



Pilotage Risk Management Methodology (PRMM)

Printed in Canada

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Transport, 2001.

Permission to reproduce

Transport Canada grants permission to copy and/or reproduce the contents of this publication for personal and public non-commercial use. Users must reproduce the materials accurately, identify Transport Canada as the source and not present theirs as an official version, or as having been produced with the help or the endorsement of Transport Canada.

For a print copy or an accessible version of this publication, please visit <http://transact-en.tc.gc.ca> or contact Transport Canada's Publications Order Desk at 1-888-830-4911 (in North America), 613-991-4071 (other countries).

An electronic version of this publication is available at
http://www.tc.gc.ca/media/documents/marinesafety/tp13741e_1.pdf.

Cette publication est aussi disponible en français sous le titre: Méthode de gestion des risques de pilotage (MGRP)

ISBN: 978-1-100-15102-1
Catalogue No. T29-70/2010E-PDF

TP 13741E
(05/2010)

TC-1003746

Table of Contents

Introduction and Methodology Overview	1
The Origin and Evolution of the PRMM	1
PRMM Application Standards.....	2
Communication and Consultation	2
Documentation	2
The Revised Guidelines.....	3
PRMM Guidelines – Application to Smaller Projects.....	4
Pilotage Risk Management Methodology	5
Module I: Project Initiation	6
1.1 Project Scoping and Planning	6
1.1.1 Document the Scope, Issues and Reference Data	6
1.1.2 Formulate a PRMM Question	6
1.1.3 Develop a Project Plan.....	7
1.2 Stakeholder Identification and Profiling	8
1.2.1 Identify Potential Stakeholders.....	8
1.2.2 Hold Stakeholder Meeting (Optional)	9
1.2.3 Develop Stakeholder Profiles.....	9
1.3 Establishing a Risk Management Team	10
1.3.1 Determine the Team Requirements.....	10
1.3.2 Establish the Risk Team	10
1.3.3 Meet With the Risk Team	11
Module II: Risk Assessment	12
2.1 Risk Scenarios	12
2.1.1 Hazard Identification.....	12
2.1.2 Identification of Current Defences.....	13
2.1.3 Evaluation of Defence Effectiveness	14
2.1.4 Description of Risk Scenarios	14
2.2 Risk Estimation	15
2.2.1 Probability of Adverse Consequences.....	15
2.2.2 Severity of Adverse Consequences.....	15
2.2.3 Scenario Risk Level.....	18
2.3 Risk Evaluation.....	18
2.3.1 Acceptability of Risk to Stakeholders	18
2.3.2 Risk Team Conclusion.....	19

2.4 Risk Mitigation/Control Strategies	19
2.4.1 Identify Feasible Risk Control Options.....	19
2.4.2 Assess Impact on Probability and Severity.....	19
2.4.3 Assess the Impact on Stakeholder NICs	20
2.4.4 Risk Team Conclusion.....	20

Module III: PRMM Documentation, Reporting and Decision 21

3.1 Working Paper Finalization	21
3.2 Report Preparation	21
3.3 Board Presentation – Optional	22
3.4 Board Decision	22

Module IV: Action 23

4.1 Action Planning.....	23
4.1.1 Review and Revise Stakeholder List	23
4.1.2 Develop an Implementation Plan	23
4.1.3 Develop Communication Plan	24
4.2 Action	24
4.2.1 Execute Implementation Plan.....	24
4.2.2 Evaluate Project Outcomes	24

Appendixes

Appendix A: Risk Definitions	25
Appendix B: Worksheets.....	27

Introduction and Methodology Overview

The Origin and Evolution of the PRMM

In 1999, a Canadian Transportation Agency (CTA) report entitled *Ministerial Review of Outstanding Pilotage Issues* issued recommendations on the use of a formal risk-based assessment methodology to support decisions on:

- Designating or reassessing compulsory pilotage areas;
- Determining the size and type of vessels subject to compulsory pilotage;
- Adopting or modifying significant policies or practices such as double pilotage or the use of waivers.

Risk methodology can also be applied to:

- A situation where an accident or occurrence has raised safety concerns;
- The introduction of new technologies;
- A complaint by a stakeholder or the general public; or
- Proposed changes in traffic patterns.

In response to a CTA recommendation, the four Pilotage Authorities, along with Transport Canada, jointly developed a comprehensive risk based methodology in 2001. The methodology developed was compliant with the Canadian Standards Association Standard CAN/CSA-Q850.

The *Pilotage Risk Management Methodology* (PRMM) has been applied to a variety of situations by each of the Authorities over the past several years. While the methodology has proven beneficial, concerns have been raised over the cost and complexity of the current approach. Consequently, in 2008, Transport Canada and the four Authorities initiated a process to review, update and streamline the PRMM.

PRMM Application Standards

The application of the Pilotage Risk Management Methodology must adhere to the following standards.

- **Comprehensive** – The level of research and the analysis must not only address the complexity of the situation but must also always be thorough.
- **Inclusive** – All potential stakeholders must be considered when developing the final list of those invited to participate in the PRMM process.
- **Flexible** – The methodology should be tailored to the specifics of the project while maintaining the integrity of core PRMM process.
- **Transparent** – The facts, analysis and conclusions must be open to review by the stakeholders.
- **Cost Effective** – The project complexity and cost should be consistent with the importance of the risk issue under review.

Communication and Consultation

Communication and consultation are essential if the PRMM process is to be effective. The exchange of information with stakeholders can assist the risk analysts and decision-makers by providing greater understanding of the issues and in identifying possible risk mitigation strategies. It can also help the participants to more accurately assess the impact of decisions on the needs, issues and concerns (NICs) of stakeholders. Finally, strong communications can help explain the rationale for the decision to the stakeholders and pave the way for a smooth implementation of the proposed actions.

Documentation

Documentation is paramount throughout the risk management process. Comprehensive documentation provides:

- A basis for consultation
- A means to explain and defend the risk analysis;
- A detailed record of decisions;
- Context for informing stakeholders of decisions.

Documentation requirements throughout the process should be guided by the importance and level of the decision to be made. A complex situation will require substantial documentation while a simple situation will require minimal documentation on each step in the PRMM.

The Revised Guidelines

The four Pilotage Authorities have limited staff resources available to carry out special projects such as risk assessments. Consequently, they generally contract an external consultant to serve as the Project Leader. However, the Authority is actively involved in the PRMM process. For example the Board of Directors would generally approve any significant project, be the end recipient of the report and be the final decision maker. Also, the senior staff of the Authority would likely be involved in the project and participate on the Risk Team. Further, the Chief Executive Officer (CEO) would be responsible for ensuring that the PRMM methodology has been followed and the analysis, reporting and documentation meets appropriate standards.

Consequently, this document, approved by the four Pilotage Authorities, is intended to provide guidance to the Authority's staff as well as the Project Leader and any other consultants involved in the project. It sets out guidance on the following four PRMM Modules.

- Project Initiation
- Risk Assessment
- Project Documentation and Reporting
- Action

Each of the basic module steps are illustrated in the following diagram and described in detail in the subsequent chapters. It should be noted that while the methodology is described in a sequence of steps, the process is not perfectly linear. There will frequently be a need to revisit previous steps and/or give consideration to future tasks when working through the methodology.

Appendix A contains a list of Risk Definitions that set out the common PRMM terminology. Appendix B provides a series of Worksheets that may be used to facilitate the documentation and analysis and may be modified, as required, to meet the needs of the specific project. Key Worksheets contain additional information on the scope of the tasks and all are cross-referenced to the steps in the process.

PRMM Guidelines – Application to Smaller Projects

There will be occasions where the Authority will want to conduct a formal risk assessment but the scope of the project and/or the number of stakeholders is limited. In these cases, the application of the full PRMM process may be neither necessary nor cost effective.

The Project Leader, in consultation with the Authority management, can consider options to streamline the process. For example, it may not be necessary to have a full Risk Team beyond representation from the Authority and the Pilots. Consultations with others can be conducted electronically thus eliminating the need for stakeholder meetings.

The number of scenarios under consideration could be reduced to two or three and the scope of the Risk Assessment Module limited accordingly. The documentation and reporting can also be tailored to the project scope and complexity.

While the PRMM steps may be streamlined, the integrity of the process must be maintained. The assessments of hazards and defences as well as the estimation and evaluation of risks and the consideration of additional risk mitigation strategies must adhere to the PRMM standards.

Pilotage Risk Management Methodology

Module I – Project Initiation

Project Scoping and Planning	Document Scope Issues and Reference Data	Formulate PRMM Question	Develop Project Plan
Stakeholder Identification and Profiling	Identify Potential Stakeholders	Hold Stakeholder Meeting (Optional)	Develop Stakeholder Profiles
Establishing Risk Team	Determine Team Requirements	Establish Risk Team	Meet with Risk Team

Module II – Risk Assessment

Risk Scenarios	Identify Hazards	Identify Current Defences	Evaluate Current Defences	Develop Risk Scenarios	
Risk Estimation	Determine Probability of Adverse Consequences	Determine Severity of Adverse Consequences	Estimate Risk		
Risk Evaluation	Determine Acceptability of Risk to Stakeholders	Risk Team Conclusion			
Risk Control Strategies	Identify Feasible Risk Control Options	Assess Impact on Probability and Severity	Re-Estimate Risk	Assess Impact on Stakeholder needs, issues and concerns	Risk Team Conclusion

Module III – Documentation

Documentation Reporting and Decision	Finalize Worksheets and Files	Prepare a Formal Report	Present to Board, if Required	Decision
--------------------------------------	-------------------------------	-------------------------	-------------------------------	----------

Module IV – Action

Action Planning	Review/Revise Stakeholder List	Develop Implementation Plan	Develop Communications Plan
Implementation	Execute Action Plans	Evaluate Project Outcomes	

Module I: Project Initiation

When the Authority management has identified an issue where a risk assessment is appropriate or required, they will usually document a case for the project and make a recommendation to the Board of Directors. If the Board agrees, management will determine the best way to undertake the project. As noted, this will usually involve contracting an external consultant to serve as Project Leader.

The three steps in the Project Initiation Module are:

- Project Scoping and Planning
- Stakeholder Identification and Profiling
- Establishing the Risk Team

Each of the above steps includes a number of tasks as described below.

1.1 Project Scoping and Planning

The initial project scoping and planning will be done by the Project Leader in consultation with the Authority management. Subsequently, it may be revised based on input from the Risk Team.

1.1.1 Document the Scope, Issues and Reference Data

All projects require a statement outlining the issues that gave rise to the project and placing them into the appropriate context. This is especially important for a PRMM as there are a number of participants involved beyond the Project Leader and the Authority.

The Authority's PRMM proposal and the Board decision should be supplemented with preliminary interviews which would likely include the Authority management, the pilots and perhaps a limited number of other stakeholders.

It is also useful at this point to identify and collect preliminary information needed to understand the scope of the issue as a basis for discussion and consultation. For example, the Project Leader may wish to source accident statistics/information from the Transportation Safety Board, identify the number and type of vessels operating in the area, determine traffic patterns or collect information from the Authority on the number and type of assignments in the area. The nature and extent of the preliminary research will depend on the complexity of the project.

The results of this work should be summarized in an Issues Paper or a PowerPoint Presentation. The Authority should review the information to ensure a common understanding. The outcome of this work forms an important input into the initial Risk Team or potential stakeholder meetings.

1.1.2 Formulate a PRMM Question

The methodology calls for the development of a question that will express the nature of the decision in one sentence. A well developed question can provide focus to the PRMM activity. The Project Leader can draft a question in consultation with the Authority. Subsequently, the question should be reviewed by the Risk Team and may be modified, if appropriate.

Examples of questions can be found in previous PRMM reports. The original PRMM Manual included the following example.

“Due to increased tanker traffic in environmentally sensitive waters, should pilotage become compulsory?”

In proposing a question, care must be taken to ensure that any reasonable response will be within the mandate of the Authority. In the above example, decisions on compulsory pilotage are within the mandate of the Authorities. Hence the question meets this standard.

1.1.3 Develop a Project Plan

The project plan must be consistent with the scope and complexity of the PRMM initiative. Like all good plans, it should contain the following elements.

- A statement of the project objectives;
- A listing and description of the tasks needed to accomplish the objectives;
- A project timetable that sets out the timeline for the whole project as well as each of its constituent parts; and
- A determination of the project knowledge/skill requirements and how they will be met.

In addition to the above, the plan should note any significant deviations from the Pilotage Risk Management Methodology, set out the nature of any specialized expertise that may be required and the plans for meeting those needs. It should also note any potential challenges and the plan for overcoming those hurdles wherever possible. The plan should be reviewed with the Authority management, who is the project client.

The Project Leader should provide the Authority with a cost estimate as early as possible and ensure that the estimate is acceptable. The estimate should include not only the cost of consulting time but also any potential out-of-pocket costs.

Worksheets:

1.1.3 (a): Project Planning – Tasks and Timetable

1.1.3 (b): Project Planning – Knowledge and Skills

1.1.3 (c): Project Planning – Task Assignments

1.2 Stakeholder Identification and Profiling

A stakeholder is defined as any individual, group or organization able to affect, be affected by, or believe it might be affected by a decision or activity.

1.2.1 Identify Potential Stakeholders

Stakeholders may include a variety of individuals or organizations. As noted, the Project Leader can draw up a preliminary list in consultation with the Authority. The list may be expanded by the Risk Team. Other stakeholders can be added at any time during the PRMM process.

While all potential stakeholders should be considered, it is useful to identify a core group of stakeholders that can provide relevant input into the process or will be impacted by any proposed changes. These primary stakeholders should be part of a proactive consultation process. Secondary stakeholders can be given an opportunity to provide input at their discretion or just be included in any communication process upon the completion of the PRMM.

A number of potential stakeholders are listed below.

- Authority Board of Directors
- Authority Management and Staff
- Authority Pilots
- Pilot Boat Operators
- Shipping Companies and Cruise Lines
- Towing Companies/Assist Tug Operators
- Fishing Industry
- First Nations
- Recreational Boating Organizations
- Port Authorities
- Coastal Enterprises
- Canadian Coast Guard – Department of Fisheries and Oceans
- Transport Canada and other federal regulatory organizations
- Provincial and Municipal governments
- Environmental Groups
- US Coast Guard
- US Pilotage Authorities
- Other Marine operations or organizations (Canada and US)

Not all of the above will be relevant to all projects. The final list of stakeholders must be tailored to the specific PRMM initiative.

1.2.2 Hold Stakeholder Meeting (Optional)

There could be times when an early meeting of all stakeholders would be beneficial. If there are a large number of stakeholders, all with a strong interest in the project, a meeting could be held to:

- Describe the PRMM process;
- Explain the nature and scope of the project;
- Solicit input on the Risk Team representation;
- Establish a communication protocol; and
- Solicit input on stakeholder NICs.

The stakeholder meeting is an optional step that may not be necessary or appropriate for all projects.

1.2.3 Develop Stakeholder Profiles

Stakeholder profiles can help to thoroughly inventory stakeholder NICs and should be developed whenever a good understanding of stakeholder motivations may be critical to the successful resolution of an issue.

Stakeholder input into the profile development can be obtained through a stakeholder meeting, individual consultation or direct participation from the members of the Risk Team. The profiles should be vetted with the stakeholders, wherever possible.

The profiles should document the potential impact of proposed changes on the stakeholders in terms of required adjustments to operating policies and practices, impacts on their competitive position, safety and environmental concerns. While the PRMM has primarily a safety focus, consideration will often need to be given to potential operating cost increases as this is frequently a major stakeholder concern. The profiles can be updated throughout the project as new information is gathered.

Worksheet:

1.2.3 Stakeholder Analysis

1.3 Establishing a Risk Management Team

The Risk Team plays a critical role in a PRMM project. It not only provides valuable input but can also help to sell the results and recommendations to other stakeholders.

1.3.1 Determine the Team Requirements

The purpose of the Risk Team is to provide expert input and advice to the Project Leader. The team is usually drawn from the group of primary stakeholders identified in consultation with the Authority management. The team can be supplemented with specialized expertise if deemed necessary. The team will generally include representation from the Authority and the pilots.

The size of the Risk Team will vary. It should be large enough to be representative of the stakeholders but small enough to be manageable. This would generally result in a team ranging from 4 to 8 members. Stakeholders not included on the team can still have input into the process. For example, there may be a shipping industry member on the team who can consult with others in the same sector. Provision can be made to solicit written input from all stakeholders or separate interviews can be conducted by the Project Leader.

1.3.2 Establish the Risk Team

The individuals selected to participate on the Risk Team should be formally invited. It should be made clear that they are advisors only. The report and recommendations are the responsibility of the Project Leader, although team members will have an opportunity to review the report before it is presented to the Authority management and Board of Directors to ensure that it accurately represents their views and those of the stakeholders. It must also be clear that the final decision rests with the Board.

1.3.3 Meet With the Risk Team

The initial meeting with the Risk Team should cover a number of subjects. A potential Agenda could:

- Provide an overview of the PRMM process to ensure that the Team understands the methodology;
- Describe the role and mandate of the Risk Team;
- Review and agree on the PRMM question and project plans;
- Review the research results to date and identify further information and research requirements;
- Review and further develop the list of potential stakeholders and identify those considered to be the primary stakeholders;
- Provide input into the stakeholder NICs;
- Identify potential risk scenarios;
- Develop a communication/consultation plan; and
- Agree on future meeting requirements.

The number of meetings will depend on the nature and complexity of the project. However, the team should have an opportunity to provide input on the identification of hazards and defences, the development of scenarios, the estimation and evaluation of the risks and the development of the risk control strategies.

Module II: Risk Assessment

The Risk Assessment Module is the heart of the PRMM process. It can involve considerable research, data gathering and analysis. Statistics are available on the numbers of accidents/incidents and transits and other key elements and are an important part of the analysis. However, while statistics provide a good view of the past history, they are not always a good predictor of the future.

It is important to analyze changes that could impact future risks – both positive and negative. Potential changes could include, but are not limited to:

- Advances in navigational and/or ship handling technology;
- Changing trends in traffic volumes and patterns;
- Changing trends in vessel size and type;
- Changes in the use, capability or availability of escort tugs;
- Future availability of skilled officers and crew; and
- Changes in the statutory and regulatory framework.

These and any other potential trends that could impact the nature and level of risk must be factored into the analysis.

2.1 Risk Scenarios

A Risk Scenario is a sequence of events potentially leading to an adverse consequence. The scenario must give consideration to the potential hazards as well as the current defences and their effectiveness. Generally, the Risk Team will develop a number of scenarios. The steps in developing the risk scenario are described below.

2.1.1 Hazard Identification

A hazard is defined as a source of potential harm, or a situation with the potential for causing harm in terms of human injury; damage to health, property, the environment, or other things of value.

The Pilotage Risk Management Methodology suggests that the development of scenarios starts with the identification and description of known hazards. There are five types of hazards that can generate adverse consequences.

- **Natural Hazards** such as strong currents, storms, shallow waters and other natural phenomena;
- **Man Made Hazards** such as bridges or other stationary structures as well as other vessels (Marine traffic).
- **Human Hazards** such as errors or omissions by marine companies or organizations, ship's masters and crews or pilots. This category can also include acts of sabotage or terrorism;
- **Technical Hazards** such as loss of navigation aids, loss of power or equipment failures or obsolescence of equipment; and
- **Economic Hazards** such as inflation or business cycles that can negatively impact internal policies and practices such as training and vessel maintenance.

Hazard identification can be performed by;

- Reviewing past accident history in the area under consideration or in other areas where situations are similar;
- Brainstorming by a team that understands all aspects of the situation under consideration;
- Consultation with stakeholders, many of whom may have relevant knowledge or expertise; and
- Consultations with specialized experts in the field.

Worksheet:

2.1.1 Hazard Identification

2.1.2 Identification of Current Defences

Once the hazards have been identified, consideration must be given to the current defences in place that could mitigate the risk. Defence is defined as physical or administrative measures to detect, reduce or prevent a potential adverse consequence. They can be designed to reduce the potential for an occurrence (e.g. navigational equipment) or to mitigate the adverse consequences resulting from an occurrence (e.g. oil spill containment equipment).

Defences can be divided into two categories, physical and administrative, as shown below:

Physical Defences

- Navigational equipment
- Survival suits
- Guardrails
- Navigational aids
- Dock/ship bumper pads
- Oil spill containment equipment
- CCG-SAR capability

Administrative Defences

- Safety regulations and standards
- Policies and procedures
- Supervision and inspection
- Training programs
- Effective communication
- Personal readiness
- Situational information

Worksheet:

2.1.2 Defence Identification and Assessment

2.1.3 Evaluation of Defence Effectiveness

Once the defences have been identified, their individual and collective effectiveness must be determined. Consideration must be given to the defence effectiveness for both minimizing the probability of an occurrence and mitigating the severity of the adverse consequences.

Determining the effectiveness of the scenario defences can involve:

- Analyzing the history of occurrences in the area;
- Determining if the defence is being used as intended and functioning appropriately;
- Drawing on the knowledge and experience of the Risk Team and/or stakeholders; and
- Soliciting input from experts, where appropriate.

Evaluating the defences involves considerable judgement. It is important to document the evaluation results to support any conclusions as set out in Worksheet II-1.2.

2.1.4 Description of Risk Scenarios

There are generally several scenarios developed for a PRMM project. Each scenario will incorporate multiple hazards which, individually or collectively, have the potential to result in adverse consequences. Risk scenarios may be developed using a variety of means including:

- Failure modes and effect analysis;
- Review of historical data;
- Using the experience of experts;
- Fault tree analysis; or
- Professional judgment (both internal and external).

The scenario should incorporate the hazards identified in Section II-1.1 into the sequence of events that could lead to the adverse consequences. In particularly complex scenarios, consideration should be given to the development of an Events Diagram to show, in a logical sequence, the events and conditions depicted by the scenario.

The next step is to consider the current defences and their effectiveness as determined in Section II-1.2 and II-1.3

Finally, consideration needs to be given to the potential outcomes of the scenario. These could include collision, grounding, fire, flooding, personal injury, environmental damage or any number of other adverse consequences.

Once the pathway from the hazards to the adverse consequences is developed as a risk scenario, the statistical or other data required to support the frequency or severity estimations can be identified. Data collection is an ongoing process throughout the PRMM.

The worksheet for this section is intended to summarize the information gathered at earlier stages into a single scenario statement.

Worksheet:

2.1.4	Scenario Description
-------	----------------------

2.2 Risk Estimation

Once the data are collected for each scenario, an estimation of the probability and severity of the specified adverse consequence can be performed and a risk level can be established.

The Risk Team is responsible for analyzing the data, drawing appropriate conclusions on the potential outcomes and matching these outcomes against the Probability definitions and the Severity descriptions. The conclusions may not always be unanimous. In these cases, the Project Leader is responsible for deciding the course of action that will be recommended to the Authority. However, the consultant must support the recommendation with facts and document the dissenting opinions in the report for Board consideration.

2.2.1 Probability of Adverse Consequences

The Probability Categories along with a brief definition for each are set out in the following tables. These definitions will likely not vary significantly. However, given the broad range of projects that could be covered by a PRMM, it may be beneficial to review the definitions early in the process to ensure that they are appropriate to the current initiative.

The role of the Risk Committee is to determine the probability category for each scenario. In doing so they should consider the past history, including the number and nature of occurrences in the area, any changes or trends in circumstances such as traffic patterns and volume, and defence enhancements such as advances in navigational and ship handling technology.

2.2.2 Severity of Adverse Consequences

The Severity Grid divides each category into subject areas and includes brief descriptions of potential outcomes. The Risk Team must determine the potential severity for each subject area. The highest subject severity ranking will apply to the risk estimation activity.

Again, these definitions will likely not vary significantly. However, given the broad range of projects that could be covered by a PRMM, it may be beneficial to review the definitions early in the project to ensure that they are appropriate for the current initiative.

Severity of Adverse Consequences

In order to qualify the Severity of the Adverse Consequences of any single event, it is only necessary to identify the most serious bulleted consequence in the row. (For example, if there is damage to a facility which will make it necessary for the operation to be moved to another location, and there is no other more serious consequence, then the severity would be considered major.)

	HUMAN	PROPERTY
EXTREME 5	Multiple Deaths and Multiple people with serious long-term injury. Intensive Care	Damage to property is such that it ceases operations for a period of time exceeding one month or financial loss exceeds \$10 million.
VERY HIGH 4	Single death and Multiple people with serious long-term injury. Intensive Care	Damage to facilities is such that operations cease for up to one month or financial loss of \$5 - \$10 million.
HIGH 3	Some people with serious long-term injury and multiple minor injuries.	Damage to facilities is such that the operations cease for up to two weeks or financial loss of \$1 - \$5 million.
MEDIUM 2	One person with serious long-term injury. Some minor injuries	Damage to facilities cause operations to cease for up to one week or financial impact of \$500,000 - \$1 million.
Low 1	Single or multiple Minor injuries requiring on site First Aid and/or off-site treatment.	Damage to facilities cause operations to cease for up to 72 hours or a financial impact up to \$500,000.

Real property generally encompasses land, land improvements resulting from human effort including buildings and machinery located on the land.

Note 1: In accepting the severity of the consequences, the event must never contravene the laws of Canada, the Provinces or the municipalities.

Note 2: The severity of consequences relates to injury, loss or concerns affecting all identified stakeholders including the Pilotage Authority.

Note 3: The financial impact of the consequences must be considered in all cases for all identified stakeholders.

Note 4: Consideration should be given to a company's intellectual property (Trademark) that may be damaged by an event, thereby affecting its ability to trade.

Note 5: Consideration must be given to the possibility that the perceived severity may be made greater by adverse media coverage and investigations by external authorities.

	VESSEL(S)	ENVIRONMENTAL	REPUTATION
	Vessel sinks or sustains so much damage that it is a constructive total loss.	Incident causes sustained long term harm to the environment (i.e. damage lasts longer than a month).	Sustained front page adverse national media coverage. International media coverage
	Vessel sustains damage significant enough to result in towing to dry dock and loss of operations of up to one month.	Incident causes sustained medium term harm to the environment (i.e. damage lasts up to one month).	Front page adverse national media coverage and intermittent International coverage.
	Vessel sustains significant damage with dry docking and loss of operations for two weeks.	Incident causes medium term harm to environment (i.e. damage lasts up to two weeks).	Intermittent adverse national media coverage.
	Vessel sustains damage resulting in loss of operations for one week.	Incident causes short term harm to the environment (i.e. damage lasts no longer than one week).	Sustained front page adverse local media coverage. Board and Ottawa receive complaints from CS and Major Clients.
	Minor damage with no effect or damage resulting in a loss of operations of no more than 72 hours.	Incident causes minimal or intermittent harm to the environment over a period of time (i.e. damage lasts no longer than a day).	Intermittent adverse local media coverage. Complaints received from Chamber of Shipping and/or Clients.



PROBABILITY OF EVENT OCCURRING	
Highly Probable	Almost certain that the event will occur OR at least once over a period of one year
Probable	Expected that the event will occur OR at least once over a period of three years
Possible	The event could occur over a period of 10 years
Unlikely	It is not expected that the event will occur over a period 10 years
Improbable	It is not expected that the event will occur over any defined period.

Note: The “defined period” will be dependent upon the event.

LEVEL OF RISK					
	EXTREME	VERY HIGH	HIGH	MEDIUM	LOW
Highly Probable					
Probable					
Possible					
Unlikely					
Improbable					

The role of the Risk Committee is to determine the severity category for each scenario.

2.2.3 Scenario Risk Level

Once the probability and severity levels have been established, they can be applied to the grid to determine the risk level associated with the scenario.

Worksheet:

2.2.3 Risk Estimation

2.3 Risk Evaluation

Once the scenario probability and severity outcomes have been determined and the risk level has been established, consideration needs to be given to the likely acceptability of the estimated risk levels to the stakeholders.

2.3.1 Acceptability of Risk to Stakeholders

In most instances, those who are familiar with a given activity or business tend to view risks associated with their activity or business differently from those who are not. In particular, experts emphasize technical factors such as the probability or severity of an adverse consequence (i.e. risk level) but many stakeholders, including the public, might emphasize factors such as:

- The degree of personal control that can be exercised over the activity; some are less accepting of risks over which they have no control;
- The potential of a hazard resulting in a severe consequence, (one death vs. many deaths); or
- The degree to which exposure to the risk is voluntary.

When evaluating perceptions, it should be kept in mind that an activity with an extremely low level of residual risk may be disregarded by experts. However, it may be a major source of concern for some stakeholders and may require that the communication plan specifically address the concerns of those stakeholders if the decision is to be sustainable.

The Risk Team will ultimately make the judgement on the acceptability of the risk levels. While this can generally be done by the Project Leader and the Risk Team, in particularly sensitive cases it may be appropriate to consult directly with the concerned stakeholder.

Worksheet:

2.3.1 Risk Evaluation

2.3.2 Risk Team Conclusion

If there is a general consensus that the risk levels are acceptable, no further risk control strategies will be required. However, there will still be a need to communicate with any stakeholders that may not be fully in agreement to ensure that they understand the rationale for the conclusion. There will also be a requirement for a comprehensive report to the Authority management and Board of Directors.

If the consensus is that the risk levels are not acceptable, the Risk Team will proceed to the next steps in the methodology and examine further Risk Control Strategies.

2.4 Risk Mitigation/Control Strategies

The Risk Team has the responsibility to consider additional, feasible, risk control options. Generally, the Team members are able to identify additional strategies. In some instances, it may also be appropriate to consult with other stakeholders or recognized experts.

2.4.1 Identify Feasible Risk Control Options

As a rule, the risk control options must be within the scope of the Pilotage Authority's mandate. However, consideration can also be given to options where the Authority could use its influence with another organization such as the Canadian Coast Guard to achieve the desired objective.

The risk control options can include physical and/or administrative defences that potentially impact both the probability and the severity of an adverse consequence.

2.4.2 Assess Impact on Probability and Severity

The probability and severity analysis must be performed again factoring in the modified risk control options. Until an option has been implemented and actual results observed, its effect can only be estimated. However, with the involvement of the Risk Team and other knowledgeable experts, a reasonable estimate of the residual risk level can be established.

The residual risk must be evaluated by returning to the risk evaluation step to determine whether or not it will be acceptable. If unacceptable, from the perspective of not adequately reducing the risk level, another option must be selected or found, or additional risk control measures devised.

2.4.3 Assess the Impact on Stakeholder NICs

At this point, the control options and revised risk levels must be assessed against the identified stakeholder needs, issues and concerns. Once the risk estimation and risk evaluation steps have been weighed against the stakeholder needs, issues and concerns and revised accordingly, the best option can be selected. It may be necessary during this step to consult with the stakeholders and keep them informed of any residual risk so that their concerns can be addressed.

2.4.4 Risk Team Conclusion

The previous steps will be repeated, as necessary, until the Risk Team is satisfied that the proposed Risk Control Strategies will reduce the residual risk to an acceptable level.

The Risk Team may also give consideration to the implementation issues. While implementation is ultimately the responsibility of the Authority, the Team will likely be in a position to provide advice on issues of timing and sequencing of the actions as well as identifying any specific challenges that may need special attention during the Action phase.

On occasion, the available risk control strategies will not reduce the risk to an acceptable level. In such cases, consideration will need to be given to abandoning or restructuring the original proposal that gave rise to the PRMM project.

Module III: PRMM Documentation, Reporting and Decision

PRMM projects usually involve a number of stakeholders, not all of whom will necessarily agree with the outcomes. Consequently, the project scope, the fact gathering and the analysis must clearly support the recommendations and the decision of the Board of Directors. Transparency is important to the success of a PRMM project. Transparency demands comprehensive documentation and reporting.

3.1 Working Paper Finalization

Throughout the PRMM project the Project Leader is responsible for ensuring that proper files are maintained. These will likely be a combination of electronic and paper files. The documentation should include:

- Data/statistics supplied by outside parties such as the Transportation Safety Board, the Marine Communications and Traffic Services, the Seaway Authorities and others;
- Correspondence/communication with stakeholders and others;
- Formal submissions by stakeholders or experts;
- Summaries of observations arising out of special activities such as accompanying a Pilot on an assignment;
- Background research papers;
- Issue and option analysis and Worksheets
- Minutes of Risk Team Meetings;
- Board decisions.

In summary, the documentation should be comprehensive and support the final conclusions and recommendations.

3.2 Report Preparation

While the primary audience for the PRMM report is the Authority management and Board of Directors, other stakeholders may also access the document to gain an understanding of the analysis, conclusions and recommendations leading up to the Board decision. In many cases, the readers will be neither marine nor risk specialists. The report should be structured accordingly.

In general, a narrative form of report would best serve the diverse audience. Selected Worksheets may be included in an Appendix or contained in a separate document, if appropriate. The report should:

- Demonstrate that the methodology has been followed and all key PRMM steps have been carried out while highlighting any significant deviations from the established process;
- Contain sufficient statistical and other data to support the analysis and conclusions;
- Ensure that the views of all stakeholders, including those that may not be in agreement with the outcomes, are fairly presented;
- Include the conclusions and recommendations of the Project Leader and the Risk Team

The report may also make action or implementation recommendations. However, this is ultimately a responsibility of the Authority management.

3.3 Board Presentation – Optional

The Authority management or Board of Directors may want to meet with the consultant to obtain elaboration on specific issues or to receive a briefing on the project and outcomes. The need for this step will often depend on the complexity and significance of the PRMM project.

The Authority CEO and Board Chair will generally determine the need for a formal presentation.

3.4 Board Decision

The Board of Directors is generally responsible for any decision on the report recommendations. The decision should be documented along with any rationale for deviations from the report recommendations.

Module IV: Action

4.1 Action Planning

Once the Board of Directors has made a decision, the Authority CEO will be responsible for implementation. This will generally involve a planning phase and an implementation phase.

The Action Module is usually the responsibility of the Authority staff. The Project Leader can provide support, if desired, in updating the stakeholder list or contributing to the plan development. However, usually the Authority is in the best position to do this work. Further, the communication plan should always be implemented by the Authority as it reflects a Board decision.

4.1.1 Review and Revise Stakeholder List

The acceptability of the current risk levels to stakeholders was assessed as part of the Risk Evaluation process (II-3.1). It was again considered as part of the development of additional Risk Control Strategies (II-4.3). Once the Board has made a decision and the implementation planning is underway, it may be useful to have a final review of the stakeholders and their NICs to ensure that they are factored into the development of the Implementation and Communication Plans.

4.1.2 Develop an Implementation Plan

An implementation plan will then be developed in response to the Board's decision. In some cases the plan will be relatively straightforward. However, for larger projects, the plan could be quite complex with the implementation taking place over a longer period of time.

The plan should give consideration to the implementation tasks, the timetable, the assignment of responsibilities and the resource requirements – both human and financial. It may also be appropriate to develop meaningful performance criteria to facilitate an assessment of project success. The data used to establish the risk level are a good starting point, since any increase or decrease in occurrences or severity resulting from implementation of the risk control strategy will provide the information necessary to evaluate performance.

Worksheet

4.1.2 Implementation Plan

4.1.3 Develop Communication Plan

Communication, both within the Authority as well as with the broader stakeholder groups, can be critical to successful implementation of the chosen risk control strategy. The sophistication of the Communication Plan depends on the number of stakeholders and the extent to which they are likely in agreement with the proposed actions.

Where there is a narrow range of stakeholders for which the impact will be less severe, the communication plan will be limited and the target groups will be few in number. In some cases, an announcement or delivery of the report can be done through regular channels with minimum effort. However, where the impact of the decision is greater and will impact a broader range of stakeholders, a more formal plan may be required. A successful communication plan will involve the following steps.

- Prioritize the stakeholder target groups for communication
- Identify the communication objectives for each group
- Specify the communication message for each group
- Specify the timing or sequencing of the communications.

Provision should be made for stakeholder feedback and, if significant, the Board should be kept advised.

Worksheet:

4.1.3 Communication Plan

4.2 Action

The Action phase is simply the implementation of the plan and the monitoring of results.

4.2.1 Execute Implementation Plan

The Authority CEO will have ultimate responsibility for the implementation of the plan. Again, the implementation challenges will depend on the nature of the PRMM initiative and the complexity of the proposed Risk Control Strategies.

In the case of more complex implementations, mechanisms should exist for ensuring that the work remains on time, on budget and that the actual work corresponds with the tasks set out in the plan. Provision should also be made for changes to the plan as course adjustments are often required during the implementation process.

4.2.2 Evaluate Project Outcomes

Complex PRMM projects may benefit from a post-implementation evaluation to determine if the risk control strategies achieved the stated objectives.

The implementation planning step (IV-1.2) called for the establishment of meaningful performance criteria. These criteria can be used to facilitate an assessment of project success. The Authority Management and Board may wish to set a timetable for a review and reporting on this matter. Often the lessons learned may benefit future PRMM projects.

Appendix A: Risk Definitions

(An asterisk indicates the definition is taken from CAN/CSA-Q850)

Adverse Consequence: The most likely thing to result from an encounter between something of value and a hazard.

Defence: A physical or administrative measure to limit, reduce, or prevent an adverse consequence.

Events Diagram: A tool for summarizing, documenting and communicating the development of a risk scenario. Brings together the events in a graphic form by indicating what can happen and why.

Hazard: A source of potential harm, or a situation with a potential for causing harm in terms of human injury; damage to health, property, the environment, and other things of value; or some combination of these.

Loss: An injury or damage to health, property, the environment, or something else of value.

Residual risk: The risk remaining after all risk control strategies have been applied. *

Risk: The chance of injury or loss as defined as a measure of the probability and severity of an adverse effect to health, property, the environment, or other things of value.

Risk analysis: The systematic use of information to identify hazards and to estimate the chance for, and severity of, injury or loss to individuals or populations, property, the environment, or other things of value.

Risk assessment: The overall process of risk analysis and risk evaluation.

Risk control option: An action intended to reduce the frequency and/or severity of injury or loss, including a decision not to pursue the activity.

Risk control strategy: A program that may include the application of several risk control options.

Risk estimation: The activity of estimating the frequency or probability and consequence of risk scenarios, including a consideration of the uncertainty of the estimates.

Risk evaluation: The process by which risks are examined in terms of costs and benefits, and evaluated in terms of acceptability of risk considering the needs, issues, and concerns of stakeholders.

Risk Level: An estimate of the probability that a hazard will involve an adverse consequence and of the severity of that adverse consequence.

Risk management: The systematic application of management policies, procedures and practices to the tasks of analyzing, evaluating, controlling, and communicating about risk issues.

Risk perception: The significance assigned to risks by stakeholders. This perception is derived from the stakeholders' expressed needs, issues, and concerns.

Risk scenario: A defined sequence of events with an associated frequency and consequences.

Stakeholder: Any individual, group, or organization able to affect, be affected by, or believe it might be affected by, a decision or activity. The decision-maker(s) is a stakeholder.

Appendix B: Worksheets

Module I: Project Initiation

- Project Planning – Tasks and Timetable1.1.3(a)
- Project Planning – Knowledge and Skills1.1.3(b)
- Project Planning – Task Assignments1.1.3(c)
- Stakeholder Analysis.....1.2.3

Module II: Risk Assessment

- Hazard Identification2.1.1
- Defence Identification and Assessment.....2.1.2
- Scenario Description2.1.3
- Risk Estimation.....2.2.3
- Risk Evaluation2.3.1

Module IV: Action

- Implementation Plan.....4.1.2
- Communication Plan.....4.1.3

Module I: Project Initiation

[illegible]

Module I: Project Initiation

[illegible]

Module I: Project Initiation

WORKSHEET 1.2.3	STAKEHOLDER ANALYSIS
PROJECT NUMBER:	PROJECT NAME:
STAKEHOLDER:	
Needs, Issues and Concerns	
<p>What is the nature and level of the stakeholder's interest in the issue?</p> <p>What impact will a PRMM decision have on the stakeholder – either positive or negative in terms of operational requirements, costs, etc?</p> <p>What is the stakeholder's knowledge level on the PRMM issue?</p> <p>Is there a need to provide the stakeholder with additional information?</p> <p>Is the stakeholder representative of a broader industry segment or stakeholder grouping?</p>	
Consultations/Communication	
<p>Is some form of consultation needed to ensure a full understanding of the stakeholder's needs, issues and concerns?</p> <p>Should the stakeholder be represented directly on the Risk Team?</p> <p>What form of consultation is most appropriate for this stakeholder?</p> <ul style="list-style-type: none">• Individual meeting• Group meeting• Correspondence or telephone contact providing project information along with an invitation to provide comments <p>What form of pre and post project communication is most appropriate for this stakeholder?</p>	

Module II: Risk Assessment

[illegible]

Module II: Risk Assessment

WORKSHEET 2.1.4	SCENARIO DESCRIPTION
PROJECT NUMBER:	PROJECT NAME:
SCENARIO NUMBER:	SCENARIO NAME:
Scenario Description Describe the Scenario including the sequence of events that could lead to the adverse consequences.	
Hazards Identify all of the hazards that apply to this scenario and describe the interaction between the hazards. (Worksheet II-1.1)	
Current Defences Describe all current defences and assess their effectiveness in this scenario. Assess the strengths and weaknesses of the current defences in relation to the defined hazards. (Worksheet II-1.2)	
Identify Potential Outcomes Identify the range of outcomes for this scenario in terms of adverse consequences.	

Module II: Risk Assessment

WORKSHEET 2.2.3	RISK ESTIMATION
PROJECT NUMBER:	PROJECT NAME:
SCENARIO NUMBER:	SCENARIO NAME:
Probability of Adverse Consequences Describe the probability of adverse consequences associated with this scenario and the data that support this conclusion. Assign a probability ranking.	
Severity of Adverse Consequences Describe the potential severity of adverse consequences associated with this scenario along with the data that support this conclusion. Assign a probability ranking.	
Risk Level Determine the Risk level using the Risk Matrix.	

Module II: Risk Assessment

WORKSHEET 2.3.1	RISK EVALUATION
PROJECT NUMBER:	PROJECT NAME:
SCENARIO NUMBER:	SCENARIO NAME:
Risk Level: Determined in Worksheet 2.2.3	
Acceptability of Risk Level Establish the acceptability of the Risk Level and state the rationale for the conclusion with references to specific defence weaknesses, as appropriate. Consider the acceptability of the risk level in terms of individual or groups of stakeholders.	
Additional Risk Mitigation Strategies If the risk level is unacceptable, identify further risk mitigation strategies and defences that could reasonably be applied to the scenario. Repeat the Risk Estimation process (Worksheet II-2.3), factoring in the additional risk mitigation strategies. Evaluate the acceptability of the proposed risk mitigation strategies to each of the stakeholders. Repeat the process until an acceptable level of risk has been established or there is a decision that it cannot be achieved.	

Module IV: Action

WORKSHEET 4.1.2	IMPLEMENTATION PLAN			
PROJECT NUMBER:	PROJECT NAME:			
ACTION TASKS		RESPONSIBILITY	START	END

Module IV: Action

[illegible]



TC-1003746

