



TSB Recommendation M95-09

BRM demonstration of training for all ship officers

The Transportation Safety Board of Canada recommends that the Department of Transport require that the initial training syllabus for all ship officers be modified to include demonstration of skills in Bridge Resource Management.

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| Marine transportation safety investigation report | SM9501 |
| Date the recommendation was issued | 11 October 1995 |
| Date of the latest response | December 2022 |
| Date of the latest assessment | March 2023 |
| Rating of the latest response | Satisfactory in Part |
| File status | Active |

Summary of the occurrence

The Transportation Safety Board of Canada (TSB) has released the final report on its *Safety Study of the Operational Relationship Between Ship Masters/Watchkeeping Officers and Marine Pilots*. This study examined safety deficiencies associated with teamwork on the bridge, including communications between marine pilots and masters/officers of the watch (OOW) on Canadian and foreign vessels, over 5,000 gross registered tons, that were under the conduct of pilots in Canadian pilotage waters.

The study was done in two phases. The first phase involved analyzing 273 occurrences where vessels were under the conduct of a pilot in Canadian pilotage waters; most of these involved misunderstandings, inattention or a lack of communications. Vessels greater than 5,000 gross registered tons were involved in 87% of these 273 occurrences.

The 273 occurrences were made up of five types:

- **Collisions:** 43 collisions with another vessel underway
- **Groundings:** 88 vessels struck shoals, touched bottom or an underwater reef and remained stranded until refloated
- **Strikings:** 95 vessels struck a stationary object, such as a vessel not underway, a quay or other fixed installation

- **Contacts:** 46 light impacts with another vessel, marker, buoy or the bottom
- **Sinking:** 1 vessel became submerged from water intake below the water line and settled to the bottom.

The Board, concerned by the frequency and potential consequences of such occurrences, conducted a preliminary examination consisting of a review of these 273 occurrences. For each occurrence, the most significant factor contributing to the occurrence was identified.

There were 200 accidents identified as involving human factors, and 84 (42%) involved misunderstanding between pilot and master, inattention by the pilot or the officer of the watch (OOW) or a lack of communication between the pilot and the OOW. In addition, 91 (46%) involved misjudgment by the pilot or master. Breakdowns in communication or teamwork on the bridge appear to be implicated in many of these marine occurrences.

As a result of its preliminary examination, the Board decided to study the conditions or practices which lead to such breakdowns, with a view to identifying safety deficiencies.

In the second phase, a questionnaire was distributed to 1,300 individuals including pilots, masters and ship officers to identify issues relevant to the interaction among the bridge team. After the responses to the questionnaire were analyzed, supplemental interviews were conducted with representatives from pilotage authorities, the shipping industry and the Canadian Coast Guard. In addition, recent occurrences were reviewed in light of the information gleaned from the results of the questionnaire. Some of the key findings that came out of the study included: inadequacy of bridge teamwork; reluctance of bridge crew to question pilot's decisions; inadequacy of information being passed between pilots and masters/OOWs and masters/OOWs and pilots; misperceptions that the other party has the necessary information; inadequate knowledge of the operating language preventing effective communication between the pilot and bridge crew; disagreement on the extent to which the OOW monitors the vessel's conduct while under the control of a pilot; and the absence of Bridge Resource Management (BRM) training in Canada.

The Board found that differences in perceptions and expectations between pilots and masters/OOWs contribute to a lack of mutual understanding between the groups. Because of the potentially serious consequences of these misunderstandings, the Board felt that strong measures were required to improve bridge team effectiveness through enhanced information exchange and made two recommendations to that effect: one concerning a formal exchange of information between the master and the pilot before the pilot commences duty, and the other concerning training for Canadian pilots and ship officers to include practice on hand-over procedures.

The TSB considers that close and continuous monitoring of a vessel's progress following an agreed passage plan is essential for the safe conduct of a vessel. In order for OOWs to effectively monitor the vessel's movements, they should know the pilot's passage plan. In December 1994, the TSB issued a recommendation to Transport Canada (TC) to require pilotage authorities to publish official passage plans for compulsory pilotage waters in order to facilitate monitoring of

the pilot's actions by the vessel's bridge team. The Board has now further recommended that pilots, as part of their hand-over briefing, obtain the master's agreement to the intended passage plan and invite the OOW to monitor the vessel's position at regular intervals with respect to the agreed plan. BRM, the managing of human and technical resources in an operational marine environment, is a function comprising several elements. These include the application of effective communication, the use of briefings and debriefings, and the creation of an environment where all members of the bridge team feel free to question assumptions and actions.

The Board concluded its investigation and released report SM9501 on 11 October 1995.

Rationale for the recommendation

Misunderstanding among the bridge team, lack of adequate information exchange, incomplete understanding of the intended manoeuvres, loss of situational awareness, absence of monitoring of the ship's progress, etc., as evidenced by the Canadian marine occurrence experience, are symptomatic of more fundamental problems in bridge practices. Such factors suggest deficiencies in the effectiveness of current bridge team management practices in compulsory pilotage areas.

A lack of teamwork on the bridge of vessels in Canadian pilotage waters is continuing to compromise safe navigation. The recent occurrences involving the *Concert Express*, the *Lake Anina*, the *Malinska*, the *Halifax*, and the *Irving Nordic* all point to a lack of communication and cooperation as contributing factors in the occurrences.

As it has stated in the past, the Board continues to believe that increased emphasis on information exchange and coordination could improve bridge team management and therefore advance safe navigation. Systematic instruction of ship officers and marine pilots in operating practices and procedures designed to facilitate information exchange and coordination among all members of the bridge team is required.

The overwhelming majority of pilots, masters and bridge officers who responded to the Board's questionnaire rated teamwork as important as technical proficiency for safe navigation. However, less than half of those who responded stated that they always worked as a team. The accident record confirms that current bridge procedures and practices frequently reflect an absence of teamwork.

In rejecting the Board's Recommendation M94-34 regarding passage planning, the Department of Transport stated (22 March 1995):

However, it is believed that a more effective bridge resource management regime (including enhanced communication between the pilot and the officer of the watch), rather than a voyage plan, may potentially have contributed to the incident being avoided.

The Board notes the intention of the Department of Transport to develop optional training courses in Bridge Resource Management. However, the Board is concerned that optional

training might not have the desired effect within the industry. Not all the major constituents of the marine industry have indicated strong support for such training.

Bridge Resource Management, the managing of human and technical resources in an operational marine environment, is a function comprising several elements. These include the application of effective communication, the use of briefings and debriefings, and the creation of an environment where all members of the bridge team feel free to question assumptions and actions.

As a result of the problems identified in this study relating to the absence of handover briefings, the ineffective monitoring of the vessel's position and in view of the frequency of occurrences involving demonstrated breaches of sound teamwork principles, the Board recommends that

the Department of Transport require that the initial training syllabus for all ship officers be modified to include demonstration of skills in Bridge Resource Management.

TSB Recommendation M95-09

Previous responses and assessments

January 1996: response from Transport Canada

At the Watchkeeping Mate level, there are currently three areas where the officer/pilot relationship is examined or demonstrated. They are:

- 041 - Chartwork and Pilotage Exam Bridge Practices
- 161 - Oral Examination - Duties at Sea
- SEN 1B Course - Maintaining a Bridge Navigational Watch - Conduct and duties as recommended in the directives of the Code of Nautical Procedures and Practices.

In addition, the higher certificate levels address the ship/pilot relationship as follows:

- SEN 2 Course - The Professional Master - The advantages/necessity of having a cooperative bridge team and dealing effectively with difficult team work situations.

Master Mariner

- 093 - Ship Management Exam - the master's responsibilities and liabilities.

ON1 and CN1

- 062 Exam - Code of Navigation Procedures and Practices
- 092 Exam - Business and Law, the Pilotage Act and pilotage.

Demonstration skills in Bridge Resource Management are contained in both the SEN 1B and SEN 2 courses. This covers virtually every officer except those who only obtain the lowest level certificates such as Master Limited (Master Minor Waters).

If further demonstration skills are warranted they would have to be included in revised SEN courses or specialized Bridge Resource Management Courses. A SEN seminar to revise the syllabus was held in June 1995 and these subject demonstration skills were not augmented.

At the next SEN seminar Transport Canada will table this recommendation for consideration. In addition, it could be tabled at an upcoming CMAC meeting in order to determine if any guidance can be given to the SEN seminar.

The Minister of Transport accepts the recommendation.

The Department of Transport will promote the development and provision of Bridge Resource Management training courses by marine training institutions in Canada. There can be a requirement for prior completion of an approved Bridge Resource Management training course when they are available in Canada. The Department of Transport will phase in this requirement consecutively for certificate groups (MM, CFGS, ON1, CN1, and CP for this group), (ON2, CN2, WKM, and CP for this group), and (CFLR, 1MFLR, CHT350, CHT350S, and CP for this group), (CFV1, CFV2, and CP for this group).

March 1996: TSB assessment of the response (Satisfactory in Part)

Recommendations M95-09 and M95-10 state that current radar courses address issues related to BRM training; recent discussion by the staff with a radar instructor from the Institute Maritime du Quebec (IMQ) pointed out that very little time is actually devoted to BRM during the SEN I and SEN II courses. (SEN I course focuses on anti-collision while SEN II course includes radar navigation and anti-collision.) Consequently, the IMQ is preparing BRM courses as distinct training for pilots, ship masters and officers. Furthermore, although there are presently no compulsory requirements for BRM training, TC intends to promote the development and the provision of BRM training courses and plans to phase in such requirements starting with higher level certificates.

Concerning Recommendation M95-11, TC and Pilotage authorities intend to promote the inclusion of a BRM training course for applicants and holders of pilot licences and pilotage certificates. So far, TC prefers to include such a requirement in the certificates of competency and continued proficiency endorsements. Although TC's response does not provide any specific action plan and falls short of compulsory BRM, it is viewed as a positive approach.

The TSB considers TC's response to Recommendation M95-09 (as well as to recommendations M95-10 and M95-11) to be **Satisfactory in Part**.

January 2014: response from Transport Canada

With the entry into force of the STCW 2010 Convention, Marine Safety and Security proceeded to amend the *Marine Personnel Regulations* (MPR). In the proposed amendments to the MPR, we are introducing the Bridge Resource Management Training course as being mandatory to obtain a Master or Chief Mate STCW certificate of competency. At the operational level, we are introducing Bridge Resource Management Competency and knowledge into the Simulated

Electronic Navigation, level 1 (SEN 1) training courses. TP 4958 will be amended accordingly to reflect this new competency in the SEN 1 training course. The review of TP 4958 will begin in March 2014.

March 2014: TSB assessment of the response (Satisfactory Intent)

Among the STCW Manila amendments in 2010 was the requirement to introduce mandatory training in resource management, leadership and teamworking skills at the operational level, and leadership and managerial skills at management levels. Seafarers holding certificates issued in accordance with the provisions of STCW will have to complete the necessary training to obtain their certificate of competency by 01 January 2017. Training for officers in charge of a navigation watch, for example, will include knowledge of bridge resource management principles, including: allocation, assignment and prioritization of resources; effective communication; assertiveness and leadership; and, obtaining and maintaining situational awareness. Training for masters and chief mates will include further detailed knowledge and abilities related to the use of leadership and management skills. Either training will require methods for demonstrating and evaluating the knowledge.

Once TC amends the *Marine Personnel Regulations* to give effect to the STCW 2010 amendments, and to introduce mandatory BRM training for master or chief mate STCW certificates of competency, and for the operational level (watchkeeper), the safety deficiency identified in the recommendation will be mitigated.

Therefore the assessment of the response to Recommendation M95-09 has been changed to **Satisfactory Intent**.

February 2015: response from Transport Canada

Transport Canada's response indicated the following:

With the entry into force of the STCW 2010 Convention, Marine Safety and Security proceeded to amend the *Marine Personnel Regulations* (MPR). In the proposed amendments to the MPR, we are introducing the Bridge Resource Management Training course as being mandatory to obtain a Master or Chief Mate STCW certificate of competency. At the operational level, we are introducing Bridge Resource Management Competency and knowledge into the Simulated Electronic Navigation, level 1 (SEN 1) training courses. TP 4958 will be amended accordingly to reflect this new competency in the SEN 1 training course. The review of TP 4958 will begin in March 2014.

Drafting of the MPR began in September 2014. TC is aiming to publish in the *Canada Gazette* Part I the proposed amendments to the MPR by the end of 2015. Once in force, this will apply to new and renewed certificates.

Additional information provided by TC indicated that its review of TP 4958, Simulated Electronic Navigation Courses, began in March 2014 and it is expected to be completed in time to present the results at the next meeting of the Canadian Marine Advisory Council to be held in April 2015.

March 2015: TSB assessment of the response (Satisfactory Intent)

Once TC amends the *Marine Personnel Regulations* to give effect to the STCW 2010 amendments, and to introduce mandatory BRM training for master or chief mate STCW certificates of competency and for the operational level (watchkeeper), the safety deficiency identified in the recommendation will be mitigated.

Therefore the assessment of the response remains **Satisfactory Intent**.

March 2016: response from Transport Canada

Transport Canada's response indicated that it is in the process of amending TP 4958, *Simulated Electronic Navigation Courses*. The amendments will require BRM competency and knowledge to be added to the Simulated Electronic Navigation (SEN) at the operational level training course (for OOWs) and at the management level (for masters and mates). A status on the amendment is to be presented at the April 2016 meeting of the Canadian Marine Advisory Council, and it is expected that a draft of the TP will be available by September 2016.

The response also noted that drafting of the *Marine Personnel Regulations* began in September 2014 and TC is aiming to publish its proposed amendments to the MPR by the end of 2016. Once in force, the amendments to the MPR will apply to both new and renewed certificates.

March 2016: TSB assessment of the response (Satisfactory Intent)

Once the changes to TP 4958, *Simulated Electronic Navigation Courses* are in force, mandatory training in BRM will be incorporated into all SEN courses, which are required for new and renewed certificates. Once TC requires the initial training syllabus for all ship officers to be modified to include demonstration of skills in BRM, the safety deficiency underlying this recommendation will be addressed.

Therefore, the assessment of the response remains **Satisfactory Intent**.

December 2016: response from Transport Canada

TC Marine Safety and Security presented the status of TP 4958 at the April, 2016 CMAC. A draft of the TP 4958 is available for Course Providers to elaborate the new training. In addition, a draft TP of Leadership, Teamwork and Managerial Skills has been provided to Course Providers to elaborate the new trainings (sic) in Leadership and Teamwork and Leadership and Managerial Skills.

The competencies and knowledge related to watchkeeping officers outlined in STCW Convention (including 2010 Manila Amendments) for Bridge Resource Management will be met at the Operational level (Officer of the Watch) once a candidate has completed the Simulated Electronic Navigation training course at Operational Level (SEN-O) and the Leadership and Teamwork training course (LTW).

The competencies and knowledge related to Masters and Chief Mates outlined in STCW Convention (including 2010 Manila Amendments) for Bridge Resource Management will be met at the Management level once a candidate has completed the Simulated Electronic Navigation training course at Management Level (SEN-M) and the Leadership and Managerial Skills course (LMS).

Bridge Resource Management course will also remain as a stand-alone training course in TP 13117 for the convenience of the seafarers.

March 2017: TSB assessment of the response (Satisfactory Intent)

TC has revised TP 4958 to incorporate the competencies and knowledge related to watchkeeping officers outlined in the STCW Convention (including 2010 Manila Amendments) for bridge resource management. The new curriculum covers both operational and management competency demonstration in the Simulated Electronic Navigation training courses required for watchkeeping officers at Operational Level (SEN-O) and for masters and mates in the Leadership and Teamwork training course (LTW).

Once the proposed TP 4958 training curriculum is in force, the initial training syllabus for all ship officers will include the requirement to demonstrate skills in bridge resource management. Therefore, the assessment of the response remains **Satisfactory Intent**.

December 2017: response from Transport Canada

Marine Safety and Security presented the status of TP 4958 at the April, 2016 CMAC. A draft of the TP 4958 is available for course providers to aid with the new training. The competencies and knowledge outlined in TP 4958 related to watchkeeping officers outlined in STCW Convention (including 2010 Manila Amendments) for Bridge Resource Management will be met at the Operational level (Officer of the Watch) once a candidate has completed the Simulated Electronic Navigation training course at Operational Level (SEN-O). The competencies and knowledge related to Masters and Chief Mates outlined in STCW Convention (including 2010 Manila Amendments) for Bridge Resource Management will be met at the Management level once a candidate has completed the Simulated Electronic Navigation training course at Management Level (SEN-M).

In addition, a draft TP 15337 regarding Leadership, Teamwork and Managerial Skills has been provided to course providers to aid the new training in Leadership and Teamwork, and Leadership and Managerial Skills. Following the draft TP, since April 2017, several course providers in Canada have been approved to deliver these training courses. TC requires any seafarers who apply for a new Ministers CoC to comply with Leadership and Teamwork at operational level and Leadership and Managerial Skills at Managerial level.

The Bridge Resource Management course will also remain as a stand-alone training course in TP 13117 for the convenience of the seafarers.

March 2018: TSB assessment of the response (Satisfactory Intent)

Transport Canada began drafting the *Marine Personnel Regulations* (MPR) in September 2014 aiming to publish its proposed amendments to the MPR, such as the STCW Convention and its associated Codes, which included the 2010 Manila amendments, STCW-F and 2014 Amendments to the Maritime Labour Convention, 2006, by the end of 2016. Once in force, the amendments to the MPR would apply to both new and renewed certificates of competencies. After the latest consultation with stakeholders at CMAC on 20 April 2016, Transport Canada now anticipates a pre-publication of the MPR in the *Canada Gazette*, Part I in late 2018.

As part of the regulatory amendment process TC also presented drafts of TP 4958, TP 15337 and TP 13117 to aid the course providers with the new training requirements.

TP 15337 would require only seafarers who apply for a new Certificate of Competency (CoC) to comply with Leadership and Teamwork at the operational level and Leadership and Managerial Skills at the managerial level. However, this will not apply to existing seafarers who are required to have their CoC endorsed once every 5 years, as TC considers a seafarer who holds a valid STCW CoC, as having a CoC to be compliant with the STCW 2010 Manila amendments. TC has not provided the TSB with the number of seafarers exempt from this training requirement.

Therefore, the Board considers the response to the recommendation to show **Satisfactory Intent**.

January 2019: response from Transport Canada

Transport Canada (TC) agrees with the recommendation. Until such time that the *Marine Personnel Regulations* are amended, Transport Canada has included the new mandatory training requirements in Leadership and Teamwork, and Leadership and Managerial Skills in Ship Safety Bulletin 09/2017, issued on November 27, 2017, titled "Update on How to Meet the *International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers* (STCW), 2010 Manila Convention".

Since January 1, 2017, Certificates of Competency have been issued only to individuals who have completed the required mandatory training, as per the STCW Convention and as identified in SSB 09/2017. TC is targeting to have the amendments to the *Marine Personnel Regulations* in the *Canada Gazette* processed in Spring 2019. The publication of these amendments are expected to satisfy the recommendation.

March 2019: TSB assessment of the response (Satisfactory Intent)

TC plans to publish amendments to the *Marine Personnel Regulations* in the *Canada Gazette* in Spring 2019 to address this issue. The Board notes that until the *Marine Personnel Regulations* are amended, TC has included the new mandatory training requirements in Leadership and Teamwork, and Leadership and Managerial Skills in Ship Safety Bulletin 09/2017.

The Board considers the response to the recommendation to show **Satisfactory Intent**.

January 2020: response from Transport Canada

Transport Canada agrees with this recommendation. Regulations amending the *Marine Personnel Regulations* are now anticipated to advance to the *Canada Gazette*, Part I, in 2020.

March 2020: TSB assessment of the response (Satisfactory Intent)

TC indicates that the publication of amendments to the *Marine Personnel Regulations* in the *Canada Gazette*, Part I, originally planned for the spring of 2019, is now anticipated in 2020. The Board notes that, until the *Marine Personnel Regulations* are amended, TC has included the new mandatory training requirements in Ship Safety Bulletin 09/2017.

The Board considers the response to the recommendation to show **Satisfactory Intent**.

February 2021: response from Transport Canada

Transport Canada agrees with this recommendation. Proposed amendments to the *Marine Personnel Regulations* are now anticipated to advance to the *Canada Gazette*, Part I, in late 2021 and will be published in the *Canada Gazette*, Part II, in summer 2022. Once these amendments are made, it is expected the risk identified in this recommendation will be mitigated.

March 2021: TSB assessment of the response (Satisfactory Intent)

TC indicates that the publication of amendments to the *Marine Personnel Regulations* in the *Canada Gazette*, Part I, expected in 2020, is now anticipated in late 2021. The Board notes that, until the *Marine Personnel Regulations* are amended, TC has included the new mandatory training requirements in Ship Safety Bulletin 09/2017, and has started to approve training programs in anticipation of the regulatory amendments. Once all training providers have their new program approved by TC, and the amendments are in force, the residual risk identified in this recommendation will be largely mitigated.

The Board considers the response to the recommendation to show **Satisfactory Intent**.

December 2021: response from Transport Canada

Proposed amendments to the *Marine Personnel Regulations, 2023* are now targeted for publication in:

- *Canada Gazette*, Part I, December 2022
- *Canada Gazette*, Part II, Summer 2023

Transport Canada discussed the proposed *Marine Personnel Regulations, 2023* in detail at the National Canadian Marine Advisory Council (CMAC) Standing Committee on Personnel on December 1, 2021.

March 2022: TSB assessment of the response (Satisfactory Intent)

The Board notes that, until the *Marine Personnel Regulations* (MPR) are amended, Transport Canada (TC) has included the new mandatory training requirements in Ship Safety Bulletin 09/2017, and has started to approve training programs in anticipation of the regulatory amendments. However, the Board also notes that, despite TC's indication that the pre-publication of amendments to the MPR is coming in the *Canada Gazette, Part I* in late 2022, there have been a number of delays in the publication of this regulation since 2016. The Board is concerned that there may be further delays in the advancement of this regulation. However, when the proposed regulations are implemented, this will address the safety deficiency associated with this recommendation.

Therefore, the Board considers TC's response to Recommendation M95-09 to be **Satisfactory Intent**.

Latest response and assessment

December 2022: response from Transport Canada

Transport Canada continues to advance work to amend the *Marine Personnel Regulations* to address this recommendation. Consultations with key stakeholders are ongoing, including at the National Canadian Marine Advisory Council (CMAC) Standing Committee on Personnel on November 10, 2022. As a result, revised targets for amendments to the *Marine Personnel Regulations* include publication in *Canada Gazette, Part I* in Fall 2023 and *Canada Gazette, Part II* in 2024. Until the amendments have been made and in recognition of the importance of Bridge Resource Management skills, Transport Canada guidance is included in Ship Safety Bulletin 09/2017 setting out specific requirements in leadership and teamwork skills as well as other mandatory training for seafarers who must comply with the *International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, as amended by the 2010 Manila Conference*.¹

March 2023: TSB assessment of the response (Satisfactory in Part)

Transport Canada's (TC) response indicates that the pre-publication of the new *Marine Personnel Regulations* (MPR) in the *Canada Gazette, Part I* has been further delayed from late 2022 to fall 2023; previous responses from TC had indicated an expected pre-publication starting in 2015.

Until the amendments have been made and in recognition of the importance of Bridge Resource Management skills, TC has issued interim guidance in Ship Safety Bulletin 09/2017 setting out specific requirements in leadership and teamwork skills as well as other mandatory training for

¹ All responses are those of the stakeholders to the TSB in written communications and are reproduced in full. The TSB corrects typographical errors in the material it reproduces without indication but uses brackets [] to show other changes or to show that part of the response was omitted because it was not pertinent.

seafarers who must comply with the *International Convention on Standards of Training, Certification, and Watchkeeping for Seafarers, as amended by the 2010 Manila Conference*.

The Board continues to be concerned over the repeated delays in the publication of the amended MPR. Therefore, the Board considers TC's response to Recommendation M95-09 to be **Satisfactory in Part**.

File status

The TSB will continue to monitor the progress made by Transport Canada. Further delays in the publication of the amended regulations may warrant a change in rating.

This deficiency file is **Active**.