogique;
6. La rédaction du guide d'évaluation.

Le volume 1 du TP 13458F regroupe les quatre premières étapes en quatre parties distinctes.

1. Analyse de la situation de travail (document validé par les participants);
2. Conception du projet de formation (document utilisé pour l'étape 3);
3. Validation du projet de formation;
4. Programme de formation.

Le volume 2 présente en deux parties, les étapes 5 et 6. Il s'adresse tout particulièrement à la clientèle intéressée par l'obtention de ce certificat de pilotage.

1. Guide pédagogique
2. Guide d'évaluation – Renseignements généraux.

Enfin, le volume 3 (document protégé à distribution restreinte) renferme l'ensemble du *Guide d'évaluation*, soit les *Renseignements généraux sur l'évaluation* et les *Cahiers d'évaluation*.

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SUMMARY

Background

The *Pilotage Act* stipulates that "no person shall have the conduct of a ship within a compulsory pilotage area unless the person is a licensed pilot or a regular member of the complement of the ship who is the holder of a pilotage certificate for that area." It further specifies that "no pilotage certificate shall be issued … unless the Authority designated for that area is satisfied that the applicant has a degree of skill and local knowledge … equivalent to that required of an applicant for a licence for that … area."

The new *Canada Marine Act*, passed in 1997, calls for a review of the procedure for issuing pilotage certificates in the light of the skills needed and the new technologies that are available. In the case of the Laurentian Pilotage Authority (LPA), a steering committee with representation from the LPA, Transport Canada, the Canadian Shipowners Association, the St. Lawrence Ship Operators Association, the Institut maritime du Québec, and the Transportation Development Centre hired the firm KPMG to investigate ways to modernize training and certificate issuing procedures. The results of the study, published in March 1998, are included in a report entitled *Modernization of the Pilotage Certification Process in the Laurentian Pilotage Region*, TP 13145E. The report's authors conclude that the procedure for issuing pilotage certificates needs revision to take account of new technologies, the specifics of the work environment, and the experience of candidates for pilotage certificates.

The study's recommendations with a direct or indirect bearing on development of the training program are:

- Build up a common core of knowledge as a source of coherent information accessible to all candidates;
- Set up a structured procedure for identifying what is available to students for training purposes, with particular attention to access to instructional materials;
- Develop a training program using a skills-based rather than a content-based method;
- Define clear objectives for candidates for pilotage certificates, tending away from a program based on knowledge and open-ended subjects and toward one based on performance, with standards to be met;
- Train candidates on a marine navigation simulator (which could also be used for the licensing procedure).

In the spring of 1998, pursuant to the study's recommendations, the steering committee mandated the Institut maritime du Québec to develop a training program based on the skills needed to obtain a pilotage certificate for the Laurentian Region.

Institut maritime du Québec procedure

The approach selected entailed defining essential professional skills and formulating them in the program in terms of objectives and performance criteria (or standards). Using the definition adopted by Quebec's department of education, a skill is:

an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.

To do this, the Institut joined forces with Éduc Action and identified six steps in the process best suited to meeting the stated need:

First step (13 and 14 January 1999): Analysis of the work situation. A working meeting of pilots, officers holding pilotage certificates, officers with a sound knowledge of the river, and a number of observers, resulted in a pooling of information for characterizing the profession, its duties, the skills and actions required, and suggestions for training. A paper entitled *Work Environment Analysis Report* was produced and submitted to participants to check for conformity with the meeting's findings.

Second step (February 1999): Design of a training program. Based on the initial determinants and data from the meeting, a draft program was produced and used for the next step. It was given the title *Draft Training Program*.

Third step (3 March 1999): Validation of the training program. A one-day validation meeting was held with pilots, officers with pilotage certificates, officers with extensive experience of the river, a representative of the Laurentian Pilotage Authority, and a representative of the St. Lawrence Ship Operators Association to improve and refine the draft. The fruit of this step was a document entitled *Validation Report of the Training Program*. This document was submitted to participants to check for quality and conformity.

Fourth step (late March 1999): Drafting of program objectives and standards. This step resulted in a document entitled *Training Program* (for marine pilotage certification, Quebec City-Les Escoumins).

The output of these first four steps was compiled in a single document entitled *Pilotage Certificate Training for the Laurentian Region (District II Quebec City-Les Escoumins)* – Volume 1, TP 13458E.

Fifth step (September 1999): Training guide. The *Training Guide* details program contents and suggested learning and teaching strategies. It is intended chiefly for teachers and trainers. It includes:

- information on the objectives and standards defined in the program;
- the weighting given to each skill to be developed;
- theoretical and practical teaching strategies, for the classroom and for distance teaching;
- an annotated bibliography as a reference source for certification candidates.

Sixth step (November 1999): Evaluation guide. The purpose of rating is to measure attainment of the skills identified in the training program. It assesses whether the certification candidate is qualified to direct and control the movements of a vessel safely and in a variety of circumstances in the waters of the district in question. The *Evaluation Guide* specifies:

- items to be rated;
- the weighting given to each such item;
- suggested rating methods.

Observable and quantifiable action is described for each item to be rated, directly linked to the performance criteria in the training program standards. Rating methods are selected on the basis of the skill to be tested, in a representative professional context. They may include:

- practical tests conducted in a simulator or through exercises on the river, etc.;
- tests of knowledge in the form of essay-type or multiple-choice examinations, case studies, and written or verbal presentations.

The training guide and the first part of the evaluation guide (general information) have been made public so that certification candidates can study effectively, either alone or in class, and can become familiar with the broad principles of the rating methodology. These constitute Volume 2 of TP 13458E.

The *Evaluation Guide* repeats the general information on rating and includes another part entitled *Evaluation Checklists*. They make up Volume 3 (protected) of TP 13458E, circulation of which is restricted to the Laurentian Pilotage Authority.

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PRODUCTION TEAM

The following persons were responsible for the work environment analysis, the training program validation meeting, and all other work associated with the preparation of this report:

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The Institut maritime du Québec management wish to highlight the pertinence and quality of the information provided by the participants and wish particularly to thank the professionals and observers who generously agreed to take part in the work environment analysis workshop. Their expertise made it possible to clarify certain aspects of the work.

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* Special thanks are extended to James Wilhelm, who authorized the use of his work entitled *Pilotage Primer*.

PART 1

Work Environment Analysis Report

February 1999

WORKSHOP PARTICIPANTS

The following persons participated in the work environment analysis workshop regarding pilotage in Marine District II, Quebec-Les Escoumins, which took place in Ste. Foy on 13 and 14 January 1999.

Participants

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INTRODUCTION

The purpose of this document is to organize and synthesize the information gathered during the work environment analysis workshop. Since the successful development of a performance-based training program depends directly on the validity of the information obtained at the beginning of the design phase, a particular effort was made both to present in the document all the data obtained during the workshop and to ensure that these data reflect actual working conditions.

The workshop brought together holders of pilotage certificates, licensed pilots, and ship's masters who agreed on a general description of the work. They defined the related tasks, operations, and suboperations, as well as the actual working conditions and performance criteria that make it possible to evaluate the quality of job performance.

The document also sets out the knowledge factors, abilities, aptitudes, and attitudes that are required. The last section of the report is devoted to training-related suggestions.

Participants contributed their expertise throughout the process. They were thus able to shed light on similarities and differences between the work and the work environment of licensed pilots and holders of pilotage certificates. This information will serve to accurately define the context of the training program.

1 GENERAL DESCRIPTION OF THE PROFESSION

1.1 General information

1.1.1 Context of the work under study

Navigational conditions on the St. Lawrence River are unique, varied, and difficult. Safe conduct of ships in the restricted waters and the fairways of the St. Lawrence demands a great deal of expertise, as well as a thorough knowledge of the passages and climate.

The Laurentian Pilotage Authority (LPA) is one of the four pilotage authorities authorized under the Pilotage Act of Canada – the others are the Atlantic, the Great Lakes, and the Pacific authorities. The mandate of the LPA is, among other things, to provide an effective pilotage service to the area of the St. Lawrence that it serves. The waters under its jurisdiction are divided into five zones as follows:

I.I Montreal Harbour;
I from Montreal to Trois Rivières,
from Trois Rivières to Quebec;
II from Quebec to Les Escoumins, including the Saguenay;
III downstream from Les Escoumins.

The first four zones are marine districts where pilotage is compulsory, while the last zone is not.

Each marine district has navigating conditions specific to itself and requires knowledge and expertise of local conditions. In the context of this analysis of the work environment, only Marine District II – i.e., the area between Les Escoumins and Quebec – has been targeted for this study.

1.1.2 Work under study and approved titles

At the start, the guest specialists were asked what titles were most frequently used to designate the job function under examination. The titles “licensed pilot” and “certified officer” were mentioned as designations for the two types of accreditation in the pilotage domain. For the purposes of this module, we will use the titles “licensed pilot” and “holder of a pilotage certificate”.

Even if the duties performed by licensed pilots and officers who hold pilotage certificates have several similarities, there are, however, significant differences in the circumstances. Licensed pilots board any type of ship, whether Canadian or foreign flagged, and are responsible for ensuring their safe passage through those waters of the St. Lawrence designated as compulsory pilotage areas. Officers or masters who hold pilotage certificates, however, are authorized to pilot a ship only in a given marine district and only if they are crew members. The master is, under all circumstances, in ultimate control of his ship, even when a licensed pilot or the holder of a pilotage certificate has the conduct of the ship. Unlike licensed pilots, holders of pilotage certificates generally work for shipowners.

1.2 Definition of the profession

The participants at the work environment analysis workshop agreed on a definition of the job function as it is performed in Marine District II between Quebec and Les Escoumins. The purpose of this definition is to clarify our understanding of the profession, not to replace other official definitions.

Marine pilotage is a navigation specialization, which consists of directing and controlling the movement of a ship in inland and coastal waters where pilotage is compulsory. In this context, specific local knowledge is necessary. Under the Pilotage Act, this work must be performed in compulsory pilotage areas by competent persons accredited by an independent government authority, in this case the LPA. These authorized persons are either licensed pilots, ship's masters, or other officers who hold pilotage certificates. Licensed pilots work on all types of ships on the St. Lawrence, whereas holders of certificates may act as pilots aboard ships only if they are regular members of the crew. In each case, the person must be able to safely assume the conduct of the ship in all weather conditions. He must also be able to deal with various emergency situations specific to navigation in coastal waters and in fairways. Notwithstanding the duties and obligations of a pilot, his presence on board does not relieve the master or the officer of the watch of his duties and obligations in respect of the safety of the ship.

When a licensed pilot is on duty, the master or the officer of the watch must co-operate closely with him, and carefully and continuously monitor the ship's position and movements. The master and the licensed pilot must exchange information on the conduct of the ship, local conditions, and the characteristics of the ship.

Appendix A provides a description of the profession provided to us by a workshop participant.

1.3 Working conditions and the work environment

1.3.1 Working conditions

Holders of pilotage certificates must work under the conditions that prevail on the ship's bridge. They are exposed to average intensity noise and to the slight vibrations caused by the proximity of instrumental aids to navigation, including the radar and the gyro compass. The quality of the work environment depends in large part on the type of ship, its age, and its maintenance. Finally, fatigue due to long shifts may reduce tolerance of the more difficult ambient conditions.

Licensed pilots work under very similar conditions. What is different in their case is the great variety of ships they are required to pilot. Thus, the vibrations they feel may be amplified, depending on propulsion and type of screws. False alarms cause needless worry. Hygiene and cleanliness sometimes leave much to be desired and acceptable standards vary as a function of culture. Certain ships may present potential risks, depending on where they called before entering Canadian waters. Ships may not be adapted to our weather conditions, they may not be well heated, and the crew may not be able to operate the heating system properly. Finally, workshop

participants mentioned that licensed pilots must adapt to crews of different origins, cultures, and levels of skill. They occasionally have to instruct the crew on how to improve the quality of shiphandling. They may even have to require that the ship be stopped, if they deem that its safe passage in the marine district has been compromised.

Among stressful factors, holders of pilotage certificates mention weather and atmospheric conditions, traffic density, emergency situations, the condition of the navigational equipment, the skill level of the crew, and fatigue resulting from irregular meal and rest periods and very long shifts. Some found it difficult to delegate tasks and trust the crew. Others have difficulty dealing with absence from their family and experience anxiety whenever family incidents occur.

Licensed pilots experience the same stress factors. In addition, there are the cultural and linguistic differences they meet on ships sailing under foreign flags, the need to adapt to ships' handling characteristics and ships' crews. As an example, they mentioned the stress involved in accurately assessing the draught in relation to the under-keel clearance.

Stress manifests itself in different ways and the ability to manage it varies from one person to another. Apparently, ill health increases tension levels. One participant mentioned that Dr. Yassi Berger, in a work entitled *Port Philip Sea Pilots*, published in Melbourne, Australia, considers the level of stress associated with the profession to be very high. Finally, participants believe that the high level of responsibility and the complexity of the decisions they have to make constitute significant stress factors.

The master has ultimate responsibility for the ship. Regulations limiting the number of consecutive hours at the conning position on the bridge are difficult to enforce. Even when he is resting, the officer of the watch will call the master if there is a major problem. When he is the holder of a pilotage certificate, he cannot delegate the pilotage to an officer who is not. Under these circumstances, fatigue must be considered a significant risk factor. Among the sources of danger, participants count the fact that licensed pilots must board ships and leave them, whether alongside or under way using ladders or any other available device.

Pilotage requires that they constantly make shiphandling decisions. The licensed pilot or the officer holding a pilotage certificate works in co-operation with the master, informing him of his decisions and, with the master's consent, executes the manoeuvres. He must be able to make correct decisions under all conditions.

LPA regulations stipulate that the presence of two pilots is required under certain circumstances – for example, when the passage exceeds eleven hours, during winter navigation, depending on the type of ship and its tonnage. The participants mention oil tankers as an example of ships requiring more than one pilot.

On an annual basis, pilotage work is marked by periods of activity as well as downtime. The pilot could, for example, work for a month and be off for a month. The ratio of time-on to time-off varies from one company to another and from year to year, depending on the circumstances. Along the same lines, work schedules and hours worked are irregular and overtime is frequent.

Finally, it should be mentioned that, to ensure the safety of the ship, licensed pilots and holders of pilotage certificates are governed by the same laws and regulations as all other mariners. The list of these laws and regulations appears in Appendix B of this module.

1.3.2 Conditions for entering the profession

Selection criteria for certificate candidates are set out by regulation. Certification eligibility is limited to experienced mariners, either officers or masters. To obtain a pilotage certificate, they must demonstrate that they have acquired the knowledge and the skills specific to navigation in confined waters, as stipulated in the study program developed by the LPA (see Appendix C).

Whether it be licensed pilots or holders of pilotage certificates, the type of person sought must be able to make quick decisions. Piloting experience and knowledge of local geography are required because of the difficulties and dangers involved in navigating in several sectors. The pilot must be able to approach the hazard and bring the ship through safely. He must be able to manage stress and establish an atmosphere of trust and confidence with the bridge watch. He is also required to demonstrate leadership and be able to communicate information to the crew. He must be able to reassure the master, especially if the master is inexperienced. Inexperience could lead to a lack of confidence. Among qualities appreciated in the profession, workshop participants also listed judgement, patience, the seaman's ability to anticipate situations, a habit of observation, and adaptability. Finally, pilotage demands in-depth general and local knowledge and pilots are required to keep this knowledge up-to-date.

1.3.3 Presence of women in the profession

In Marine District II, Quebec-Les Escoumins, no women are licensed pilots or holders of pilotage certificates.

1.4 Profile of the pilot

1.4.1 Aptitudes

Pilotage work requires certain aptitudes such as the ability to learn, perform mental calculations, to express ideas orally and in writing; spatial perception, perception of forms, eye, hand, and foot co-ordination, especially when climbing ladders, as well as manual and digital dexterity for using navigational instruments. Being able to distinguish colours is considered essential. Balance is also necessary to deal with ship's roll. The pilot must demonstrate great physical endurance to deal with the long hours and the cold aboard certain ships. The job function sometimes requires that licensed pilots be in good physical condition because they have to climb ladders in sometimes difficult weather conditions.

1.4.2 Job interest factors

Certification candidates should:

- like working with data, people, and things;
- like work that is at times routine, concrete and organized, yet varied and changing, especially for the licensed pilot;
- like to maintain professional relations and human contacts, especially with the crew on the bridge;
- like work that confers prestige and respect;
- like scientific and technical work;
- like activities that translate into tangible results;
- like directing, controlling, and organizing;
- like exerting their influence, for example, by persuading the crew of the soundness of their decisions;
- like working in crisis and unforeseen situations;
- like working with precision, within established limits, tolerances, and standards;
- like making observable and verifiable judgements;
- love their work.

1.5 Trends and future developments

Workshop participants noted the way pilotage was changing. In the first instance, they pointed out that, because of budget restrictions, the Canadian Coast Guard intends to reduce the number of navigation aids currently in place.

Participants also discussed the increasing use of instruments based on new technologies, such as the electronic chart and other electronic instruments. All aspects of pilotage work are affected by these changes.

The invited specialists also pointed out that the number of experienced personnel on ships was diminishing, listing among the reasons retirements and advancement of officers and pilots who move on to jobs with greater responsibilities. This leads to a surplus of work since the masters have to train new personnel. Participants were of the opinion that this situation would only get worse.

Along different lines, participants noted a deterioration in crew competence on some foreign ships, which complicates the work of licensed pilots.

Participants felt that, in the next five years, ship’s masters would see a significant increase in their clerical work.

Finally, participants felt that, in the near future, pilots would have access to a virtual navigation system for doing simulations. The product already exists but production and marketing costs are

very high. One or more manufacturers would have to be found who would be willing to make the necessary investments. This simulation system has many advantages. Small in size, it would be easy to use. It would also be economical because it would make it possible to repeat manoeuvres without risk of damage. However, while the simulator presents definite advantages, candidates will still have to acquire experience with real-time shiphandling situations.

2 JOB DESCRIPTION

2.1 General information

First, the current chapter presents, in Tables 1a and 1b, a synopsis of the tasks and operations associated with marine pilotage. Subsequently, these tasks, along with their subsidiary tasks, are reviewed. Additional information has been included to spell out tasks in greater detail. Next, Table 2 outlines the relative importance of the tasks, followed by the working conditions and the performance criteria that make it possible to verify the quality of the work performed for each task.

Table 1a Synopsis of tasks and operations regarding holders of pilotage certificates as well as licensed pilots

The tasks	The operations
1. Planning the passage in the marine district	1.1 Prepare course plan 1.2 Check instrument precision 1.3 Obtain information from Vessel Traffic Services 1.4 Determine course to steer to compensate for current 1.5 Determine time of passage through areas of greatest risk
2. Ensuring a smooth and safe passage in the marine district	2.1 Verify ship's position on a continuing basis 2.2 Analyse information obtained from the crew and Vessel Traffic Services 2.3 Report to Vessel Traffic Services 2.4 Give helm, steering, and engine orders 2.5 Manoeuvre the ship in accordance with weather conditions 2.6 Change pilots, where applicable
3. Performing specific manoeuvres in the marine district	3.1 Perform departure and docking manoeuvres 3.2 Perform anchoring manoeuvres 3.3 Follow the instructions of the master of the icebreaker when the ship is under escort
4. Performing specific manoeuvres in emergency situations	4.1 Perform manoeuvres to avoid catastrophes in emergency situations 4.2 Evaluate potential environmental damage 4.3 Evaluate the need for towing assistance 4.4 Update knowledge of emergency plans
5. Training replacements	5.1 Train candidates for certification

Table 1b Synopsis of tasks and operations pertaining to licensed pilots only

6. Gathering and transmitting specific information about the ship and navigation in the marine district upon arrival on the ship	6.1 Obtain information on ship's characteristics 6.2 Inform the master about the particular characteristics of the marine district 6.3 Establish trust and confidence between the pilot and the bridge watch 6.4 Evaluate the ship's performance and behaviour
7. Training replacements	7.1 Develop course content and give courses (local knowledge, general knowledge, etc.) 7.2 Train candidates for certification

2.1.1 Tasks, operations, and suboperations for piloting a ship in the Quebec-Les Escoumins marine district

The work environment analysis workshop participants agreed on the definitions of five tasks relating to pilotage performed by officers holding pilotage certificates as well as by licensed pilots. They also identified two additional tasks that apply only to licensed pilots.

The operations relate to the stages of performing a task, while the suboperations make it possible to be more specific about the details necessary for understanding the nature of the operations.

Task 1: Planning the passage in the marine district

1.1 Prepare course plan
- 1.1.1 Check pertinent documentation
- 1.1.2 Trace primary courses (and secondary courses, if necessary)
- 1.1.3 Identify course changing points
- 1.1.4 Identify courses and distances to be covered
- 1.1.5 Establish safety limits for each section of the course (cross track)
- 1.1.6 Establish the safe speed for each section of the course
- 1.1.7 Identify dangers on the course
- 1.1.8 Indicate navigation aids
- 1.1.9 Trace safety bearings
- 1.1.10 Plan emergency manoeuvres (anchoring)
- 1.1.11 Record currents (direction and velocity)
- 1.1.12 Prepare a plan for parallel index technique

1.2 Check instrument precision
- 1.2.1 Check gyro compass
- 1.2.2 Check radar (bearings, distance, heading line, control, others)
- 1.2.3 Check GPS and DGPS
- 1.2.4 Check echo sounder
- 1.2.5 Check VHF radio, etc.

1.3 Obtain information from Vessel Traffic Services
- 1.3.1 Obtain traffic information
- 1.3.2 Evaluate ice conditions
- 1.3.3 Inquire about current and future weather conditions
- 1.3.4 Read Notices to Shipping

1.4 Determine the course to steer to compensate for current
- 1.4.1 Evaluate current and future tidal points
- 1.4.2 Estimate ship's speed
- 1.4.3 Estimate drift

1.5 Determine time of passage in areas of greatest risk
- 1.5.1 Evaluate window of passage in relation to the tide
- 1.5.2 Assess squat

Task 2: Ensuring a smooth and safe passage in the marine district

2.1 Check ship's position on a continuing basis
- 2.1.1 Check accuracy of position using navigation aids
- 2.1.2 Check quality of reception of DGPS and any other tracking system
- 2.1.3 Use visual and electronic navigation aids such as radar, GPS, echo sounder, electronic chart generated by ECDIS. If all else fails, make an estimate
- 2.1.4 Maintain constant lookout (reference marks, obstacles, manoeuvring room, etc.)

2.2 Analyse information provided by the crew and Vessel Traffic Services
- 2.2.1 Read Notices to Shipping
- 2.2.2 Get current and forecast weather
- 2.2.3 Get traffic information
- 2.2.4 Evaluate tides
- 2.2.5 Estimate time and place for meeting the ship

2.3 Report to Vessel Traffic Services
- 2.3.1 Estimate the time of arrival at the next calling-in point or next pilot station
- 2.3.2 Report position and estimated time of arrival at these points
- 2.3.3 Report any incidents or position errors involving navigation aids

2.4 Give helm, steering, and engine orders
- 2.4.1 Order course and speed changes via helm and engine orders
- 2.4.2 Ensure that orders have been well understood and executed
- 2.4.3 Verify the results after orders have been executed
- 2.4.4 Verify ship's speed and leeway
- 2.4.5 Ensure that officer of the watch follows the course plan
- 2.4.6 Ensure an adequate exchange of information when watches are relieved

2.5 Handle the ship in accordance with weather conditions

Sea spray and fog

2.5.1 Adopt a safe speed

2.5.2 Alert the master to the possibility of ice formation on superstructures (in cases where he is not also the pilot)

2.5.3 Double the lookout

2.5.4 Navigate with the help of available instruments

Heavy weather

2.5.5 Adopt a safe speed

2.5.6 Inform the master if there is a risk of grounding or any other risk, as applicable

2.5.7 Advise the master as required

2.5.8 Evaluate and use alternative positioning methods

Winter

2.5.9 Ensure good visibility from the bridge

2.5.10 Ascertain ice conditions (type and density)

2.5.11 Confirm with the chief engineer that suctions are and remain free of ice

2.6 Change pilots, where applicable

2.6.1 Inform pilot station of time of arrival

2.6.2 Provide information about course, speed, aids available on the ship, errors in available navigation instruments, etc.

Task 3: Performing specific manoeuvres in the marine district

3.1 Perform departure and docking manoeuvres

3.1.1 Learn the ship's handling characteristics

3.1.2 Evaluate the need for towing assistance and give orders to the master of the tug, if necessary

3.1.3 Verify the proper functioning of navigational equipment and machinery

3.1.4 Obtain departure or docking authorization and traffic information from Vessel Traffic Services

3.1.5 Establish, with the bridge watch, a docking or departure plan

3.1.6 Perform the planned manoeuvres

3.1.7 Inform Vessel Traffic Services that the manoeuvres are complete

3.2 Perform anchoring manoeuvres

3.2.1 Inform Vessel Traffic Services of your intentions

3.2.2 Establish, with the bridge watch, an anchoring plan (estimated position, anchor to use, length of cable, nature of the bottom, swing space, appropriate signals, etc.)

3.2.3 Ensure that position will be maintained

3.2.4 Inform Vessel Traffic Services that manoeuvres are complete

3.3 Follow instructions of the master of the icebreaker when the ship is under escort

Task 4: Performing specific manoeuvres in emergency situations

4.1 Manoeuvres to avoid catastrophes in emergency situations
- 4.1.1 Evaluate the situation rapidly
- 4.1.2 Take action as rapidly as possible in accordance with the nature of the emergency
- 4.1.3 Inform the master, where applicable
- 4.1.4 Consider the possibility of anchoring immediately or at an anchorage
- 4.1.5 Consider the possibility of grounding the ship
- 4.1.6 Inform Vessel Traffic Services

4.2 Evaluate possible environmental damage
- 4.2.1 Make appropriate decisions according to the circumstances of the accident

4.3 Evaluate need for towing assistance

4.4 Update knowledge about emergency plans

Task 5: Training replacements

5.1 Train candidates for certification
- 5.1.1 Provide knowledge about the ship's characteristics
- 5.1.2 Explain and show the various techniques for navigating in narrow fairways
- 5.1.3 Offer assistance in learning tasks required for piloting in various situations
- 5.1.4 Test what was learned
- 5.1.5 Use feedback to correct gaps in knowledge

2.1.2 Additional tasks, operations, and suboperations required of licensed pilots

To make a clear distinction between the work of licensed pilots and the work of masters or officers who hold certificates, workshop participants defined two additional tasks. We offer them below along with their operations and their suboperations.

Task 6: Collecting and transmitting specific information about the ship and navigation in the marine district upon arrival on the ship

6.1 Inquire about the characteristics of the ship
- 6.1.1 Collect data on draught, type of propulsion, ship's cargo, length, beam and draught of the ship, turning radius, stopping distance, squat, handling speed, cruising speed, engine power and its critical revolutions, bow thruster, type of rudder, emergency stop, etc.

6.2 Inform the master of the specific conditions in the area
- 6.2.1 Inform the master about current and future tides, weather forecasts, speed reductions and anticipated traffic, ice conditions in the area, and where applicable, the need for a tug and a branch pilot, etc.

6.2.2 Inform the master about the language used on the St. Lawrence, if necessary
6.2.3 Inform the master about local regulations

6.3 Establish trust and confidence between the pilot and the bridge watch
6.3.1 Give judicious advice about the special features of the passage
6.3.2 Give precise and clear instructions
6.3.3 Demonstrate professionalism
6.3.4 Inform the bridge watch of intentions and expectations as pilot
6.3.5 Reassure the bridge watch
6.3.6 Inform the master if you have previously piloted this ship

6.4 Evaluate ship's performance and behaviour
6.4.1 Check speed
6.4.2 Evaluate response to helm
6.4.3 Check accuracy and calibration of electronic navigational aids
6.4.4 Ascertain the time it takes to go from cruising speed to manoeuvring speed
6.4.5 Inquire about the time required to go full astern
6.4.6 Inquire whether both steering engines are in operation
6.4.7 Inquire whether anchors are ready to be let go
6.4.8 Inquire whether mooring lines are ready
6.4.9 Inquire whether machinery cooling system is functioning and adequate

Task 7: Training replacements

7.1 Develop course content and give courses (local knowledge, general knowledge, etc.)

7.2 Train candidates for certification
7.2.1 Supplement acquired knowledge regarding ships' handling characteristics
7.2.2 Provide knowledge about the ships' characteristics
7.2.3 Explain and demonstrate various techniques for negotiating narrow fairways
7.2.4 Teach tasks required to pilot under varying conditions
7.2.5 Test what was learned
7.2.6 Use feedback to correct gaps in knowledge

2.1.3 Additional information regarding tasks, operations, and suboperations

This section reports comments made by the invited specialists on tasks, operations, and suboperations listed above.

Task 1: Planning the passage in the marine district

Each marine district presents its own peculiarities as regards tides, micro-climates, dangerous areas, etc. Planning is necessary to ensure a smooth passage and to avoid disasters and incidents on the way. The preparation of a course plan is usually done formally, but it is sometimes done mentally.

Masters and officers who hold certificates and have to pilot the same ship in a given district must develop a plan for the initial passage. After that, it is sufficient to follow the established plan, making corrections and adapting it to any new conditions that are likely to occur.

However, licensed pilots must resort to a new plan for each passage, since they navigate different ships. They must take into account ship's characteristics, speed, and safety limits on the river. They must establish a clear understanding with the master or the officer of the watch, as well as with other crew members.

Task 2: Ensuring a smooth and safe passage in the marine district

Participants focussed on suboperation 2.1.4, *Ensure a constant watch*. Monotony can cause distraction. This real danger threatens all seamen when least expected. Pilots must remain alert throughout the passage and demonstrate their ability to anticipate.

Sea spray and fog are factors that reduce visibility. Sea spray occurs when the bow of the ship dips into the wave and the wave hits the bridge and forms a spray. It appears that sea spray occurs more frequently when sailing on the open sea. Nevertheless, some areas on the St. Lawrence, Les Escoumins being one, involve risks. Ship's tonnage has a direct bearing on the amount of sea spray. Reduced visibility calls for pilotage by instruments. Speed must be reduced and the number of lookouts increased. It would also be appropriate to check the contour of the coastline because its configuration can change with low tide, high tide, or in the presence of ice.

Bad weather brings gales, high seas, or storms. It is important to reduce speed and take the required precautions immediately.

Pilots must pay special attention when they navigate through difficult or narrow passages or when visibility is reduced.

Use of electronic instruments like radar and ECDIS-generated charts is increasing on Canadian ships. Masters or officers who hold pilotage certificates and who are familiar with the handling of their ships use these electronic aids most of the time. However, when weather is bad, electronic equipment may be less reliable or even unusable. In such cases, they must rely on available traditional navigation and visual aids.

Licensed pilots, for their part, rely as much on conventional aids as on electronic instruments. This is due to the fact that up-to-date equipment is not as common on foreign ships. Consequently, licensed pilots have to fall back on traditional navigation aids. Occasionally, ships are fitted with antiquated instruments. In such cases, if they judge the equipment to be too faulty or too dangerous to continue the passage, pilots have the right to stop the ship.

Workshop participants felt that all good pilots, whether licensed or certificated, must be able to operate all available navigational aids to bring the ship through safely. Pilots must gather data from various sources, enabling them to make enlightened decisions or to validate their choices, whether the data come from electronic instruments or visual aids.

Task 3: Performing specific manoeuvres in the marine district

St. Lawrence ports have their own particular characteristics. Workshop participants were of the opinion that they all present docking difficulties because of tides and currents. Among others, they mentioned the wharves at Pointe au Pic, Grande Anse, Cacouna, and La Baie. In St. Romuald, there are inner and outer wharves that affect manoeuvring. In addition, the danger is increased by the fact that ships that berth there are tankers.

Task 4: Performing specific manoeuvres in emergency situations

Emergency plans, mentioned in suboperation 4.4, are partially included in the Procedures Guide – Bridge.

While navigating on the St. Lawrence and specifically in Marine District II, ships will encounter more obstacles than at sea. In emergency situations pilots have to operate under various constraints. The safety margin in several places is very narrow and any course change becomes risky. The reaction time may be very short; it is therefore important to make sound decisions quickly. In some places, deep water rules out anchoring.

All along the river, pilots must be conscious of the marine environment and the need to protect it. Pollution causes immense damage to marine fauna and flora. Piloting supertankers calls for increased measures to prevent potential major ecological disasters.

Task 6: Gathering and transmitting specific information about the ship and navigation in the marine district upon arrival on the ship

This task applies only to licensed pilots. To perform it well, they must look to the recommendations contained in the Recommended Nautical Practices Code, as well as in the Procedures Guide – Bridge.

Tasks 5 and 7: Training replacements

Even though these tasks are both set out in the same way, the operations differ depending on who performs them – a licensed pilot or an officer who holds a pilotage certificate.

Licensed pilots have a duty to train apprentice pilots or candidates for certification. Masters and officers who hold pilotage certificates may be called upon to train replacements. However, they must respect the limits of their certificate regarding which ship and in which marine district they are qualified to pilot.

2.1.4 Relative importance of tasks

Table 2 sets out the relative importance of tasks and deals exclusively with tasks common to licensed pilots and officers holding pilotage certificates.

Usually, this table shows the percentage of time allotted to performing the task, its degree of difficulty, and its effect on results. In this case, times allotted to the tasks cannot be compared because the times depend on other factors. Indeed, the lengths of the passages vary as do the types and numbers of manoeuvres necessary. Moreover, emergency situations occur sporadically and cannot be predicted in advance.

The ratings outlined in Table 2 represent the averages of the data suggested by the workshop participants. They were asked to evaluate the degree of difficulty, keeping in mind the required knowledge, the degree of precision required, the dangers associated with the performance of the tasks, the level of responsibility, and the complexity of the decisions and problems encountered. In the third column, the effect on the results is associated with the safe passage of the ship in the marine district.

Table 2 Relative importance of tasks common to licensed pilots and officers holding pilotage certificates

Tasks	Time allotted* (%)	Degree of difficulty (1 to 5)	Effect on results (1 to 5)
1. Planning the passage in the marine district	–	2.8	4.2
2. Ensuring a smooth and safe passage in the marine district	–	3.7	4.5
3. Performing specific manoeuvres in the marine district	–	3.5	4.0
4. Performing specific manoeuvres in emergency situations	–	4.7	4.7
5. Training replacements	–	2.2	2.3

Legend:
Percentage of time allotted to each task: the total should come close to 100%
Degree of difficulty of the task: 1 = very easy 5 = very difficult
Effects on results: 1 = little importance 5 = great importance

* It is important to refer to the interpretation of the results presented in Table 2.

2.2 Additional information

The tables that follow deal with the general performance conditions and performance criteria for each task performed by officers holding pilotage certificates. It should be mentioned that these tasks are also performed by licensed pilots. Participants agreed to limit the table to tasks that are part of the training program, that is to say, those tasks that are relevant to the work of holders of pilotage certificates.

The column on the left side of each table sets out the conditions under which a task is performed. In the column on the right are the criteria that make it possible to evaluate whether the task was performed in a satisfactory manner.

Task 1: Planning the passage in the marine district

Performance conditions	Performance criteria
As a team: – bridge watch **Under supervision:** – the work is unsupervised, but the pilot must obtain the approval of the master **Others:** – Vessel Traffic Services _____ **Stress factors:** – none **Danger to health and safety:** – none **Technical documents:** – nautical charts; – sailing instructions; – tide and current tables; – Notices to Shipping; – others. **Materials, tools, and equipment:** – navigational instruments; – plotting materials; – a computerized system with electronic chart; – a VHF radio.	**The product or the results:** – accuracy and exhaustiveness of the course plan; – clarity of information. **The work process:** – steps to observe: tracing the course to be made good; defining margins of error; defining navigation by the artificial alignment of the radar, if possible **Knowledge and abilities:** – basic navigation knowledge and abilities; – knowledge of the ship's capacity; – knowledge of local tides, currents, distances, difficult passages, and topography; – programming the passage on the instruments; – seeking out information. **Perceptions:** – nil **Aptitudes and attitudes:** – concentration; – capacity to analyse and synthesize; – teamwork; – patience; – curiosity – seeking out information; – meticulousness.

Task 2: Ensuring a smooth and safe passage in the marine district

Performance conditions	Performance criteria
As a team: ✓ **Without supervision** **Others:** – Vessel Traffic Services **Stress factors:** – poor navigating conditions, such as weather, ice, difficult tide points, other; – ship's dimensions and draught; – poor equipment performance; – unfamiliarity with crew; – dense traffic; – schedules to be met. **Dangers to health and safety:** – fatigue due to irregular working hours **Technical documentation:** – nautical charts; – sailing directions; – Notices to Shipping; – tide and current tables; – Rules of the Road and List of Lights; – equipment handbooks; – Code of Navigation Practices and Procedures; – Navigation Procedures Handbook. **Material, tools, and equipment:** – navigational instruments such as radar, gyro compass, GPS, DGPS, ECDIS-generated chart, VHF radio, and engine room telegraph; – rudder system and its indicator; – binoculars, clock, barometer; – writing and plotting materials; – engine order repeaters.	**The product or the results:** – compliance with the passage plan and safety limits; – conduct adapted to surrounding conditions; – harmony and understanding among crew members. **The process:** – clarity and precision of orders; – verifying whether orders were understood; – decisions made at appropriate moments. **Knowledge and abilities:** – appropriate use of equipment; – interpretation of data from equipment; – basic navigation knowledge and abilities; – local knowledge; – knowledge of ship's peculiarities and capabilities; – precautions to be taken in dangerous areas. **Perceptions:** – visual and auditory awareness; – judgement of distances and speeds; – constant attention and vigilance; – intuition and deductive reasoning. **Aptitudes and attitudes:** – leadership; – clear, concise, and precise expression of thought; – humane attitude; – self-confidence to promote confidence on the bridge.

Task 3: Performing specific manoeuvres in the marine district

Performance conditions	Performance criteria
As a team: ✓ **Under supervision:** – the work is not supervised but the pilot must obtain the approval of the master when the master is not the pilot **Others:** – Vessel Traffic Services and the crew of the tug, when applicable **Stress factors:** – weather conditions; – defective equipment; – time allowed for manoeuvres. **Dangers to health and safety:** – stress-related illnesses; – handling of mooring lines and various pieces of gear. **Technical documentation:** – current and tide tables; – Recommended Nautical Practices Guide; – information regarding manoeuvres; – information from Vessel Traffic Services. **Material, tools, and equipment:** – radar; – bow thruster; – ECDIS-generated chart; – communications system; – etc.	**The product and the result:** – efficiency of manoeuvres; – absence of material damage; – protection of the environment. **The process:** – continued supervision throughout the process; – clarity and precision of orders. **Knowledge and abilities:** – basic knowledge of human relations; – local knowledge; – knowledge of ship's peculiarities; – communication with the crew. **Perceptions:** – sense of observation; – intuition. **Aptitudes and attitudes:** – sense of responsibility required to assume the consequences of one's actions and decisions; – capacity to evaluate situations and to respond to all eventualities; – meticulousness; – sense of organization.

Task 4: Performing specific manoeuvres in emergency situations

Performance conditions	Performance criteria
As a team: ✓ **Under supervision:** – the work is not supervised, but the pilot must obtain the approval of the master **Others:** – Vessel Traffic Services _____ **Stress factors:** – fear of a disaster; – limited reaction and manoeuvring times; – fear of damage to the environment and to the ship; – safety of the crew; – need to keep a cool head. **Dangers to health and safety:** – stress-related illnesses such as heart attacks **Technical documentation:** – emergency procedures of the International Safety Management Code (ISM) **Material, tools, and equipment:** – portable transmitter-receiver; – communication system; – anchors; – equipment used for grounding.	**The product and the results:** – safe anchoring while limiting damage; – proper execution of grounding as planned. **The process:** – rapid analysis of the emergency situation; – respect of emergency procedures (ISM); – clarity and precision of orders. **Knowledge and abilities:** – knowledge of the nature of the bottom in case of grounding; – local knowledge; – capacity of the anchors; – seeking and communicating information; – traffic density in the area. **Perceptions:** – reaction speed following perception **Aptitudes and attitudes:** – sense of responsibility; – methodical work; – calmness and objectivity; – determination.

Task 5: Training replacements

Performance conditions	Performance criteria
Alone: ✓ **Without supervision** _____ **Stress factors:** – risk of errors by candidates during different manoeuvres; – increased level of responsibility while training candidates. **Dangers to health and safety:** – none **Technical documentation:** – charts and relevant publications **Material, tools, and equipment:** – navigation instruments; – simulator when it comes on the market.	**The product and the results:** – safe conduct from one point to another by the candidate **The process:** – recognition of knowledge and gaps; – clear and complete explanations; – coaching during practical exercises; – feedback. **Knowledge and abilities:** – knowledge of pilotage; – principal training techniques; – clear oral expression; – ability to communicate; – establishing and communicating limits to prevent candidate from compromising the ship's safety. **Perceptions:** – nil **Aptitudes and attitudes:** – due consideration given to the candidate's experience; – patience; – listening ability; – ability to establish interpersonal relationships; – ability to instill confidence.

3 TRANSFERABLE SKILLS AND BEHAVIOURS

Analysis of the work environment has helped us identify certain areas of knowledge necessary to perform the tasks and operations required of holders of pilotage certificates. We also identified the aptitudes and attitudes needed to perform the job functions.

3.1 Knowledge

Participants in the work environment analysis workshop agreed to refer to the syllabus of the study programs for pilotage diplomas and certificates produced by LPA to determine which tasks are necessary for performing this work. The syllabus is presented in Appendix C.

The following table sets out the knowledge judged essential to perform the tasks of holders of pilotage certificates, as set out in the syllabus. Also included are the comments of the participants regarding each subject.

Knowledge
Local knowledge This must be a priority in the training to obtain a pilotage certificate. A thorough knowledge of Marine District II between Quebec and Les Escoumins is necessary to ensure safe passage of ships in these waters. Certain areas present manoeuvring, docking, and anchoring difficulties requiring special attention. Difficult passages and navigating conditions prevailing in the marine district must be recognized. The invited specialists identified locations where navigation is difficult, such as Quebec Harbour; Île aux Coudres; the fairway between St. Jean, Île d'Orléans, and Gréban (the north passage); and the mouth of the Saguenay. It should be noted that all of the harbours in the marine district are considered difficult to enter, depending on currents and tides. The pilot must be familiar with the behaviour of ships in confined waters and, more specifically, the capabilities and limits of ships being piloted. As well, navigation in the confined fairways of this part of the St. Lawrence demands solid knowledge of topography, tides, current, typical weather conditions, and micro-climates. Licensed pilots and certificate holders must also recognize the landmarks along the course. Finally, pilotage in confined waters involves more reliance on radar.

Knowledge
Legislation and regulations The list of legislation and regulations governing pilotage has already been mentioned in this module. A general knowledge of international, national, and local legislation and regulations is required to be able to refer to them. Taking charge of a ship in a given marine district puts the pilot under an obligation to observe the rules and regulations in effect in that marine district. Licensed pilots and certificate holders are required to comply with such legislation and regulations, and to ensure that others do so as well. It is important for them to know to what extent they are protected by these laws and regulations. The basic training for officers already includes this subject matter. This is why participants proposed focussing on the legislation and regulations pertaining to pilotage and collision in confined waters.
Chartwork, tides, and practical use of radar and other navigational aids These skills are fundamental to navigation and are part of the basic training for officers. These factors are essential for ensuring the proper position of the ship in the marine district, for determining the fairway limits, and for recognizing dangers. Among the navigation aids, the participants in the workshop mentioned charts, racons, visual landmarks, as well as electronic instruments such as GPS and DGPS. In fact, the pilot will have to be familiar with everything that is specific to navigation in the marine district.
Vessel performance in confined and restricted channels, shiphandling, and anchoring Pilotage requires the pilot to make major decisions. Navigation in restricted waters involves particular difficulties as far as manoeuvring and anchoring are concerned. It is important for pilots to anticipate their ship's behaviour under the conditions prevailing in the marine district. They must be able to ensure control and eliminate all possibility of disaster. The ship's behaviour can vary with draught. Knowing the ship's capacity and its limitations will enable the pilot to optimize the results of the various manoeuvres. In the case of officers holding pilotage certificates, they, as crew members, are well aware of the ship's capacity and its limitations.
Meteorology and winter navigation Knowledge of the weather conditions specific to the marine district and its micro-climates for each season of the year is essential. It enables the pilot to anticipate difficult navigating conditions and the decisions he will have to make in course correction and the manoeuvres he will have to perform in these cases. Pilotage in confined waters becomes complicated in the presence of sea spray and heavy ice conditions, for example. The pilot must take into account the tides and attempt to avoid places where the ship is at risk of being carried ashore by ice.

3.2 Aptitudes and attitudes

Participants in the work environment analysis workshop identified aptitudes and attitudes deemed useful in the performance of the work. They agreed on an order of priority and the results of the compilation are shown in the following table. Six individuals made comments and the total values attributed to each element were converted to a percentage.

In presenting the results, the participants explained the low value attributed to teamwork by the fact that the pilot is used to working alone and assuming a responsibility and leadership role. Urgency of decision sometimes makes it impossible to consult the crew. It is, however, important to note that the work is evolving and that teamwork is gaining ground. Also underlined was the importance of communicating with the bridge watch.

Aptitudes and attitudes	**Relative importance as a percentage**
1. Judgement	80.7
2. Ability to analyse and to synthesize	79.5
3. Mariner's sense *The participants explained what they meant by mariner's sense. It is the ability to anticipate in order to control the ship and not be overtaken by events. Pilots must anticipate the ship's behaviour and take necessary measures to avoid potential dangers.*	66.7
4. Ability to sustain attention *Distraction is a major danger factor. In spite of the long hours sometimes spent on the bridge, the pilot must remain alert to everything that is going on.*	65.4
5. Sense of observation	64.1
5. Sense of responsibility	64.1
6. Patience	56.4
7. Leadership	53.8
8. Being prepared for all eventualities *Pilots are required to react immediately to various situations and make quick decisions. Licensed pilots must adapt to different types of ships, to new crews, and to a changing environment.*	52.7
9. Ability to withstand stress	48.7
10. Willingness to update knowledge	41

Aptitudes and attitudes	Relative importance as a percentage
10. Safety consciousness *This means adopting a safety-conscious attitude to ensure the protection of human lives, the ship, the environment, and property ashore.*	41
11. Teamwork	33.3

4 TRAINING-RELATED SUGGESTIONS

During the work environment analysis workshop, the invited specialists made a number of suggestions regarding the future training program for certification candidates in Marine District II between Quebec and Les Escoumins. Their comments are outlined below.

4.1 Suggestions regarding theoretical and practical training courses

The first objective of a pilotage certification training program must be to train officers and masters capable of ensuring the safe passage of ships on the St. Lawrence, specifically through difficult and dangerous areas.

The training program should enable candidates to acquire solid, local knowledge of Marine District II running between Quebec and Les Escoumins. The training program should focus on the stretches that are the most difficult to navigate.

Theoretical skills definitely have their place. However, the participants were of the opinion that the training program should give candidates the opportunity to do a minimum of twelve passages in the marine district in order to acquire the competence necessary to pilot safely. These passages should be performed under the supervision of a licensed pilot or a pilotage certificate holder. Thus candidates would be better oriented during their training. One participant even suggested that the number of training passages under supervision be increased, to give candidates the opportunity to be on watch while the ship is going through difficult passages. This would enable them not only to become familiar with existing landmarks, but also to establish their own points of reference.

Pilotage certificate holders would like to have evaluation methods reviewed. It is important to verify the local knowledge candidates have acquired and the candidates' ability to navigate in the marine district. In a general way, the participants suggested that theoretical examinations be reduced and the focus be on the acquisition of practical experience and the demonstration of abilities. The training and evaluation would then better reflect the reality and the practical aspect of navigation.

Candidates for certification would like to have access to the same documentation as the candidates for licensing, both during their training and when they apply for certification.

4.2 Suggestions regarding recognition of previously acquired knowledge

Even though they hold that skills set out in the Laurentian Pilotage Authority syllabus are essential, workshop participants were insistent in pointing out that the majority of masters and officers who apply for certification already have substantial general knowledge acquired with the training to obtain an officer's or a master's licence. Also, they can get credit for the experience they have acquired, when they apply for certification. The participants were of the opinion that

the training must meet the needs of all candidates, to enable them to acquire the skills they need to meet certification requirements. To this end, consideration should be given to the principle of recognizing prior experience when candidates with general knowledge about navigation and the behaviour of ships as well as navigation experience are accepted for training.

APPENDICES

APPENDIX A

What is marine pilotage?

Pilotage is a unique service based on local knowledge and special conditions prevailing in the pilotage area. It may be performed in coastal waters, estuarial waters, rivers, ports, harbours, lakes, or enclosed dock systems, or any combination of these areas that may come within a port's jurisdiction, its prime goal being the safe and efficient moving of shipping while ensuring the protection of the marine environment. A pilot's function is to combine technical knowledge concerning the operation and handling of a vessel with his local knowledge concerning special conditions that exist in the port area and with which the master of the vessel cannot be expected to be conversant.

In this respect, pilots must first of all be technically capable of piloting vessels of all types that call at the port. They must be very familiar with the latest equipment and navigational aids as well as regulatory and environmental requirements. A pilot must also have an overall appreciation of the special regulations and unique conditions that exist in his waters.

From the Web site of International Maritime Pilots' Association
(http://www.pilotes-maritimes.fr/impa.html)

APPENDIX B

Legislation and regulations governing the pilotage licence and certification training program between Les Escoumins and Montreal

Participants in the work environment analysis workshop drew up the following list of legislaton and regulations, excluding the St. Lawrence Seaway Authority Marine Traffic Regulations – Chapter 1470, which is apparently no longer in force.

- Pilotage Act – chapter P-14;
- General Pilotage Regulations – chapter 1263;
- Laurentian Pilotage Authority Regulations – chapter 1268;
- Laurentian Pilotage Authority Tariff Regulations;
- Canada Shipping Act – chapter S-9;
- Collision Regulations;
- Aids to Navigation Protection Regulations – chapter 1403;
- Pilot Ladder Regulations – Reference: Notices to Mariners, annual edition, TP 390E;
- Pilot Ladder Regulations and Pilot Hoists – items 1-6 and 14 – Reference: Notices to Mariners, annual edition, TP 390E;
- Regulation 17 of Chapter V of the 1974 International Convention for the Safety of Life at Sea – Reference: Notices to Mariners, annual edition, TP 390E;
- Shipping Casualties Reporting Regulations – chapter 1478;
- Vessel Traffic Services Regulations (Canada Shipping Act, 562.16);
- Public Harbours Regulations and Ports Canada Regulations;
- Ice Navigation in Canadian Waters, TP 5064 (Canadian Coast Guard).

APPENDIX C

Administration of Laurentian Pilotage

Study program for pilot's licences and pilotage certificates between Les Escoumins and Montreal

96-11-20

FIRST CATEGORY OF CANDIDATES

1. The provisions of the Pilotage Act, the General Pilotage Regulations, and the Laurentian Pilotage Authority Regulations set out in detail the conditions that have to be met by the candidates to obtain pilot's licences or pilotage certificates. The following applies to candidates who already comply with the provisions of the foregoing Regulations, who have the navigational experience as described below, and are now ready to take pilotage examinations.

2. Pages C-3 to C-11 of this study program apply only to those who meet the following conditions and whose application has been accepted by the Board of Examiners and the Authority.

3. Candidates for pilotage certificates:

   a) District no. 1.1:
   The candidate must have served as master on board ship while navigating in the district, be a regular member of the complement of the ship, and have effected at least 20 movages, including 6 between the 1st of December and the 8th of April following.

   b) Districts no. 1 and 2:
   The candidate must have served as master on board ship while navigating in the appropriate district, be a regular member of the complement of the ship, and have had sea service for at least 6 months during the last 24 months.

4. Candidates for pilot's licences – Districts no. 1.1, 1, and 2:

   Candidates must have served as master on board ship and have had sea service for at least 6 months during the last 24 months.

3. CHARTWORK, TIDES, AND PRACTICAL USE OF RADAR AND OTHER AIDS

3.01 Navigational charts, their use as an aid to piloting and recommendations concerning their usage; electronic charts.

3.02 Notices of reference indicated on charts pertaining to depths and heights, including notions on vertical clearances (air).

3.03 Knowledge of the factors causing tides: the sun, the moon, and the role of each of the following: tide, tidal currents, current, high water, low water, spring tide, mean tide, port of reference, secondary port, amplitude, rise, duration of ebb, height of tide, ebb, flood, slack, reverse of the tide.

3.04
a) effects of meteorological conditions on the predicted height of a tide;
b) times and heights of high and low waters at reference and secondary ports;
c) height of the tide at a specific time and the depth of the water for a given location;
d) time between which there will be a minimum depth for the water and minimum height of the tide for a given position;
e) practical knowledge of radar errors.

3.05 Racons, description, and use.

3.06 Determination of the period within a tidal frame allowing to transit a predetermined passage for a given draught.

3.07 GPS, DGPS, ECDIS, AIS, DOPPLER: basic principles, use limitations, accuracy and error of the system, shiphandling, anchoring.

4. VESSEL PERFORMANCE IN CONFINED AND RESTRICTED CHANNELS, SHIPHANDLING, ANCHORING

4.01 Squat, its nature, causes and effects.

4.02 Interaction of vessels meeting and overtaking in restricted and confined channels. Its nature, causes, effects, and precautions to be taken.

4.03 Vessels stopping and turning distances, factors involved. Method of stopping and turning in confined and restricted channels. Emergency manoeuvres.

4.04 Knowledge of the effect of the location of the centre of gravity on the behaviour of a ship, and knowledge of the effect sustained by a ship: having a low GM when turning at high speed under full rudder action (hardover).

4.05 Consequence of the heel or list on the draught and calculation of the draught increase.

4.06 Practical knowledge of the use of tugs during manoeuvres; for docking and getting under way.

4.07 General practical knowledge in shiphandling for a vessel under way, at docking and anchoring.

4.08 Important factors to consider before anchoring a ship:

a) under-keel clearance;
b) area available for manoeuvring;
c) nature of the bottom;
d) natural elements (wind, tides, etc.).

4.09 The effects of the wind current, shallows, trim, and list during rnanoeuvres on the river, including knowledge of fresh water allowance – for draught and calculation of the draught increase.

4.10 Procedure to follow in case of engine breakdown or when only part of the engine power is available.

4.11 Knowledge of various types and effects of propellers in manoeuvring:

a) pitch of the propeller;
b) variable pitch;
c) rotation;
d) degree of efficiency;
e) advantages and drawbacks;
f) vessels equipped with twin screws;
g) manoeuvring control systems.

4.12 Manoeuvres to enter and exit a lock.

4.13 Measures to be taken after a collision or stranding, and procedures to follow when grounding a vessel.

4.14 Knowledge on the use and operation of various manual, automatic, and emergency steering apparatus on the bridge.

4.15 General knowledge of various types of ship propulsion; advantages and drawbacks of each:

a) steam turbine;
b) straight diesel;
c) diesel – electric.

4.16 Knowledge of rudders such as:

a) kort-nozzle;
b) protection in ice;
c) shilling.

4.17 General knowledge of towing and behaviour of tows.

5. METEOROLOGY AND WINTER NAVIGATION

5.01 Knowledge of meteorology relating to a pilotage district for each season and knowledge of its micro-climates.

5.02 Knowledge of various ship classifications, particularly in regard to ice navigation.

5.03 Practical knowledge of ice navigation in narrow channels and minimum under-keel clearance.

5.04 Procedure to follow when navigating alone or in convoy under icebreaker escort, as well as how to foresee icebreaker actions.

5.05 Practical knowledge of ice movement in a pilotage district.

5.06 Knowledge of frazil problems and precautions to prevent ice-clogging of intakes and cooling systems in winter.

5.07 Knowledge of sources of information on local ice conditions.

6. LEGISLATION AND REGULATIONS

6.01 Pilotage Act – chapter P-14.

6.02 General Pilotage Regulations – chapter 1263.

6.03 Laurentian Pilotage Authority Regulations – chapter 1268.

6.04 Laurentian Pilotage Authority Tariff Regulations.*

6.05 Canada Shipping Act – chapter S-9.

6.06 Collision Regulations – chapter 1416.

6.07 Aids to Navigation Protection Regulations – chapter 1403.

6.08 St. Lawrence Waterway Marine Traffic Regulations – chapter 1410.

6.09 Pilot Ladder Regulations – Re: Notices to Mariners, annual edition, TP 390E.

6.10 Pilot Ladder Regulations and Pilot Hoists, items 1-6 and 14 – Re: Notices to Mariners, annual edition, TP 390E.

6.11 Regulation 17, chapter V of the International Convention for the Safety of Life at Sea, 1974 – Re: Notices to Mariners, annual edition, TP 390E.

6.12 Shipping Casualties Reporting Regulations – chapter 1478.

6.13 Vessel Traffic Services Regulations (section 562.16, Canada Shipping Act).

6.14 Public Harbours Regulations and Ports Canada Regulations.

6.15 lce Navigation in Canadian Waters, TP 5064 (Canadian Coast Guard).

∗ This item is not required of pilotage certificate candidates.

Note: Except for the collision regulations that require a thorough and in-depth knowledge, the laws and regulations listed above must be known by a candidate regarding their nature and content, to the extent that they shall be correctly applied when so required.

7. LOCAL KNOWLEDGE

7.01 General topography and boundaries of the district. Includes general knowledge of the outline of the coast and channels, and in particular:

- length and limits of the district;
- cities, towns, villages, and ports;
- channels, their lengths, depths at datum, widths;
- ports and approach channels;
- recommended safe anchorages;
- buoyage system and types of aids;
- Vessel Traffic Services;
- speed restrictions;
- ice and fog hazards;
- tides, their duration and heights throughout the district; tidal streams and currents, their direction and velocity throughout the district at all stages of the tide;
- overhead and underwater cables; bridges and ferries.

7.02 Courses and distances. Includes knowledge of:

- course to steer and distances from one point to another throughout the district;
- courses to be made good and time to run throughout the district, account being given to tides and tidal streams and currents. Courses should lead clear of natural obstructions within the 15-metre depth contour line and clear of oncoming traffic (notion of narrow-channel navigation);
- courses to be made good and distances from main channel to ports and anchorages.

7.03 Lights with distances and bearings. Includes knowledge of:

- location;
- characteristics;
- range of visibility;
- bearing of lights and buoys from positions and courses within the channel limits.

7.04 Official clearing marks and main beacons and shallows. Includes knowledge of:

- clearing marks shown on the chart and leading a line clear of obstructions to navigation and indicating position of vessel along that line;
- clearing lines of two conspicuous objects leading clear of obstructions to navigation and indicating position of vessel along that line;
- clearing bearing on lights, buoys, structures, and objects to lead clear of obstructions to navigation;
- knowledge of clearing marks, lines, and bearings is applied:
  a) to establishing position of vessel,
  b) to keeping to the right-hand side of the channel and clear of oncoming traffic,
  c) to effecting change of course by simultaneous use of two or more such marks, lines, and bearings.

7.05 Knowledge of tides and local currents. Includes:

- determination of the depth of water available at different stages of the tide and the time of change of the tidal flow in all parts of the district;
- direction and velocity of local currents, given the different stages of the tide;
- allowances to be made on courses and speed to counteract set and drift.

7.06 Aids to navigation. Includes knowledge of:

- buoyage system in effect in district;
- location and characteristics of aids such as lights, range lights, beacons, racons;
- location of lights and buoys in relation with navigabIe channels, shoals, reefs, etc., together with depth of water in surrounding areas.

7.07 Bearings and distances. Includes knowledge of bearings of and distances from ship to land, lights, buoys, beacons, and other aids:

a) to keep clear of obstructions to navigation;
b) to verify position while on course from one point to another;
c) to keep clear of oncoming traffic;
d) to establish moment and position for changes of courses.

7.08 Soundings. Includes knowledge of:

- depth of water when approaching land, shoals, reefs, and other obstructions;
- depth of water by sectors or areas of the channels where variations in the depth of water are prominent.

7.09 Wharves and installations. Includes knowledge of:

- direction, length, depth of water alongside, conspicuous objects, and configuration of surrounding area;
- channels and approaches with marks, ranges, and bearings;
- currents and set of currents and methods of counteracting;
- services available, such as tugs and their characteristics, linesmen, etc.;
- method of approach with or without tugs.

7.10 Contour lines, shallows, shoals, reefs. Includes knowledge of:

- aspect and dimension of obstacles; direction and dimension of shoals, including depth of water in surrounding area;
- marks, ranges, and bearings to position and clear obstacles.

7.11 Use of radar distances to fix position and set courses. Includes knowledge of:

- distance and bearing of conspicuous targets to verify courses and position;
- distance and bearing of conspicuous targets to fix position to alter course;
- distance and bearing of conspicuous targets to maintain course and position away from oncoming traffic.

7.12 An in-depth knowledge of the waters of the district, including secondary channels.

SECOND CATEGORY OF CANDIDATES

1. The provisions of the Pilotage Act, the General Pilotage Regulations, and the Laurentian Pilotage Authority Regulations set out in detail the conditions that have to be met by the candidates to obtain pilot's licences or pilotage certificates. The following applies to candidates who already comply with the provisions of the above-noted regulations, who have the navigational experience described hereunder and are now ready to take pilotage examinations.

2. Pages C-12 to C-21 of this study program apply to candidates who do not meet the requirements of paragraphs 2, 3, or 4 on page C-3.

3. Candidates for pilotage certificates who are eligible under this part:

   must have served as master or 1st officer on board ship while navigating in the appropriate district, be a regular member of the complement of the ship, and have had sea service for at least 12 months during the last 36 months.

4. Candidates for pilot's licences:

   must have served as master or 1st officer on board ship.

3. CHARTWORK, TIDES, AND PRACTICAL USE OF RADAR AND OTHER AIDS

3.01 Navigational charts, their use as an aid to piloting, and recommendations concerning their usage; electronic charts.

3.02 Find the deviation or compass error by the means of two marks in line.

3.03 Find the course to steer over the bottom when one knows the compass course steered, the speed of the ship, the direction and speed of the current, and determine the correction to be made to account for the drift; also find the course to steer, taking into account the direction of the current and the drift due to the current.

3.04 Notices of reference indicated on charts pertaining to depths and heights, including notions on vertical clearances (air).

3.05 Knowledge of factors causing tides: the sun, the moon, and the role of each. Definition of the following: tide, tidal current, current, high water, low water, spring tide, mean tide, port of reference, secondary port, amplitude, rise, duration of ebb, height of tide, ebb, flood, slacks, reverse of the tide.

3.06
a) effects of meteorological conditions on the predicted height of a tide;
b) the times and heights of high and low waters at reference and secondary ports;
c) the height of the tide at a specific time and the depth of the water for a given location;
d) the time between which there will be a minimum depth for the water and minimum height of the tide for a given position;
e) practical knowledge of radar errors.

3.07 Racons, descriptions, and use.

3.08 To determine the period within a tidal frame allowing to transit a predetermined passage for a given draught.

3.09 GPS, DGPS, ECDIS, AIS, DOPPLER: basic principles, use limitations, accuracy and error of the system, summary of the standards.

4. VESSEL PERFORMANCE IN CONFINED AND RESTRICTED CHANNELS, SHIPHANDLING, AND ANCHORING

4.01 Squat, its nature, causes and effects.

a) under-keel clearance and manoeuvrability;
b) bow cushion, its nature, causes and effects.

4.02 Effect of the under-keel clearance on manoeuvrability.

4.03 Stern suction, its nature, causes and effects.

4.04 Shallow water effect, its nature and causes.

4.05 Interaction of vessels meeting and overtaking in restricted and confined channels. Its nature, causes, effects, and precautions to be taken.

4.06 Vessel stopping and turning distances. Factors involved. Method of stopping and turning in confined and restricted channels. Emergency manoeuvres.

4.07 Knowledge of the effect of the location of the centre of gravity on the behaviour of a ship and knowledge of the effect sustained by a ship having a low GM when turning at high speed under full rudder action (hardover).

4.08 Consequence of the heel or list on the draught, and calculation of the draught increase.

4.09 Knowledge of freshwater allowance for draught, and method of calculation.

4.10 Practical knowledge of the use of tugs during manoeuvres; for docking and getting under way.

4.11 Manoeuvres from high to low speed to stop and emergency full ahead and astern.

4.12 Manoeuvres for holding ship with minimum advance.

4.13 General practical knowledge in shiphandling for a vessel under way, at docking, and at anchoring.

4.14 Manoeuvres for turning – minimum circle; the location of the pivoting point going ahead and astern; notion of the turning circle.

4.15 Manoeuvres for docking ship to ship.

4.16 The use of bow thrusters.

4.17 Important factors to consider before anchoring a ship:

a) under-keel clearance;
b) area available for manoeuvring;
c) nature of the bottom;
d) natural elements (wind, tides, etc.).

4.18 The effects of the wind current, shallows, trim, and list during manoeuvres on the river, including knowledge of freshwater allowance for draught and calculation of the draught increase.

4.19 Procedure to follow in case of engine breakdown or when only part of the engine power is available.

4.20 Knowledge of various types and effects of propellers in manoeuvring:

a) pitch of the propeller;
b) variable pitch;
c) rotation;
d) degree of efficiency;
e) advantages and drawbacks;
f) vessels equipped with twin screws;
g) manoeuvring control systems.

4.21 Manoeuvres to enter and exit a lock.

4.22 Measures to be taken after a collision or a stranding; procedures to follow when grounding a ship.

4.23 Manual, automatic, and emergency operation of steering apparatus on the bridge.

4.24 General knowledge of various types of ship propulsion, advantages and drawbacks of each:

a) steam turbine;
b) straight diesel;
c) diesel – electric.

4.25 Knowledge of rudders, such as:

a) kort nozzle;
b) protection in ice;
c) shilling.

4.26 General knowledge of towing and behaviour of tows.

5. METEOROLOGY AND WINTER NAVIGATION

5.01 Notions of meteorology relating to a pilotage district for each season, and knowledge of its micro-climates.

5.02 Knowledge of various ship classifications and particularly in regard to ice navigation.

5.03 Practical knowledge of ice navigation in narrow channels and minimum under-keel clearance.

5.04 Procedure to follow when navigating alone or in convoy under icebreaker escort, as well as how to foresee icebreaker actions.

5.05 Practical knowledge of ice movement in a pilotage district.

5.06 Knowledge of frazil problems and precautions to prevent ice-clogging of intakes and cooling systems.

5.07 Knowledge of sources of information on local ice conditions.

6. LEGISLATION AND REGULATIONS

6.01 Pilotage Act – chapter P-14.

6.02 General Pilotage Regulations – chapter 1263.

6.03 Laurentian Pilotage Authority Regulations – chapter 1268.

6.04 Laurentian Pilotage Authority Tariff Regulations.*

6.05 Canada Shipping Act – chapter S-9.

6.06 Collision Regulations – chapter 1416.

6.07 Aids to Navigation Protection Regulations – chapter 1403.

6.08 St. Lawrence Waterway Marine Traffic Regulations – chapter 1470.

6.09 Pilot Ladder Regulations – Re: Notices to Mariners, annual edition, TP 390E.

6.10 Pilot Ladder Regulations and Pilot Hoists, items 1-6 and 14 – Re: Notices to Mariners, annual edition, TP 390E.

6.11 Regulation 17, chapter V of the International Convention for the Safety of Life at Sea, 1974 – Re: Notices to Mariners, annual edition, TP 390E.

6.12 Shipping Casualties Reporting Regulations – chapter 1478.

6.13 Vessel Traffic Services Regulations (section 562.16, Canada Shipping Act).

6.14 Public Harbours Regulations and Ports Canada Regulations.

6.15 Ice Navigation in Canadian Waters, TP 5064 (Canadian Coast Guard).

* This item is not required of candidates for the pilotage certificate.

Note: Except for the collision regulations that require a thorough and in-depth knowledge, the laws and regulations listed above must be known by a candidate, regarding their nature and content, to the extent that they shall be correctly applied when so required.

7. LOCAL KNOWLEDGE

7.01 General topography and boundaries of the district. Includes a general knowledge of the outline of the coast and channels, and in particular:

- length and limits of the district;
- cities, towns, villages, and ports;
- channels, their lengths, depths at datum, widths;
- ports and approach channels;
- recommended safe anchorages;
- buoyage system and types of aids;
- Vessel Traffic Services;
- speed restrictions;
- ice and fog hazards;
- tides, their duration and heights throughout the district; tidal streams and currents, their direction and velocity throughout the district at all stages of the tide;
- overhead and underwater cables; bridges and ferries.

7.02 Courses and distances. Includes knowledge of:

- courses to steer and distances from one point to another throughout the district;
- courses to be made good and time to run throughout the district, account being given to tides and tidal streams and currents. Courses should lead clear of natural obstructions within the 15-metre depth contour line and clear of oncoming traffic (notion of narrow-channel navigation);
- courses to be made good and distances from main channel to ports and anchorages.

7.03 Lights with distances and bearings. Includes knowledge of:

- location;
- characteristics;
- range of visibility;
- bearing of lights and buoys from positions and courses within the channel limits.

7.04 Official clearing marks and main beacons and shallows. Includes knowledge of:

- clearing marks shown on the chart and leading a line clear of obstructions to navigation and indicating position of vessel along that line;
- clearing lines of two conspicuous objects leading clear of obstructions to navigation and indicating position of vessel along that line;
- clearing bearings on lights, buoys, structures, and objects to lead clear of obstructions to navigation;
- the knowledge of clearing marks, lines, and bearings is applied:
  a) to establishing position of vessel,
  b) to keeping to the right-hand side of the channel and clear of oncoming traffic,
  c) to effecting change of course by use of two or more such marks, lines, and bearings in conjunction.

7.05 Knowledge of tides and local currents. Includes:

- the determination of the depth of water available at different stages of the tide and the time of change of the tidal flow in all parts of the district;
- the direction and velocity of local currents, given the different stages of the tide;
- allowances to be made on courses and speed to counteract set and drift.

7.06 Aids to navigation. Includes knowledge of:

- buoyage system in effect in district;
- location and characteristics of aids such as lights, range lights, beacons, racons;
- location of lights and buoys in relation to navigable channels, shoals, reefs, etc., together with depth of water in surrounding areas.

7.07 Bearings and distances. Includes knowledge of bearings of and distances from ship to land, lights, buoys, beacons, and other aids:

a) to keep clear of obstructions to navigation;
b) to verify position while on course from one point to another;
c) to keep clear of oncoming traffic;
d) to establish moment and position for changes of course.

7.08 Soundings. Includes knowledge of:

- depth of water when approaching land, shoals, reefs, and other obstructions;
- depth of water by sectors or areas of the channels where variations in the depth of water are prominent.

7.09 Wharves and installations. Includes knowledge of:

- direction, length, depth of water alongside, conspicuous objects, and configuration of surrounding area;
- channels and approaches with marks, ranges, and bearings;
- currents and set of currents and methods of counteracting;
- services available, such as tugs and their characteristics, linesmen, etc.;
- method of approach with or without tugs.

7.10 Contour lines, shallows, shoals, reefs. Includes knowledge of:

- aspect and dimension of obstacles; direction and dimension of shoals, including depth of water in surrounding area;
- marks, ranges, and bearings to position and clear obstacles.

7.11 Use of radar distances to fix position and set courses. Includes knowledge of:

- distance and bearing of conspicuous targets to verify courses and position;
- distance and bearing of conspicuous targets to fix position to alter course;
- distance and bearing of conspicuous targets to maintain course and position away from oncoming traffic.

7.12 An in-depth knowledge of the waters of the district, including secondary channels.

PART 2

Draft Training Program

(Working document presented for validation)

February 1999

TABLE OF CONTENTS

1 PRESENTATION OF THE PROGRAM

This draft program is part of the procedure launched to update the pilot certification process in the Laurentian Region. The program was designed as part of the development of technical and professional study programs initiated by the Quebec department of education, which requires, among other things, participation by partners from both the labour and academic environments.

The program will be defined by skills and sanctioned by objectives and standards. Based on our definition, combined with that of the department of education, a skill is *an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.*

The draft program makes use of an analysis of the work environment carried out on 13 and 14 January 1999, the current certification syllabus, recommendations of the IMO Subcommittee on Standards of Training and Watchkeeping, the training program for a college-level diploma in navigation, as well as the profiles of potential program clients.

The draft program covers six skills totalling 300 hours of study. Since this is a development program, it takes candidates' prior experience into account in the training. Prerequisites for admission have been set: either a college-level diploma in navigation or experience deemed satisfactory by the training institution. The licence required by the Laurentian Pilotage Authority for admission to the pilot certification program is also one of the prerequisites.

Practicums in the marine district should be included throughout the training period as an indispensable complement to theoretical courses and drills in the simulator.

2 PROGRAM OBJECTIVES

The aim of the draft program is to train persons capable of directing and controlling the movement of their ship in the waters of the Quebec-Les Escoumins Marine District in complete safety and of adapting rapidly to difficult, dangerous, and unforeseen situations. Pilotage in any marine district requires extensive knowledge of local inland and coastal waters, as well as of the wharves and locks in that marine district.

Training will render candidates able to plan the course they should follow in the marine district; to conduct their ship in complete safety by avoiding obstacles to navigation; to make decisions on measures to be taken in bad weather and emergency situations; to perform manoeuvres specific to docking, departure, and anchoring in the marine district and, finally, to manage bridge resources.

The training also aims at developing the candidates' judgement, ability to analyse and synthesize, mariner's sense, ability to withstand stress, ability to react appropriately in unforeseen circumstances, leadership skills, and the ability to work in teams.

3 REQUIRED SKILLS

3.1 List of skills

The following table shows the six required skills and the training time for each. They are organized into four training blocks and each block is followed by a supervised practicum in the marine district. This training scenario is presented by way of suggestion, since a variety of models are possible.

No.	SKILLS	DURATION (hours)
1.	Planning the passage into the marine district	60
Practicum in the marine district		
2.	Navigating a ship in the marine district's confined waters	90
Practicum in the marine district		
3.	Deciding which measures to take in difficult weather conditions	45
4.	Carrying out emergency manoeuvres specific to the marine district	45
Practicum in the marine district		
5.	Carrying out alongside and anchoring area manoeuvres	30
6.	Bridge resource management	30
TOTAL		300

3.2 Description of skills

Here is a description of the various skills that are covered by the marine pilot training program. Other elements of the skills can be found in the table of correspondence. Note that each skill is relatively self-contained in the sense that the order of acquisition could be changed. Transfer of local knowledge from one skill to another is, however, indispensable.

Skill 1: Planning the passage into the marine district (60 h)

Officers holding pilotage certificates are required to develop their own plans for the passage and to adjust them as need be in the course of the passage. This plan will be used as the blueprint for subsequent passages. It will be adjusted to account for cargo, tides, weather conditions, etc. This skill differs from the licensed pilot's, who must continuously adjust his plan to account for the type of ship, the circumstances, the crew, the equipment on board and its condition, communication difficulties, etc.

This skill will enable the officer to develop his ability to plan passages in the marine district, taking into account topography, courses and distances, tides, tidal streams and currents, visual navigation aids, safe bearings, tide frames, etc. He will be required to use conventional and electronic charts.

Specific strategies must be developed to facilitate learning and memorization of essential data pertaining to local knowledge.

Skill 2: Navigating a ship in the marine district's confined waters (90 h)

Restricted and shallow waters present risk factors that amplify the dangers inherent in current navigation practices. Navigating a ship in confined waters requires an understanding of these factors and a high level of skill, both based on wide experience in the sector. The person having control of the ship must constantly analyse, manage and, through clear orders, translate the various pieces of information that come to him from various sources, so as to keep the ship in safe waters.

This skill is therefore aimed at reinforcing the officer's skills by enabling him to learn the specifics of navigation in the marine district. He will learn to anticipate the behaviour of the ship in confined waters, to manage the information necessary to ensure a smooth passage, to estimate the time of arrival at waypoints along the passage, to give appropriate orders, to perform manoeuvres under way, to negotiate difficult passages, to avoid obstacles to navigation, to recognize lights and markings, to use clearing marks, to use range markings, to use the buoyage system, and to choose appropriate electronic aids. He will consolidate his knowledge of relevant regulations. He will practice in the simulator and perform practicums in the marine district.

Skill 3: Deciding which measures to take in difficult weather conditions (45 h)

Navigation in the marine district presents specific difficulties related to very changeable weather conditions depending on the season: visibility reduced by rain, mist, fog or snow; limited buoyage that is hard to see in winter because of ice; ice fields; radar ranges distorted by ice piled on the shores; ice movement that affects ship's behaviour, especially in narrow, shallow fairways; obstruction of machinery cooling intakes, etc. Micro-climates in certain sectors bring about sudden and undesirable changes requiring rapid adjustments of ship's behaviour. Navigation in a convoy and cooperation with icebreakers also present difficulties.

This skill will develop the officer's ability to make decisions under changeable and unpredictable weather conditions. The criteria to be considered in order to make decisions that frequently boil down to "can I continue, should I wait, should I anchor, is it possible to berth the ship, or would it be better to head for safe waters and stay the course?" will have to be analysed with a view to coming up with the most logical and safest course of action.

Skill 4: Carrying out emergency manoeuvres specific to the marine district (45 h)

Emergency situations, which unfortunately occur whatever we do, are frequently managed differently in a marine district than at sea. Standard emergency manoeuvres are sometimes impossible to execute. Alternative manoeuvres must be chosen and undertaken in order to avoid or at the very least minimize the damage. Events that could require standard or adapted emergency manoeuvres include a breakdown or a failure in the equipment on board, factors outside the ship (another ship we encounter could lose its steering capability, thus creating an imminent risk of collision), an inevitable or obligatory grounding, etc.

This skill will give the certification candidate decision-making tools that will assist him in choosing the manoeuvre he needs to execute in an emergency and the criteria that dictate the use of a tug.

Skill 5: Carrying out alongside and anchoring area manoeuvres (30 h)

We can go out on a limb and say that manoeuvring is the science and the art of moving a ship using the diverse forces that act upon it. Each ship has its own personality that changes with the eyes of the person looking at it. The sailor will prize it for its seaworthiness and its manoeuvrability. The manoeuvres that will be dealt with under this skill are departure, docking, and anchoring.

This skill will serve to consolidate the candidate's knowledge of the three principal groups of forces that act on the ship:

- forces that are under the pilot's control (engines, steering gear, anchors, mooring lines);
- forces that are more difficult to measure (effect of the screw, wind, sea, currents, under-keel clearance);
- forces that result from the ship's inertia (turning inertia, starting inertia, stopping inertia).

To achieve its purpose, this skill will also target the candidate's knowledge of the particular features of the wharves and port installations in the marine district, visual aids that are specific to the marine district, available manoeuvring surfaces, under-keel clearance, bottom features, prohibited anchoring zones, traffic, assessment of tidal currents, communications procedures, etc.

Skill 6: Bridge resource management (30 h)

Managing bridge resources is, in fact, a way of setting up work models that take into account all relevant factors – the crew, the navigation instruments, the type of ship, its manoeuvring characteristics, the operating zones, weather conditions, unforeseen and random factors, etc. – and the need to adhere to them strictly from departure to arrival.

This skill will prepare the holder of a pilotage certificate for the teamwork on the bridge of the ship for the praiseworthy and avowed purpose of reducing the risk of accidents, which in many cases tend to be due to ineffective management of bridge resources. The candidate will learn to assign a clearly-defined role to each person, to detect advance signs of a possible chain of errors, to direct and coordinate the entire process, to develop post orders, to transmit and receive information. In fact, he will learn to correctly manage a team from the passage evaluation phase to the ultimate goal, which is the safe passage of the ship through the marine district.

4 TABLE OF CORRESPONDENCE

The table of correspondence makes it possible to establish the relevance of the draft program by highlighting the specifics of each skill and the links with the program determinants – i.e., the work environment analysis report, the current certification syllabus, and the recommendations of the IMO Subcommittee on Standards of Training and Watchkeeping.

The table contains information relating to the draft training program. The first line contains a statement of the skill, the skill number, and the duration of the training.

The first column contains the components of the skill, and provides benchmarks and specifics. These data are provided for reference purposes and are meant to make the statement of the skill more explicit. It should be noted, however, that this information constitutes, above all, an initial cast aimed at better defining the skill and is not necessarily exhaustive. Furthermore, it may refer as much to elements of content and to notions pertaining to the acquisition of the skill as to elements of the skill itself. It would be unwise to automatically associate this information with those elements of the skill that will be identified when the objectives and standards are developed.

The second column establishes the links between the skills set out in the draft program and the program determinants. The numbers associated with the duties and the operations in the second column refer to the numbering in the WEA report under the corresponding headings.

Skill 1:	Planning the passage into the marine district	Duration: 60 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Consult relevant documents. • Trace primary and secondary courses. • Identify course changing points. • Identify the courses and the distances to be covered. • Establish the safety limits for each section of the course. • Establish the safe speed for each section of the course. • Identify the dangers on the course. • Indicate the navigation aids. • Trace the safety bearings. • Prepare strategies in case of emergency (anchoring). • Indicate the currents (direction and velocity). • Prepare a plan for the technique of artificial alignments (parallel index). • Determine the moment of passage through points with the highest risks. • Determine course changing times. • Determine the moment of arrival at the pilot station of the next marine district. **Additional information** Local knowledge: – Topography of the marine district. – Courses and distances. – Tides, tidal streams, and currents. – Visual navigation aids. – Safety bearings. – Tide frames. – Planning with the use of conventional and electronic charts.	**WEA** **Duties and operations** 1 Plan the passage: 1.1, 1.2, 1.5. **Cognitive and psychomotor skills** See *LPA Syllabus.* 3 Chartwork, tides, and practical use of radar and other aids: 3.04, 3.05, 3.06. 4 Vessel performance in confined and restricted channels, shiphandling, and anchoring: 4.09. 7 Local knowledge: 7.01, 7.02, 7.05, 7.06. **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, sense of observation, patience, safety consciousness, teamwork and assertiveness, willingness to upgrade skills. **Training-related suggestions** – Acquire solid local knowledge. – Focus on the acquisition of practical experience. **Trends and future developments** – Increasing use of electronic charts (ECDIS). **KPMG report** – User needs and Authority requirements: B Canadian shipowners: importance of the passage plan, p. 31. D Masters of Canadian ships: local knowledge necessary, pp. 34-35. **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B.

Skill 2	Navigating a ship in the marine district's confined waters	Duration: 90 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Anticipate the behaviour of the ship in shallow waters: excessive sinkage, meeting and overtaking, stopping and slewing, etc. • Determine the position of the ship using the visual aids in the marine district. • Manage information obtained from the crew and the Vessel Traffic Services (VTS): – navigation notices; – weather conditions. • Estimate time of arrival. • Give appropriate orders (wheel, course, engine) during difficult passages and with a view to avoiding obstacles in the marine district. • Establish the reliability of electronic aids. **Additional information** • Obstacles: contour of the coastline, shallow and deep waters, reefs. • Lights, their distance and their bearings. • Clearing marks, range lights, and bearings. • Buoyage system in place and racons. • Radar distances. • Use of electronic aids such as support systems, including the sounder. • Respect of relevant regulations. • Difficult passages in marine district.	**WEA** **Duties and operations** 2 Ensure smooth passage: 2.1 à 2.4; 2.6. **Cognitive and psychomotor skills** See *LPA Syllabus*. 4 Vessel performance in confined and restricted channels, shiphandling, and anchoring: 4.07, 4.08. 7 Local knowledge: 7.03, 7.04, 7.06, 7.07, 7.08, 7.10, 7.11. **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, mariner's sense, sustained attention, sense of observation, sense of responsibility, leadership, being prepared for all eventualities, ability to withstand stress, safety consciousness, teamwork. **Training-related suggestions** – Focus on the sections that are the most difficult to navigate. – Execute passages in the marine district for practice purposes. **Trends and future developments** – Increasing use of simulators. **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B.

Skill 3	Deciding which measures to take in difficult weather conditions	Duration: 45 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Identify the dangers specific to the marine district in the presence of: – sea spray, fog, rain, and snow; – heavy seas; – winter ice conditions. • Prepare appropriate strategies for planning the passage and navigating the ship. • Gather data on the condition of the ice in the marine district from the information centre. **Additional information** • Weather conditions specific to the marine district for each season and each micro-climate. • Classification of ships able to navigate in ice. • Ice movement in the marine district. • Conditions affecting the navigation of the ship when navigating in ice, especially in shallow waters; dangers and preventive measures. • Procedures to be followed when navigating in ice, alone, or in convoy. • Anticipating movements of the icebreaker escorting the ship. • Problems presented by frazil and measures to be taken to prevent obstruction of the cooling vents. • Information systems on ice conditions in the marine district. • Acquiring more in-depth knowledge about instrument use, possible errors, and their limitations.	**WEA** **Duties and operations** 1 Plan the passage: 1.3.2, 1.3.3. 2 Ensure a smooth passage: 2.5. 3 Perform specific manoeuvres in the marine district: 3.3. **Cognitive and psychomotor skills** See *LPA Syllabus*. 5 Meteorology and winter navigation (in its entirety). **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, mariner's sense, sustained attention, sense of observation, sense of responsibility, being prepared for all eventualities, ability to withstand stress, safety consciousness. **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B.

Skill 4	Carrying out emergency manoeuvres specific to the marine district	Duration: 45 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Adapt standard manoeuvres depending on the position of the ship in the marine district and the type of emergency. • Manoeuvre the ship, taking into account environmental risks, in the case of: – engine failure or loss of power; – failure of the steering apparatus; – failure of the gyro compass or the magnetic compass; – failure of the engine room telegraph; – person overboard. • Evaluate towing assistance needs. • Towing a ship in the marine district or getting towed. • Be aware of the emergency plans established for the marine district or adapt the standard emergency manoeuvres in the Procedures Guide – Bridge. • Use steering system apparatus in manual, automatic or emergency mode, depending on the situation. • Decide whether it is necessary to use a secondary fairway. **Additional information** • Measures to be taken in case of a collision or a grounding, a fire, a leak, a search and rescue, the need to abandon a ship in imminent danger of sinking.	**WEA** **Duties and operations** 4 Perform specific manoeuvres in emergency situations: in its entirety. **Cognitive and psychomotor skills** See *LPA Syllabus*. 4 Vessel performance in confined and restricted channels, shiphandling, anchoring: 4.10, 4.13, 4.14, 4.17. 7 Local knowledge: 7.12. **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, mariner's sense, sustained attention, sense of observation, sense of responsibility, leadership, being prepared for all eventualities, ability to withstand stress, safety consciousness. **Training-related suggestions** – Focus on the acquisition of practical experience. **Trends and future developments** – Nil **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B.

Skill 5	Carrying out alongside and anchoring area manoeuvres	Duration: 30 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Use visual navigation aids specific to the location. • Assess local currents. • Give appropriate orders during: – docking; – departure; – anchoring. • Evaluate the need for towing assistance. • Give appropriate orders to the master of the tug. **Additional information** • Wharves, port installations, and services available in the marine district. • Ports and approach channels. • Manoeuvres specific to the characteristics of the ship (screw, rudder, shape of the hull, tonnage, draught, trim, air draught, etc.) for: – docking; – departure; – anchoring. • Factors to be considered when docking, departure, and anchoring, such as under-keel clearance, surface area available for manoeuvring, bottom, natural elements, traffic, etc. **Note:** Should the entry and exit manoeuvres for the locks in the marine district be looked at? (e.g., locks in the Louise Basin)	**WEA** **Duties and operations** 3 Perform manoeuvres specific to the marine district: 3.1, 3.2. **Cognitive and psychomotor skills** See *LPA Syllabus*. 4 Vessel performance in confined and restricted channels, shiphandling, anchoring: 4.06, 4.07, 4.08, 4.11, 4.12. 8 Local knowledge: 7.09. **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, mariner's sense, sustained attention, sense of observation, sense of responsibility, patience, leadership, being prepared for all eventualities, ability to withstand stress, safety consciousness, teamwork, self-control. **Training-related suggestions** – Focus on the acquisition of practical experience. **Trends and future developments** – Nil **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B.

Skill 6	Bridge resource management	Duration: 30 h

SKILL COMPONENTS	LINKS WITH THE DETERMINANTS
• Recognize the role of each member of the bridge watch. • Be aware of the human factors involved in marine accidents and of the ways of preventing accidents. • Understand how the management of bridge resources can eliminate safety and efficiency concerns. • Analyse and break the chain of errors. • Teamwork. • Direct and coordinate the work of a team. • Transmit and receive information. • Develop emergency orders. • Manage a team during the execution of a planned passage. **Additional information** • Introduction to the management of bridge resources. • Relevant regulations. • Chain of errors. • Relations between the master, the watch officer, and the pilot. • Leadership, organization of the bridge watch. • Interpersonal communication. • Emergency preparedness. • Planning and execution of a passage. **Note:** What should be done with the task noted in the WEA Training certification candidates?	**WEA** **Duties and operations** – Nil **Cognitive and psychomotor skills** – Nil **Attitudes, behaviours** – Judgement, ability to analyse and synthesize, sustained attention, sense of observation, sense of responsibility, patience, leadership, ability to withstand stress, safety consciousness, teamwork. **Training-related suggestions** – Focus on the acquisition of practical experience. **Trends and future developments** – Nil **KPMG report** User needs and Authority requirements: A LPA: “critical requirements”, p. 27. B Canadian shipowners: “attribute a great deal of importance to it”, p. 33. **IMO Subcommittee on Standards of Training and Watchkeeping** See recommendations in Appendix B. **Note:** Transport Canada requirements.

5 LINKS WITH PROGRAM DETERMINANTS

The table that follows (Skill Matrix) presents the links that exist between this draft training program and the college-level navigation diploma on the one hand and the LPA syllabus entitled *Study program for pilot's licences and pilotage certificates between Les Escoumins and Montreal* on the other hand.

In this table, the six skills covered by this draft training program and their study duration are presented in the left-hand column. The top row contains the skills covered in the navigation program that are linked with the draft training program, as well as the knowledge categories drawn from the LPA syllabus.

The symbol ● indicates a link between the skills covered in the navigation program and the skills covered in the draft pilot training program. These links have been taken into consideration in the draft training program to avoid duplication.

The symbol ❍ indicates a link between LPA syllabus elements and the skills covered in the draft training program. These links highlight the skills that take the syllabus elements into consideration. For example, the element *Chartwork, tides, and the practical use of radar and other aids* will be dealt with under all of the skills, since candidates will have to work with the charts and the other navigation aids in the marine district. Thus, it will not be necessary to cover the notions that have already been acquired on the use of these aids.

In developing the draft training program, we also took into account the elements recommended by the IMO Subcommittee on Standards of Training and Watchkeeping for the certification of pilots around the world. These elements appear in Appendix B, along with the skills covered in the college-level navigation program and the LPA syllabus.

SKILL MATRIX

MATRIX OF TRAINING ELEMENTS MARINE PILOTAGE QUEBEC-LES ESCOUMINS MARINE DISTRICT FOR CERTIFICATION PURPOSES SKILLS COVERED IN THE TRAINING PROGRAM	LINKS WITH THE COLLEGE-LEVEL DIPLOMA IN NAVIGATION												THE LPA SYLLABUS				
	Duration (hours)	Analyse charts and nautical publications	Control the progress of a ship	Determine the position of a ship using electronic instruments	Avoid collisions	Manage human resources	Ensure the stability of the ship	Use marine communication systems	Make weather forecasts	Exploit the capabilities and limitations of ship's machinery	Perform manoeuvres having regard to special navigating conditions	Carry out a complete passage	Using maps, tides, and practical use of radar and other aids	Behaviour of ships in confined and narrow channels, shiphandling, and anchoring	Meteorology and winter navigation	Legislation and regulations	Local knowledge
1. Planning the passage into the marine district	60	●	●		●		●		●			●	❍			❍	❍
2. Navigating a ship in the marine district's confined waters	90	●	●	●	●		●	●		●		●	❍	❍		❍	❍
3. Deciding which measures to take in difficult weather conditions	45	●			●		●		●	●	●		❍		❍	❍	❍
4. Carrying out emergency manoeuvres specific to the marine district	45	●	●	●	●	●	●	●		●	●		❍	❍		❍	❍
5. Carrying out alongside and anchoring area manoeuvres	30	●	●	●	●	●	●	●		●			❍	❍		❍	❍
6. Bridge resource management	30				●	●	●						❍			❍	❍
	300																

APPENDICES

APPENDIX A

Navigation program objectives and standards

- Analyse charts and nautical publications
- Control the progress of a ship
- Determine the position of a ship using electronic instruments
- Avoid collisions
- Manage human resources
- Ensure the stability of the ship
- Use marine communication systems
- Make weather forecasts
- Exploit the capabilities and limitations of ship’s machinery
- Perform manoeuvres having regard to special navigating conditions
- Carry out a complete passage

APPENDIX B

IMO
Syllabus for pilot certification and licensing[1]

7.1 In the syllabus, "area" means the waters for which the applicant is to be certified or licensed. Applicants for a pilot certificate or licence should demonstrate that they have necessary knowledge of the following:

- Limits of local pilotage areas.
- International Regulations for Preventing Collisions at Sea, 1972, as amended, and also such other national and local navigational safety and pollution prevention rules as may apply in the area.
- System of buoyage used in the area.
- Characteristics of the lights and their angles of visibility and the fog signals, racons, and radio beacons and other electronic aids in use in the area.
- Names, positions, and characteristics of the light vessels, buoys, beacons, structures, and other marks in the area.
- Names and characteristics of the channels, shoals, headlands, and points in the area.
- Bridge and similar obstruction limitations including air draughts.
- Depths of water throughout the area, including tidal effects and similar factors.
- General set, rate, rise, and duration of the tides and use of the tide tables for the area.
- Proper courses and distances in the area.
- Anchorages in the area.
- Shiphandling for piloting, anchoring, docking and departure, manoeuvring with and without tugs, and emergency situations.
- Communications and availability of navigational information.
- Systems of radio navigational and meteorological warning broadcasts in the area and the type of information likely to be included.
- Traffic separation schemes and other routing systems, Vessel Traffic Services, and similar vessel management systems in the area.
- Bridge equipment and navigational aids.
- Use of radar and other electronic devices, their limitations and capabilities as navigation and collision avoidance aids, and radar plotting.
- Manoeuvring behaviour of the types of ships expected to be piloted and the limitations imposed by particular propulsion and steering systems.

[1] From: IMO Subcommittee on Standards of Training and Watchkeeping. *Training and certification of maritime pilots and revision of resolution A.485 (XII). Note by the secretariat.* Appendix. Draft recommendation on training and certification requirements for maritime pilots other than deep sea pilots. November 1998.

- Factors affecting ship performance such as wind, current, tide, channel configuration, water depth, bottom, bank and ship interaction including squat.
- Use and limitation of tugs.
- The English language at a standard adequate to enable the pilot to express communications clearly.
- *IMO Standard Marine Navigational Vocabulary.*
- Master-Pilot relationship, Pilot Card, operational procedures.
- Pollution prevention.
- Contingency plans for the area.
- Any other relevant knowledge considered necessary.

PART 3

Validation Report of the Training Program

(Working paper)

March 1999

WORKSHOP PARTICIPANTS

The Institut maritime du Québec would like to thank the following individuals who took part in the validation meeting held on 3 March 1999, in Quebec City. We wish to highlight the pertinence and quality of the remarks and comments.

Sylvain Bertrand	Master, Canadian Coast Guard
Jacques Desgagnés	Master, Transport Desgagnés
Rosaire Desgagnés	Master, Transport Desgagnés
Joseph Fraser	Master, Algoma Central Marine
Jacquelin Hardy	Pilot, President, Corporation des pilotes du Saint-Laurent central
Louis Rhéaume	Pilot, President, Corporation des pilotes du Bas Saint-Laurent
Fidèle Tremblay	Pilot, Administration de pilotage des Laurentides
James Wilhelm	Master, Algoma Central Marine

Observers

Clément Deschênes	Director of Operations, Laurentian Pilotage Authority
André Taschereau	Senior Development Officer, Transportation Development Centre, Transport Canada
Nicole Trépanier	Director, St. Lawrence Ship Operators Association

TABLE OF CONTENTS

TRAINING PROJECT'S VALIDATION SESSION

Objective: To establish the relevance, consistency, and feasibility of the training project to ensure the program's quality

AGENDA

1. Reception
2. Words of welcome
3. Presentation by the participants and on the meeting's progress
4. Brief overview of the file
5. Presentation of the training project in connection with work situation's analysis report
6. Questions of clarification
7. Syndicate work
8. Plenary
9. Presentation of previously drafted objectives and standards
10. Assessment and conclusion

1 MEETING'S PROGRESS REPORT

Raymond Giguère began by welcoming the participants. He went on to introduce the meeting's objectives and to provide a brief overview of the file. Julie Audet then explained the training project, determining factors, requirements that influenced the drafting, and the methodology used. Participants then met in workshops to examine the project as a whole before focussing on each skill. Their mandate was to verify the relevance, effectiveness, and feasibility of the project. Certified officers were also invited to speak about acknowledging the candidates' experience. Suggestions and comments were compiled and discussed at the plenary. Finally, certain previously drafted objectives and standards were submitted to the group to illustrate the direction the program would take.

2 DETERMINING FACTORS

Several documents and pieces of information helped develop the training project. The drafting team took care to consider these factors, which were then presented by Julie Audet.

- Analysis of the work situation.
- Laurentian Pilotage Authority's course outline.
- Navigation program (college degree).
- Transport Canada's bridge resource management course outline.
- Needs highlighted in the KPMG report.
- IMO sub-committee's course outline on patents and certificates worldwide.
- Traits of the candidates-in-training.

3 CONSIDERED REQUIREMENTS

Different expectations emerged from related and analysed data. The writers noted the main requirements that prevailed during the training project's design and that remained in effect throughout the entire effort.

- The need to assist candidates during their training.
- The need to maintain high expectations to ensure safety.
- Focus training on the skill required to navigate the ship under all types of conditions: currents, difficult or dangerous conditions.
- Recognize the experience of the officer-candidates.
- Emphasize difficult passages and thorough knowledge of the marine district.
- Include passage plans and bridge resource management as part of the training.
- Rely on the college degree program and current course outline.

- Link up the simulator training and the practicum consisting of several passages in the marine district to ensure better apprenticeships.
- The need to carry out a supervised practicum.
- Take the availability of the candidates-in-training into account.

4 GENERAL SUGGESTIONS AND COMMENTS

This section provides the group's ideas on the major tendencies and the overall aspect of the program. Several suggestions were discussed, all of which reached consensus.

- Local knowledge is inherent for this program and should be highlighted at the very start of the program.
- The 300-hour duration of the training program is relevant when compared to the training of licensed pilots, which ranges from 240 to 285 hours.
- Alongside manoeuvres, ice navigation, and bridge resource management skills should all be offered as options, since they are not part of the basic certification required by the LPA. Hours recovered in this way could be transferred to the required skills.
- Shorten the training period so that candidates can complete it within a year if desired.
- Look into the possibility of providing the training as tutorials, given the candidates' individual timetables and the difficulty anticipated in recruiting a sufficient number of candidates for a given period. This would provide a varied entrance to and exit from the program. The chosen pedagogical approaches, either as tutorials or group training, could be adapted to the situation and to the number of registered candidates.
- The time frame of the practicum in the marine district would be left up to the candidate.

5 SPECIFIC SUGGESTIONS AND COMMENTS

This section presents the ideas proposed for each of the program's six skills, all of which were reached by consensus.

1 Planning the passage into the marine district

- Increase the duration of the skill.

2 Navigating a ship in the marine district's confined waters

- Increase the duration.
- Learning the visual cues needed to complement the use of the electronic chart.

Additional information:

- Know the types of ships that navigate in the marine district.
- Locate pleasure crafts and excursions in the St. Lawrence and their movements.
- Combine skill #3's information regarding weather conditions and skill #5's anchoring area manoeuvres that are specific to the marine district.

3 Deciding which measures to take in difficult weather conditions

- This skill could be made optional and limited to ice navigation. The section on pilotage in the marine district during reduced visibility could be transferred to skill #2.
- According to an estimate by Sylvain Bertrand of the Canadian Coast Guard, ice navigation training takes approximately 40 hours.
- It is highly recommended that the person be requested to have ice navigation experience prior to the training program.

Additional information:

- Ice classification and movement.
- Elements unfavourable to ice navigation.
- Type of ship depending on ice.
- Critical areas.
- Ability to make rapid and appropriate decisions (and not wait if it becomes necessary to call the icebreaker).

4 Carrying out emergency manoeuvres specific to the marine district

- Make sure not to duplicate knowledge and skills already acquired by officers, such as the breakdown of the steering system or of the engine room telegraph system.

5 Carrying out alongside and anchoring area manoeuvres

- The skill involving alongside manoeuvres could be offered as an option for candidates opting for such a specification on their LPA certificate. Some candidates will never have to carry out alongside manoeuvres since their company uses docking pilots for docking.
- The marine district's anchoring area manoeuvres could be introduced during skill #2.
- Lock manoeuvres are not necessary for the marine district.

Additional information:

- After "assess local currents", add "taking tidal water into account".
- Take into account port regulations in terms of safety measures.

6 Bridge resource management

- This skill could be dropped from the program or offered as an option since it is up to the companies to determine their officers' training.
- Currently, acquiring this skill is highly recommended by Transport Canada. Furthermore, a ruling to this effect is expected in the near future.

6 GROUP'S QUESTIONS

The following information was provided to the participants in response to the questions raised at the meeting.

- According to Capt. Louis Rhéaume, there is a training program for officers navigating the Great Lakes, although it is not available at the moment.
- Estimates on the duration of the training periods are based on experience and take the scope of the topics to be covered into account.
- LPA's Clément Deschênes claims that the prerequisites to register for pilot certification are described in the course outline.
- The necessary experience to register for training will be assessed by the training establishment, whereas those required for certification will be assessed by the LPA.
- The number of potential candidates and training costs were not part of the mandate for the development of the training project.
- According to the Institut maritime du Québec, eight is the maximum number of candidates who can be admitted at the same time for simulator training at the moment.
- Officers could do their practicum in the marine district on their own ship by observing the on-board pilot. This issue will be examined more closely when designing the training's educational planning.
- Alain Victor said that it is now possible to simulate tides and currents with approximately 90 percent degree of realism.
- André Taschereau said that ice navigation simulation, currently being developed, will be available in the year 2000 on an ordinary PC.
- Nicole Trépanier, St. Lawrence Ship Operators Association, reassured some participants by explaining that the association would not become involved in such a process if it had any doubts about its chances of success.
- At the moment, nothing can prevent a person with a Canadian pilot's certificate from navigating a foreign vessel. Given the exceptional nature of this fact, the group agreed not to take this comment into account.

7 ASSESSMENT AND ACKNOWLEGEMENTS

Raymond Giguère explained the steps that will follow the validation process. During the assessment, the participants expressed their satisfaction with the meeting, the outcome of the exercise, and the feeling of cooperation with which it was carried out. Mr. Giguère ended the work session by thanking the participants for their input and by emphasizing the valuable contribution of each participant.

APPENDIX

APPENDIX A

Summary of the changes made to the training project for the Marine Pilotage certificate following the validation session

PRESENTATION

During the validation meeting, participants submitted their comments and suggestions regarding the overall program and each skill involved. A thorough analysis of each recommendation was then made by the drafting team. This analysis enabled us to make certain changes to improve the training project. The changes made take the participants' comments, deciding factors, and program requirements into consideration. Below is a summary of the changes made.

1 GENERAL COMMENTS ABOUT THE PROGRAM

- The presentation of the program will explain that it focuses on the application of local knowledge for each skill in the program.
- The candidate's basic program will cover the following skills: *Planning the passage into the marine district; Navigating a ship in the marine district's confined waters; Carrying out emergency manoeuvres specific to the marine district.*
- The following skills, *Deciding which measures to take for ice navigation, Carrying out alongside and anchoring area manoeuvres,* and *Bridge resource management* will be offered as optional skills in the program.
- The duration of the basic program's skills will total 270 hours, or nine weeks. This duration closely resembles that of the theoretical training for licensed pilots, lasting between 240 and 285 hours based on comments from the participants.
- In the educational guide that ensued from the training program, it should be mentioned that training for studies and personal practice takes twice as long.
- For the training's educational organization, the tutorial format suggested by the group should be examined more closely. Such a format would encourage continual admission into the training program. Candidates could then choose between organizing their own training as they see fit either intensively or interspersed with practicum periods in the marine district.

2 SPECIFIC COMMENTS ABOUT THE SKILLS

1 Planning the passage into the marine district

- This skill will last 120 hours to encourage the memorization of the information on the marine district.
- The term *Preparing the passage* had been suggested. However, in the KPMG report, shipowners had stressed the importance of having the passage plan appear in the program. Therefore we feel it is important to maintain the *Planning* for its connection with *Passage/Plan.*

Additional information for drafting the objective and standards:

- Learn about the types of ships that may appear in the marine district.
- Locate the movement of pleasure craft in the marine district, such as excursions, sailboats, etc.

2 Navigating a ship in the marine district's confined waters

- This skill will last 120 hours to encourage the integration of local knowledge in navigation situations.
- Training will include the electronic chart managed by ECDIS, as well the marine district's visual cues. This requires that a visual system be coupled with the simulator. Furthermore, candidates will be strongly advised to complete their apprenticeship in real navigation situations in the marine district.
- Impaired vision navigation will be examined under this skill.

3 Deciding which measures to take for ice navigation **(formerly *in difficult weather conditions*)**

- This skill will be offered as an option and limited to winter navigation for 30 hours. It was decided to reduce it to 30 hours to limit the training to one week. Based on the availability of ice navigation software, its duration may change.
- The wording of the skill was modified accordingly.
- This skill was revamped given the elements provided by Sylvain Bertrand, ice navigation specialist.
- The educational guide will include a mention about previous experience being necessary for ice navigation.

4 Carrying out emergency manoeuvres specific to the marine district

- It was decided to reduce this skill to 30 hours to limit training to one week.
- Emergency manoeuvres will be tackled on simulator and based on case studies.

- Special attention will be paid to avoid duplicating the experience already acquired in emergency situations. Candidates will be placed in emergency situations specific to the marine district, with the need to rapidly adapt standard measures.

5 Carrying out docking manoeuvres* (formerly *and anchoring area)

- This skill will be optional and limit itself to alongside manoeuvres since only certain officers request this addition to their certification. The basic duration will be 30 hours, as planned, with additions based on the number of ports requested by the candidate.
- The anchoring area manoeuvres will be integrated into the *Navigating a ship in the marine district's confined waters* skill.

Additional factors considered for drafting objective standards

- Take tidal water into account for current assessment.
- Take port regulations into account regarding safety measures.
- Wharf or wharf basin.

6 Bridge resource management

- It was agreed to retain this skill in the program. This skill will therefore be drafted as objectives and standards, like the others, and will be offered as an option. Companies are requiring it more and more and a ruling to this effect is expected.

PART 4

Training Program

(Working paper)

March 1999

PILOTAGE IN THE QUEBEC-LES ESCOUMINS MARINE DISTRICT

Type of sanction: Pilotage certification

Total duration: 270 hours

Specific admission requirements:

- Prerequisites required by the Laurentian Pilotage Authority to register for certification.
- College degree in navigation or experience deemed equivalent based on experiential learning.
- Experience in ice navigation prior to the *Deciding which measures to take for ice navigation* skill.

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1 PRESENTATION OF THE PROGRAM

This program is in keeping with the procedure launched to upgrade the process of obtaining pilot certification in the Laurentian region. It was designed along the framework of the ministère de l'Éducation du Québec's technical and professional study programs, which require the participation of partners from work and educational environments.

This program is defined by skills and formulated by objectives and standards. Based on our definition combined with that of the ministère de l'Éducation, a skill is *an integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.*

The program takes into account the work environment analysis workshop held on 13 and 14 January 1999; the current course outline of the IMO's Sub-Committee on Standards of Training and Watchkeeping; the training program for the college degree's navigation officers; the KPMG report entitled *Modernization of the Pilotage Certification Process in the Laurentian Pilotage Region* (TDC, 1998), TP 13145E, together with comments from the Corporation des pilotes du Bas Saint-Laurent on the subject; as well as features of the program's potential clients.

The program focusses on pilotage in the Quebec-Les Escoumins marine district by applying navigation to local knowledge. It consists of three main skills totalling 270 hours and three other optional skills of 30 hours each. Since this is a development program, it takes the candidates' experience into consideration during training. Prerequisites for admission are required, namely a college degree in Navigation or experience judged satisfactory by the training establishment. The diploma required by the Laurentian Pilotage Authority (LPA) to be admissible for the pilot certificate is also in keeping with the conditions of admission.

Practicums should ideally be spread out during the training to ensure a complement to the theoretical courses and to the simulator exercises.

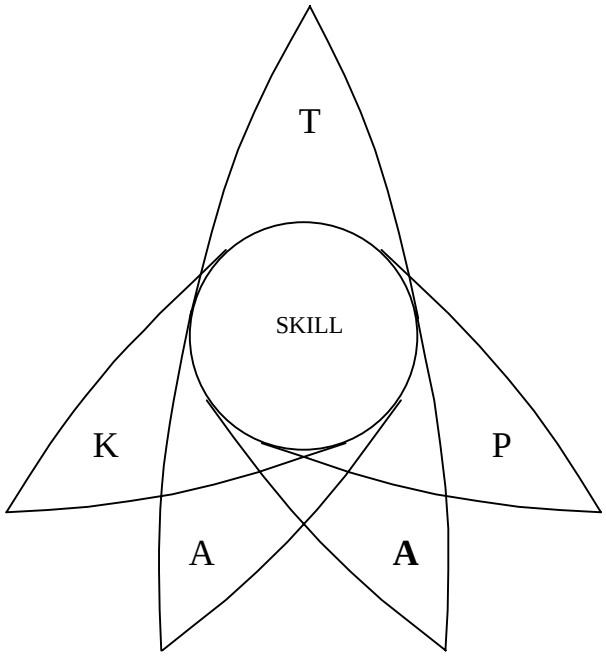
2 TERMINOLOGY

Program
Integrated set of learning activities aimed at reaching training objectives based on pre-established standards.

Objective
Skill to acquire or master.

Skill
An integrated set of the knowledge, abilities, attitudes, and perceptions necessary to perform a task or a work activity at the threshold of performance required.

Standard
Level of performance considered as a threshold based on which an objective is considered as having been reached.



T	Task or work activity
K	Knowledge
A	Abilities
A	Attitudes
P	Perceptions

Adapted from a model by Adèle Chené-Williams

3 SECTION ONE – OVERVIEW

3.1 Aims of the program

The program's objective is to train people capable of directing and controlling the movement of their ship in the waters of the Quebec-Les Escoumins marine district in complete safety. Pilotage in a given marine district requires extensive local knowledge of inland and coastal waters.

Training will provide candidates with the ability to plan the course to follow in the marine district; to navigate the ship in complete safety by avoiding obstacles to navigation; to decide on measures to take during difficult weather conditions or emergency situations; and to perform manoeuvres specific to anchorage in the marine district.

Optional training will make candidates ready to carry out manoeuvres that are specific to getting under way and docking a ship; to navigate a ship through ice; and to manage bridge resources.

The general objectives of the program are defined as follows:

- To make the individuals competent in the exercise of their functions, namely enabling them to carry out correctly, according to the required performances, the duties and activities inherent to these functions.

- To promote individuals' development by reinforcing their professional knowledge.

The training also aims to reinforce candidates' judgement, their ability to analyse and summarize, their mariner's sense, their leadership, their ability to work in a team, as well as their ability to withstand stress and to react appropriately during unforeseen situations.

3.2 Summary of the Program[1]

Program: Marine Pilotage in the Quebec-Les Escoumins Marine District II
Program code:

Required skills

Skills	Duration
1. Planning the passage into the marine district	120 h
2. Navigating a ship in the marine district's confined waters	120 h
3. Carrying out emergency manoeuvres specific to the marine district	30 h
Duration	270 h

Optional skills[2]

Skills	Duration
4. Deciding which measures to take for ice navigation	30 h
5. Carrying out docking manoeuvres	30 h
6. Bridge resource management	30 h
Duration	90 h

[1] The set of skills deal with the application of local knowledge.
[2] Optional skills may be taken individually or collectively, depending on the candidates' needs.

4 SECTION TWO – TRAINING OBJECTIVES AND STANDARDS

Objectives and standards

Each skill is defined by an objective and a standard to be attained. The skills are structured around and hinge on an integrated training project providing adequate training for candidates.

Drafting objectives and standards makes for objective, significant, and transparent training and assessment. The program is designed to promote the harmonious progression of skills while avoiding duplication of the officers' basic training and expertise.

The objectives and standards make up the main and mandatory targets of instruction and learning. They are taken into consideration for the development of training content and for skill assessment. Not all the elements and criteria are necessarily assessed. A specialist's analysis in terms of measurement and assessment allows for the establishment of assessment objectives and specific behaviours for observation.

Reading an objective and standard

The wording of the skill describes the observable behaviour expected at the end of the training period.

The context of achievement defines the work function's conditions of execution and serves as a reference to establish the conditions the learners are placed in during the evaluation.

The components of the skill provide details on the expected skill and behaviours. They also help specify the major stages of the professional pursuit of an occupation or the main components of the skill.

The performance criteria define the requirements to meet and accompany each one of the skill's components. They also foster enlightened judgement on reaching the objective.

Skill 1	Planning the passage into the marine district	Duration: 120 h
OBJECTIVE	**STANDARD**	
Wording of the skill Planning the passage into the marine district.	**Context of achievement** • Based on data about the ship's features and navigation conditions. • With the help of: – traditional and electronic charts; – relevant technical documentation; – drawing material.	
Skill component 1. Gathering data from documentation.	**Performance criteria** 1.1 Precise demarcation of the marine district's geographical expanse. 1.2 Appropriate account of the types of ships that usually circulate in the marine district. 1.3 Accurate localization of the concentration of pleasure craft and small commercial ships. 1.4 Approximate displacement forecasts. 1.5 Recognizing areas where sea fog may cause icing problems. 1.6 Complete record of technical documentation: – weather conditions specific to each season; – micro-climates.	

Skill 1	Planning the passage into the marine district	Duration: 120 h
OBJECTIVE	**STANDARD**	
Skill Component 2. Plotting courses.	**Performance Criteria** 2.1 Clear indication of natural and artificial obstacles along the course, such as: – depth, length, and width of channels; – shoals; – shipwrecks; – aerial cables and bridges. 2.2 Careful marking of course over ground. 2.3 Precise indications of the distances to cover on each section of course. 2.4 Appropriate adaptation of usual courses in terms of tides and speed of currents. 2.5 Judicious choice of safety limits in terms of the ship and of conditions. 2.6 Meticulous work.	
Skill Component 3. Indicating visual aid information on the chart.	**Performance Criteria** 3.1 Precise identification of the buoyage systems and fixed aids, such as: – markers; – artificial alignments; – principal recognized natural alignments; – main navigational structures along the coast; – leading lights. 3.2 Precise marking of the lateral distances between landmarks compared to the desired course over ground. 3.3 Precise calculation and course of safety bearings.	
Skill Component 4. Preparing the hypothetical radar alignments.	**Performance Criteria** 4.1 Precise calculation of the anticipated relative movement of the radar echo to be used. 4.2 Precise indication of the following data: – lateral and longitudinal distances; – course changes; – safety margins.	

Skill 1	Planning the passage into the marine district	Duration: 120 h
OBJECTIVE	**STANDARD**	
Skill Component	**Performance Criteria**	
5. Drawing up the passage plan.	5.1 Consideration of the type of ship and navigation conditions. 5.2 Safety speed adapted to marine district's prevailing conditions. 5.3 Stringent forecasting of the amount of time to spend on each portion of the course. 5.4 Realistic estimate: – of the passage's timing for high-risk areas; – of the time of arrival at destination point. 5.5 Proper endorsements regarding the calling-in-points and frequencies to be used to communicate with the Vessel Traffic Service. 5.6 Complete information on the secondary channels and on the passages that lead to ports and anchoring. 5.7 Relevance of notes regarding the passage's risk factors. 5.8 Following the rules for changing pilots. 5.9 Clear, accurate, and complete passage plan.	

Skill 2	Navigating a ship in the marine district's confined waters	Duration: 120 h
OBJECTIVE		**STANDARD**
Wording of the skill Navigating a ship in the marine district's confined waters.		**Context of achievement** • Teamwork. • For various circumstances and visibility conditions. • Based on data relative to the ship's features and navigation conditions. • With the help of: – the passage plan, navigation instruments whose electronic chart is managed by ECDIS, and technical documentation. • By paying special attention to the marine district's more difficult passages.
Skill component 1. Anticipating the ship's behaviour in the marine district's shallow and confined waters.		**Performance Criteria** 1.1 Precise assessment of squat and its effects. 1.2 Accurate anticipation of reactions during meetings and overtakings within the channel. 1.3 Correct assessment of the stopping and turning distances based on the distance under the keel. 1.4 Correct forecasting of the ship's reactions in terms of its centre of gravity position in more difficult passages. 1.5 Precise assessment of the increased draft as a result of the heel. 1.6 Consideration of the bank effect.

Skill 2	Navigating a ship in the marine district's confined waters	Duration: 120 h

OBJECTIVE	STANDARD
Skill Component 2. Determining the ship's position with visual and electronic aids: – while under way; – during course changes.	**Performance Criteria** 2.1 Precise bearing measurement and distances from lights, leading lines, and main recognized navigational structures. 2.2 Verification of the exactitude of the buoyage system. 2.3 Correct positioning based on radar-provided data, including the fictitious leading line method and racon bearings. 2.4 Recognition of location of towns and cities. 2.5 Distance of and easily identifiable bearings of targets to confirm ship's position. 2.6 Judicious use of recognized marks for changing course. 2.7 Critical verification with the electronic chart.
Skill Component 3. Establishing navigation strategies.	**Performance Criteria** 3.1 Rapid analysis of gathered data: – navigation warnings; – information transmitted by the team; – information from navigation aids. 3.2 Consideration of the ship's predictable behaviour. 3.3 Appropriate forecasting of squat. 3.4 Relevant decisions in terms of extreme weather conditions, depending on ship's position.

Skill 2	Navigating a ship in the marine district's confined waters	Duration: 120 h

OBJECTIVE	STANDARD
Skill Component 4. Avoiding obstacles on the course.	**Performance Criteria** 4.1 Thorough verification of the accuracy and reliability of electronic navigation aids. 4.2 Correct determination of the peculiarities of the marine district's more difficult passages. 4.3 Judicious decisions in terms of ship's behaviour, tides, current, and traffic. 4.4 Constant maintenance of the ship on the planned course. 4.5 Safety speed depending on prevailing conditions in the marine district, based on rules. 4.6 Absolute memorization of distances and safety bearings of the main navigational structures. 4.7 Strict adherence to rules and passage plan. 4.8 Constant vigilance.
Skill Component 5. Announcing arrival times at crucial points.	**Performance Criteria** 5.1 Accurate estimate of arrival times at calling-in-points, course changes, difficult passages, and meeting points with other ships. 5.2 Consideration of factors that influence the speed over the ground. 5.3 Strict adherence to prevailing communication procedures in the marine district.
Skill Component 6. Anchoring the ship.	**Performance Criteria** 6.1 Precise calculation of ship's turning basin. 6.2 Relevance of the anchoring choice in terms of depth of the ground, type of ground, the number of shackles to spin, proximity of other ships, and other factors. 6.3 Consideration of the ship's characteristics. 6.4 Consideration of the ship's external factors. 6.5 Safe and properly carried out safety manoeuvres.

Skill 3	Carrying out emergency manoeuvres specific to the marine district	Duration: 30 h
OBJECTIVE		**STANDARD**
Wording of the skill Carrying out emergency manoeuvres specific to the marine district.		**Context of exercise** • Teamwork. • For emergency situations in the marine district such as outage, collision, grounding of a ship, fire, leak, search and rescue, sinking, person overboard. • Based on data on: – the type of ship; – the emergency situation; – the ship's position; – additional and random factors. • With the help of: – a passage plan; – navigation instruments whose electronic chart is controlled by ECDIS; – International Safety Management Code (ISM) emergency procedures.
Skill Component 1. Planning emergency manoeuvres.		**Performance Criteria** 1.1 Adaptation of standard manoeuvres based on the ship's position in the marine district and type of emergency. 1.2 Meticulous identification of the high-risk areas in the marine district. 1.3 Proper planning of time frames to carry out emergency plans.
Skill Component 2. Deciding on emergency manoeuvres.		**Performance Criteria** 2.1 Quick analysis of all the collective data. 2.2 Consideration of environmental risks. 2.3 Relevance of measures to take based on environment characteristics. 2.4 Relevance of the decision to take a secondary channel. 2.5 Clear and precise orders. 2.6 Self-restraint and objectivity.

Skill 3	Carrying out emergency manoeuvres specific to the marine district	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill Component 3. Carrying out towing manoeuvres.	**Performance Criteria** 3.1 Relevance of the decision to tow or be towed. 3.2 Manoeuvres appropriate for a narrow channel: – for being towed; – for towing. 3.3 Correct adjustment of the length of the tow based on ship's location and position. 3.4 Strict adherence to rules and regulations that may be applied in this context.	

Skill 4	Deciding which measures to take for ice navigation	Duration: 30 h
OBJECTIVE	**STANDARD**	
Wording of the skill Deciding which measures to take for ice navigation.	**Context of achievement** • Teamwork. • Based on weather data and notice to mariners. • Based on data on the type of ship and its classification. • With the help of relevant documentation.	
Skill Component 1. Reading ice charts.	**Performance Criteria** 1.1 Recognize the type of ice based on international and Canadian codes. 1.2 Appropriate location of ice in the marine district.	
Skill Component 2. Recognizing hazards specific to the marine district.	**Performance Criteria** 2.1 Correct description of the peculiarities of the marine district, such as: – areas and timing of ice formation; – causes of congestion and areas where it occurs; – fixed ice expanses; – wind effect on ice concentration. 2.2 Proper record of critical areas of the marine district. 2.3 Correct prediction of ice movement. 2.4 Proper record of potential dangers such as floating ice from shoaling. 2.5 Relevant emergency measures in terms of the inherent risks to ice navigation.	

Skill 4	Deciding which measures to take for ice navigation	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill Component 3. Analysing the factors that influence navigation.	**Performance Criteria** 3.1 Consideration of the ship's characteristics. 3.2 Consideration of ice status information and navigation conditions. 3.3 Recognition of the criteria that limit the use of radar in the presence of ice. 3.4 Determining preventive measures for navigating shallow waters in the winter. 3.5 Determining the communication strategies with the engine room in case of sea suctions' obstructed purifiers. 3.6 Appropriate determination of unfavourable conditions forecast for the duration of the passage. 3.7 Consideration of weather conditions that could affect proper identification of the detected ice. 3.8 Consideration of the effects of the ship's speed on fixed ice.	

Skill 4	Deciding which measures to take for ice navigation	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill Component 4. Determining strategies for navigation under escort and with an icebreaker.	**Performance Criteria** 4.1 Correct assessment of the needs for assistance from an icebreaker. 4.2 Accurate determination of the availability of icebreakers in the marine district and of their position. 4.3 Permanent radio watch on the suitable frequency during an escort situation. 4.4 Close cooperation with the captain of the icebreaker. 4.5 Correct interpretation of the aural, visual, or radio signals specific to communications with an icebreaker. 4.6 Strict maintenance of distances between ships, ordered by the operations commandant under escort. 4.7 Accurate anticipation of escort icebreaker manoeuvres.	
Skill Component 5. Determining strategies for navigation without escort.	**Performance Criteria** 5.1 Judicious choice of preferable passages to follow. 5.2 Correct assessment of the speed of entry in ice for navigation without escort. 5.3 Proper maintenance of speed so as to maintain control of the ship at all times. 5.4 Accurate assessment of the appropriate timing when negotiating a difficult passage. 5.5 Consideration of traffic before tackling a difficult passage. 5.6 Clear identification of the parameters dictating recourse to an icebreaker.	

Skill 5	Carrying out docking manoeuvres	Duration: 30 h
OBJECTIVE		**STANDARD**
Wording of the skill Carrying out docking manoeuvres.		**Context achievement** • Teamwork. • For getting under way and docking manoeuvres to wharves or wharf basins in the marine district. • Based on information on the type of ship, its position, and additional and random factors. • With a passage plan, navigation instruments whose electronic chart is managed by ECDIS, wharf charts, and technical documentation. • In keeping with regulations.
Skill Component 1. Planning manoeuvres.		**Performance Criteria** 1.1 Accurate assessment of the characteristics of the ship's manoeuvres. 1.2 Relevant record of wharf's peculiarities, port infrastructure facilities, and marine district services. 1.3 Accurate determination of the extent and characteristics of the exercise ground. 1.4 Detailed record of viable navigation aids. 1.5 Consideration of: – in-port water depth; – weather conditions; – the ship's apparel and hawser capacities; – ships docked near the ship's bridge; – information obtained from the Vessel Traffic Service. 1.6 Appropriate forecasting of the hydrodynamic effects on the ship in terms of tidal water.

Skill 5	Carrying out docking manoeuvres	Duration: 30 h
OBJECTIVE	**STANDARD**	
Skill Component 2. Assessing the need to use a tug.	**Performance Criteria** 2.1 Consideration of the tug's capacity. 2.2 Consideration of the port's regulations. 2.3 Judicious decision.	
Skill Component 3. Getting under way and docking manoeuvres.	**Performance Criteria** 3.1 Follow plans. 3.2 Safety manoeuvres properly carried out. 3.3 Abide by port regulations.	

Skill 6	Bridge resource management	Duration: 30 h
OBJECTIVE	**STANDARD**	
Wording of the skill Bridge resource management.	**Context of achievement** • Teamwork. • With the use of: – a passage plan; – navigation instruments such as the electronic chart managed by ECDIS; – technical documentation.	
Skill Component 1. Analysing events that lead up to accidents.	**Performance Criteria** 1.1 Accurate analysis of the human factors involved in accidents. 1.2 Appropriate determination of preventive methods. 1.3 In-depth analysis of the chain of errors and its break.	
Skill Component 2. Communicating with the ship's crew.	**Performance Criteria** 2.1 Recognition of harmful factors and those that help establish a healthy working environment. 2.2 Stringent methods of transmission and of information reception.	
Skill Component 3. Taking a leadership role.	**Performance Criteria** 3.1 Firm control over the ship's crew during a planned leg of a passage. 3.2 Disciplined organization of teamwork. 3.3 Establishing an effective group synergy.	
Skill Component 4. Working as part of a team.	**Performance Criteria** 4.1 Precise assignment of the respective roles of each team member. 4.2 Respect of the organization during the passage.	
Skill Component 5. Developing emergency procedures.	**Performance Criteria** 5.1 Active participation of team members to design emergency procedures. 5.2 Appropriate planning of the periodic updating of acquired knowledge.	