



## REASSESSMENT OF THE RESPONSE TO TSB RECOMMENDATION M05-05

### Design, inspection, and testing of the CO<sub>2</sub> system

#### Background

On the morning of 12 May 2003, while en route from Horseshoe Bay, British Columbia, to Langdale, British Columbia, the *Queen of Surrey*, with 318 passengers and 137 vehicles on board, suffered a diesel oil fire on its No. 2 main engine. The engine room was evacuated and sealed, and carbon dioxide (CO<sub>2</sub>) gas was released into it. Although immediate failure of the CO<sub>2</sub> distribution manifold allowed some of the gas to escape, enough reached the engine room to extinguish the fire. The vessel was then towed to the Langdale ferry terminal, where the passengers disembarked. There were no fatalities.

The Board issued the safety recommendation on 09 February 2006.

#### TSB Recommendation M05-05 (February 2006)

When designed, maintained and tested appropriately, CO<sub>2</sub> fixed smothering systems are highly effective in containing and extinguishing fires that have become too large or dangerous to fight using direct-attack methods. Should the activation of a fixed smothering system fail to extinguish a fire, and other firefighting methods are ruled out, the passengers and crew may find themselves in a high-risk situation. In recognition of the crucial protection afforded to spaces deemed to be at high risk of fire, the Board is concerned that, without adequate design requirements to prevent accidental leakage and discharge, and without test procedures to demonstrate continued structural and functional integrity, subsequent failures of fixed fire-extinguishing systems during emergencies may place vessels, crew, passengers and the environment at undue risk. The Board therefore recommended that

the Department of Transport, in conjunction with other stakeholders, review Canadian and international marine regulations respecting fixed fire-extinguishing systems to ensure that their design, maintenance, inspection, and testing regimes effectively demonstrate continued structural and functional integrity.

**TSB Recommendation M05-05**

#### Transport Canada's response to Recommendation M05-05 (May 2006)

The Minister of Transport, Infrastructure and Communities agrees with this recommendation. It is evident from the post-incident inspections that the initial installation of the CO<sub>2</sub> system was not in keeping with good marine practice and engineering. One of the results of this less than

satisfactory initial installation was an acceleration of the deterioration of the system and some of its components.

As part of the regulatory reform regime initiative, Transport Canada will review international marine regulations and standards respecting fixed fire-extinguishing system design, maintenance, inspection, and testing. The goal of this review will be aimed at determining whether the proposed Fire Safety Regulations, will involve additional requirements in order to address potential deficiencies that may arise with fixed smothering system installations. The review will assess all aspects of maintenance, testing, and inspections in order to demonstrate continued structural and functional integrity. These regulations are scheduled to come into force in 2007.

### **TSB assessment of the response to Recommendation M05-05 (October 2006)**

The goal of Transport Canada's (TC's) commitment to review international marine regulations and standards respecting fixed fire-extinguishing systems is to determine whether additional requirements will be needed to address potential deficiencies in the domestic regulations. TC has not indicated how it will address deficiencies in international regulations identified in the report and subsequent failures of fixed fire-extinguishing systems during emergencies may continue to place vessels, crew, passengers, and the environment at undue risk.

TC's planned action, when completed, will substantially reduce the deficiencies associated with domestic regulations. However, the planned action does not address deficiencies in international regulations, identified in the recommendation.

Therefore, the assessment is **Satisfactory in Part**.

### **Transport Canada's response to Recommendation M05-05 (June 2008)**

TC's update, dated June 2008, indicated that TC continues to review requirements and will determine whether the proposed Fire Safety Regulations will involve additional requirements in order to address potential deficiencies that may arise with fixed smothering system installations. The review will assess all aspects of maintenance, testing, and inspections in order to demonstrate continued structural and functional integrity. The proposed Fire Safety Regulations are expected to be pre-published in Part I of the *Canada Gazette* in the fall 2008.

### **TSB reassessment of the response to Recommendation M05-05 (September 2008)**

No substantial change to address the safety deficiency since the last reassessment. Follow-up information indicated that the proposed Fire Safety Regulations are expected to be pre-published in Part I of the *Canada Gazette* in the fall 2009.

Therefore, the assessment of the response remains **Satisfactory in Part**.

### **Transport Canada's response to Recommendation M05-05 (November 2009)**

TC's update, dated November 2009, indicated that it will determine whether the proposed Vessel Fire Safety Regulations will involve additional requirements in order to address potential deficiencies that may arise with fixed smothering system installations. This will include a review to assess all aspects of maintenance, testing, and inspections in order to demonstrate continued structural and functional integrity.

The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in Part I of the *Canada Gazette* in the spring 2010.

### **TSB reassessment of the response to Recommendation M05-05 (May 2010)**

TC has yet to determine whether the proposed Vessel Fire Safety Regulations will involve additional requirements in order to address potential deficiencies that may arise with fixed smothering system installations. If, however, TC implements action to address the design, maintenance, inspection, and testing regimes to effectively demonstrate continued structural and functional integrity, the deficiencies associated with the domestic regulations should be substantially reduced. It is now anticipated that the proposed regulations will be pre-published in the *Canada Gazette*, Part I in the summer of 2010.

Therefore, the assessment of the response remains **Satisfactory in Part**.

### **Transport Canada's response to Recommendation M05-05 (December 2010)**

TC's December 2010 update indicated that the proposed Vessel Fire Safety Regulations will incorporate, by reference, SOLAS Chapter II-2. As required by SOLAS, fixed fire extinguishing systems must meet the requirements of the Fire Safety System Code (FSS Code). SOLAS also requires all systems to be maintained, tested and inspected according to the guidelines published by IMO in MSC/Circ.850 Guidelines for the Maintenance and Inspection of Fire-Protection Systems and Appliances. The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in Part I of the *Canada Gazette* in the second quarter of 2011.

### **TSB reassessment of the response to Recommendation M05-05 (March 2011)**

If the proposed actions to address the design, maintenance, inspection, and testing regimes of fixed fire fighting and extinguishing systems are fully implemented, the deficiency will be substantially reduced or eliminated.

Therefore, the assessment of the response is changed to **Satisfactory Intent**.

### **Transport Canada's response to Recommendation M05-05 (December 2011)**

The proposed Vessel Fire Safety Regulations incorporate, by reference SOLAS Chapter II-2, as amended from time to time. Regulation 10 (Fire Fighting) requires that fixed fire extinguishing systems must meet the specification of the *Fire Safety System Code* (FSS Code) for design and installation.

Continued structural and functional integrity of fixed fire extinguishing systems will require that all systems to be maintained tested and inspected according to the guidelines published by the International Maritime Organization in MSC/Circ.850 *Guidelines for the Maintenance and Inspection of Fire-Protection Systems and Appliances*.

The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in the *Canada Gazette*, Part I in the first quarter of 2012.

### **TSB reassessment of the response to Recommendation M05-05 (March 2012)**

Once the proposed Vessel Fire Safety Regulations are fully implemented, the deficiency will be substantially reduced or eliminated.

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

### **Transport Canada's response to Recommendation M05-05 (December 2012)**

Transport Canada considers that this recommendation has been met.

The proposed Vessel Fire Safety Regulations incorporate by reference SOLAS Chapter II-2, as amended from time to time. Regulation 10 requires that fixed fire extinguishing systems must meet the specification of the Fire Safety System Code (FSS Code) for design and installation.

Continued structural and functional integrity of fixed fire extinguishing systems will be promoted through Regulation 14 which requires all system to be maintained, tested and inspected according to the guidelines published by the International Maritime Organization in MSC/Circ.850 *Guidelines for the Maintenance and Inspection of Fire-Protection Systems and Appliances*.

The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in the *Canada Gazette*, Part I in the first quarter of 2013.

### **TSB reassessment of the response to Recommendation M05-05 (March 2013)**

Once the proposed Vessel Fire Safety Regulations are fully implemented, the deficiency will be substantially reduced or eliminated. Therefore, the assessment of the response remains **Satisfactory Intent**.

### **Transport Canada's response to Recommendation M05-05 (December 2013)**

Transport Canada considers that this recommendation has been met.

The proposed Vessel Fire Safety Regulations incorporate by reference SOLAS Chapter II-2, as amended from time to time. Regulation 10 requires that fixed fire extinguishing systems must meet the specification of the *Fire Safety System Code* (FSS Code) for design and installation.

Continued structural and functional integrity of fixed fire extinguishing systems will be promoted through Regulation 14 which requires all systems to be maintained, tested and inspected according to the guidelines published by the International Maritime Organization in MSC/Circ.850 *Guidelines for the Maintenance and Inspection of Fire-Protection Systems and Appliances*.

The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in the *Canada Gazette*, Part I in the first quarter of 2014.

In advance of the coming into force of the Vessel Fire Safety Regulations, the above requirements have been incorporated in *The Canadian Supplement to the SOLAS Convention* (TP15211).

### **TSB reassessment of the response to Recommendation M05-05 (March 2014)**

This recommendation, issued over 8 years ago, asked for a review of “Canadian and international marine regulations respecting fixed fire-extinguishing systems to ensure that their design, maintenance, inspection, and testing regimes effectively demonstrate continued structural and functional integrity.” The review has been carried out, and the guidelines are being incorporated into the proposed Canadian regulations.

TC had previously indicated these regulations were scheduled to come into force in 2007. The proposed Vessel Fire Safety Regulations are now anticipated to be pre-published in the *Canada Gazette*, Part I in the first quarter of 2014. Once the proposed Vessel Fire Safety Regulations are fully implemented, the deficiency will be substantially reduced or eliminated. Therefore, the assessment of the response remains **Satisfactory Intent**.

### **Transport Canada’s response to Recommendation M05-05 (December 2014)**

Transport Canada’s response indicated that it considered that this recommendation has been met, and reiterated the following:

The proposed Vessel Fire Safety Regulations incorporate by reference SOLAS Chapter II-2, as amended from time to time. Regulation 10 requires that fixed fire extinguishing systems must meet the specification of the Fire Safety System Code (FSS Code) for design and installation.

Continued structural and functional integrity of fixed fire extinguishing systems will be promoted through Regulation 14 which requires all system to be maintained, tested and inspected according to the guidelines published by the International Maritime Organization in MSC/Circ.850 Guidelines for the Maintenance and Inspection of Fire-Protection Systems and Appliances.

The proposed Vessel Fire Safety Regulations are anticipated to be pre-published in the *Canada Gazette*, Part I in the 1st quarter of 2015.

In advance of the coming into force of the Vessel Fire Safety Regulations, the above requirements have been incorporated in The Canadian Supplement to the SOLAS Convention (TP15211).

### **TSB reassessment of the response to Recommendation M05-05 (March 2015)**

The TSB notes that the Vessel Fire Safety Regulations will substantially address the deficiency associated with the recommendation when fully implemented as proposed. In advance of the coming into force of the Vessel Fire Safety Regulations, the above requirements have been incorporated in The Canadian Supplement to the SOLAS Convention (TP152110).

TC first indicated that the proposed Vessel Fire Safety Regulations were scheduled to come into force in 2007, but they have yet to be pre-published in the *Canada Gazette*. While the proposed measures are reasonable, a protracted delay is of concern.

The assessment rating remains **Satisfactory Intent**.

## **Transport Canada's response to Recommendation M05-05 (February 2016)**

Transport Canada's response indicated that once a definitive date of publication for the *Vessel Fire Safety Regulations* is confirmed, it would advise the TSB.

Subsequently, the TSB was informed that the proposed regulations amending the *Vessel Fire Safety Regulations* were published in the *Canada Gazette*, Part I on 6 February 2016. The public, stakeholders, and industry now have until 6 April 2016 to review and comment on the proposed regulations before they are enacted, and then published in Part II.

## **TSB reassessment of the response to Recommendation M05-05 (June 2016)**

The delay in publishing the *Vessel Fire Safety Regulations* has resulted in the risk that fixed fire fighting systems may not have continued structural and functional integrity. That is, without adequate design requirements to prevent accidental leakage and discharge of inert gas in the case of a fire that is too large to be fought by direct attack; without adequate guidance regarding the maintenance of these systems; without inspection regimes to check for structural integrity; and without test procedures to demonstrate continued structural and functional integrity, fixed fire-extinguishing systems may fail in emergencies, and cause undue risk to vessels, crews, passengers, and the environment.

Since this recommendation was issued in 2006, there have been 418 fires on board vessels in Canadian waters, or approximately 1 fire per week. However, it was not possible to determine how many of those fires were extinguished by crew, or if the crew used the fixed fire fighting system on board. There were 4 fatalities, and 10 serious injuries. Twenty-nine vessels were declared as total constructive losses, which amount to slightly more than 2 vessels per year that are lost to fire. Forty-four vessels were reported to be majorly damaged.

The proposed regulations amending the *Vessel Fire Safety Regulations* were published in the *Canada Gazette*, Part I on 06 February 2016. Although this is a positive step forward, the risk will remain until such time as the regulations are finalized and implemented. Until then, the assessment rating remains **Satisfactory Intent**.

## **Transport Canada's response to Recommendation M05-05 (December 2016)**

Stakeholder comments were received following the publication of the proposed *Vessel Fire Safety Regulations* in the *Canada Gazette*, Part I. Comments have been considered by Transport Canada and incorporated in the proposed regulations where appropriate. The regulatory development process has been completed and the regulations are scheduled to be published in the *Canada Gazette*, Part II early in 2017. The regulations will implement the maintenance, testing and inspections requirements of the SOLAS Convention Chapter II-2 for fire safety equipment and systems.

## **TSB reassessment of the response to Recommendation M05-05 (March 2017)**

The actions planned by TC will address the deficiency identified by recommendation M05-05. However, until the proposed *Vessel Fire Safety Regulations*, including the maintenance, testing and inspection requirements of the SOLAS Convention Chapter II-2 for fire safety equipment and systems, come into force, the reassessment of this response remains as **Satisfactory Intent**.

## **Transport Canada's response to Recommendation M05-05 (December 2017)**

The new *Vessel Fire Safety Regulations* (VFSR) were published in the *Canada Gazette*, Part II and came into force on 22 February 2017.

SSB-04-2017 outlines the requirements.

For vessels subject to Part 1 or Part 2, the grandfathering provisions apply for only one year after the day on which the VFSR come in force, in respect to requirements for:

- Emergency escape breathing devices;
- Operational readiness (including training); and
- Maintenance.

## **TSB reassessment of Transport Canada's response to Recommendation M05-05 (March 2018)**

The grandfathering provisions in the *Vessel Fire Safety Regulations* (VFSR), which have been in force since 22 February 2017, allow vessels certified in Canada before the day the VFSR came into force, to continue to comply with the existing fire safety regulatory regime. However, the provisions for operational readiness and maintenance were limited for one year from the time the VFSR came into force, after which the marine industry had to comply with the new regulations. Since 2003, there have been no instances of a major engine room fire on Canadian vessels where the fixed fire-extinguishing system was an issue. Therefore, the Board considers the response to the recommendation to be **Fully Satisfactory**.

### **Next TSB action**

This deficiency file is **Closed**.