Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

MARINE INVESTIGATION REPORT

M04W0235

SINKING AND LOSS OF LIFE

BETWEEN

THE TUG *MANSON* TOWING THE

CRANE BARGE *MCKENZIE* AND DECK BARGE *M.B.D. 32*

STRAIT OF GEORGIA, BRITISH COLUMBIA

06 NOVEMBER 2004

Canada

Marine Investigation Report

Sinking and Loss of Life

Between the Tug *Manson* Towing the Crane Barge *McKenzie* and Deck Barge *M.B.D. 32* Strait of Georgia, British Columbia 06 November 2004

Report Number M04W0235

Summary

On the morning of 06 November 2004, the tug *Manson*, with a crew of two, was on passage between New Westminster, British Columbia, on the Fraser River and Beale Cove, Texada Island, British Columbia. The *Manson* had two barges in tow: the crane barge *McKenzie* and the deck barge *M.B.D. 32*. During the transit through the Strait of Georgia, the couplers connecting the *M.B.D. 32* to the stern of the *McKenzie* parted. The *Manson*, with the *McKenzie* in tow, attempted to recover the *M.B.D. 32* but experienced steering difficulties during this process. The *Manson* capsized and sank with the loss of both crew members – a deckhand and the master. Both barges were subsequently recovered; the *Manson* has not been located.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessels

Tug

Name	***Manson***
Official Number	344666
Port of Registry	Vancouver, British Columbia
Flag	Canada
Type	Tug
Gross Tons[1]	44.29
Length	13.56 m
Built	1970, New Westminster, British Columbia
Propulsion	Twin-screw, diesel, 550 kW
Cargo	N/A
Crew Members	2
Owners/Operators	Empire Tug Boats/Discovery Towing Ltd.

Barges

Name	***M.B.D. 32***	***McKenzie***
Official Number	313699	329425
Port of Registry	Vancouver	Vancouver
Flag	Canada	Canada
Type	Deck barge	Crane barge
Gross Tons	408.73	505.38
Length	36.58 m	37.4 m
Built	1960, Vancouver	1968, Vancouver
Propulsion	N/A	N/A
Cargo	Construction materials	N/A
Crew Members	0	0
Owners/Operators	Graymar Equipment Ltd.	Graymar Equipment Ltd.

[1] Units of measurement in this report conform to International Maritime Organization (IMO) standards or, where there is no such standard, are expressed in the International System (SI) of units.

Description of the Vessels

Manson

The *Manson* was a small twin-screw tug of conventional design. A single deckhouse enclosed the wheelhouse forward with a galley/mess area at its after end. Aft of the deckhouse were the twin engine exhaust uptakes. Aft of the uptakes, on the centreline, was the towing winch containing 594 m of 28.6 mm-diameter tow wire, connected via a fish plate to a 75 m wire pendant. Two 12 m-long, 25.4 mm-diameter wire bridles were shackled through a thimble at the end of the pendant. The winch brake was fitted with a manually operated hydraulic brake.

Photo 1. *Manson*

Straddling the winch on either side were steel "goal posts" installed to protect the tug when backing against the raked bow of light displacement barges.

Below decks, the tug was divided into three watertight compartments: a forecastle forward containing crew berths, the engine space amidships, and the lazarette aft. Access to the engine space and lazarette was through watertight deck hatches outside the wheelhouse.

The *Manson*'s main control station, located inside the forward end of the deckhouse, was equipped with steering and engine controls, and navigation equipment, which included two radars, very high frequency (VHF) radios, and an echo sounder. Secondary steering and engine control stations were located by the winch on the main deck, and on the deck above the wheelhouse, at both the forward and after ends. Each control station was fitted with the means to release the tow wire by releasing hydraulic pressure on the winch brake.

McKenzie

The *McKenzie* is a dedicated crane barge with a large-capacity, pedestal-mounted crane permanently fixed to its deck. Spuds, used for keeping the barge in position, are fitted near the barge's mid-length. In Photo 2, the spuds are seen in the raised position – as they were when the barge was being towed. The crane is situated near the bow, where the towing bridles were attached.

Photo 2. *McKenzie*

M.B.D. 32

The barge *M.B.D. 32* is an open-deck barge used for the carriage of deck cargo. Bulwarks approximately 1.8 m high are erected to port and starboard of the main deck. The barge was loaded with construction material and was trimmed significantly by the stern (see Photo 3).

Photo 3. *M.B.D. 32* (note the parted rope coupler at bow)

History of the Voyage

Throughout the day on November 5, a two-person crew had operated the *Manson* on the Fraser River. The crew had secured the tug in New Westminster at the Fraser River Pile & Dredge (FRPD) dock on the North Arm of the Fraser River and was relieved by a second two-person crew. The relief crew then connected the tug to the barges *McKenzie* and *M.B.D. 32* for the approximately 82-mile passage to Beale Cove on Texada Island. The *M.B.D. 32* was connected to the stern of the *McKenzie* with two synthetic-rope couplers, each approximately 7 m long, 80 mm in diameter, and with a spliced eye at each end. The bow of the *McKenzie* was connected by wire-rope bridles shackled to the end of the tow wire/pendant of the *Manson*.

The *Manson*, with the two barges in tow, departed the FRPD at 1700 Pacific standard time.[2] The 20-mile passage down the Fraser River, to where it enters the Strait of Georgia at Sand Heads light, was uneventful. From Sand Heads, the course is 305° True (T) to Sabine Channel at the south end of Texada Island. After passing Sand Heads, the *Manson* called Victoria Marine Communications and Traffic Services (MCTS) at 2050 on VHF channel 74, and the tug/tow unit was then tagged on their radar system. Due to the proximity of the *Manson* and its tow, the separate radar echoes of the tug and barges merged into one echo on the MCTS radar screen. The master then switched the VHF to channel 11, the designated channel for the next leg of the voyage.

Shortly after 0218 on November 6, the Victoria MCTS officer observed on radar that the echo representing the *Manson* and its tow had separated into two distinct echoes. The new echo, later identified to be that of *M.B.D. 32,* was tagged. At 0226, Victoria MCTS reviewed the situation and called the *Manson* to inquire if it had lost a barge. The *Manson* responded that it would check into it. The tug and tow were now approaching the Merry Island/Ballenas Island boundary where communications are handed over to MCTS at Comox, British Columbia.

Victoria MCTS was unable to establish further contact with the *Manson*, and at 0227, advised Comox MCTS of the situation. Comox MCTS made several attempts to contact the *Manson*, and at about 0236, the *Manson* confirmed that the couplers had parted and that the barge *M.B.D. 32* was adrift. Radar observations recorded by Victoria MCTS show that, at 0243, the *Manson*, with the *McKenzie* in tow, altered course to starboard toward the *M.B.D. 32*. The tug and tow then made good speed (towing speed) toward the *M.B.D. 32*.

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[2] All times are Pacific standard time (Coordinated Universal Time minus eight hours).

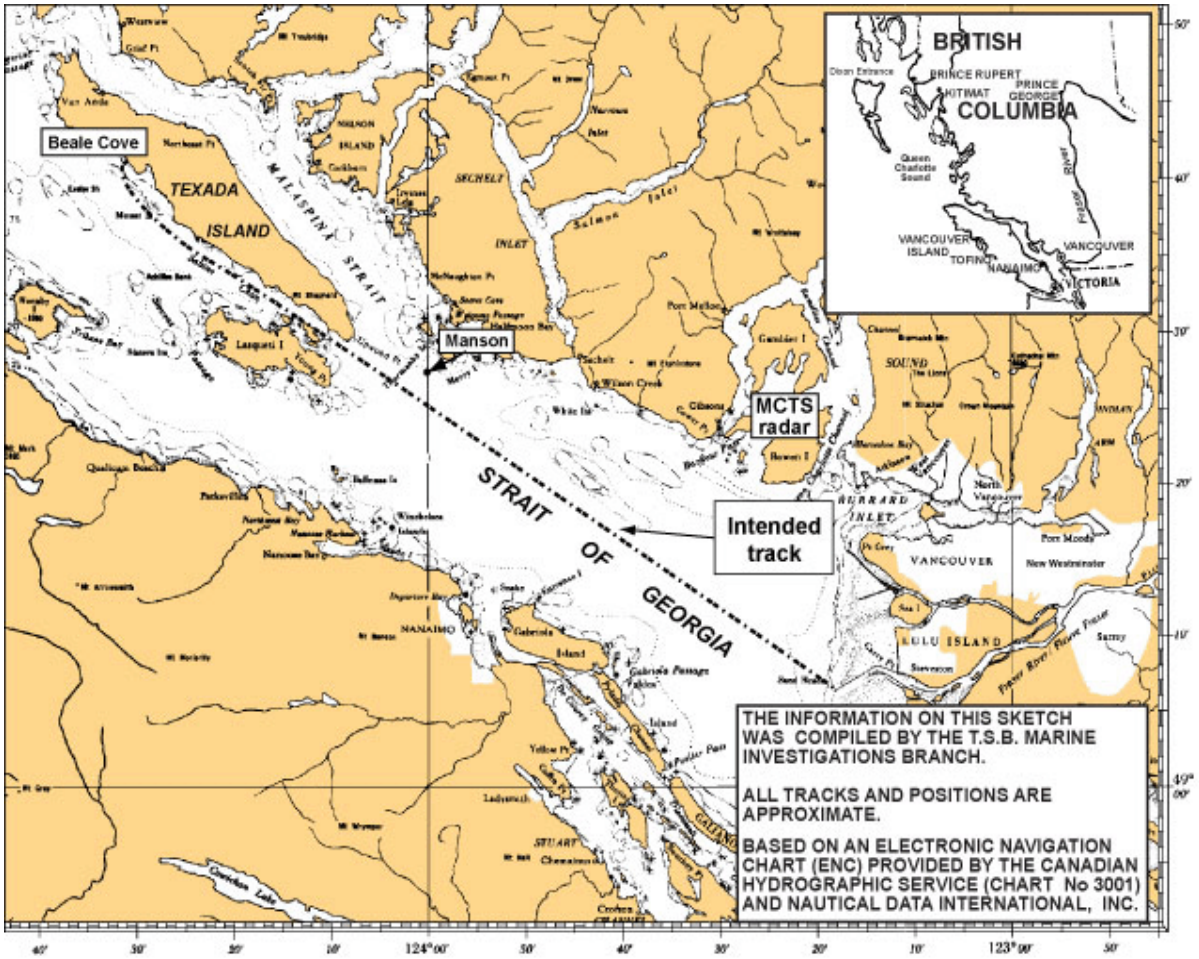

Figure 1. Sketch of the occurrence area

The following is a chronological summary of Victoria MCTS radar data and VHF communications with Comox MCTS.

Table 1. Chronological radar data and communications – MCTS

Time	From	To	Text
0301	–	–	Speed vector for *Manson/McKenzie* reduces then disappears as the two vessels stop. *M.B.D. 32* is an estimated 120 m to the west of *Manson*, with the *McKenzie* some 75 m astern of the tug.
302	MA	MCTS	It has lost steering, the unit was drifting around and the request for assistance was limited to vessels that may be transiting the area.
	MCTS	MA	Nearest vessel was the tug *N.A. Champion* with one barge in tow. That the tug switch to VHF 22A.
0302 to 0305	–	–	Distance between the radar echoes of the *Manson* and the *McKenzie* increased.
0305	MA	Comox MCTS	Tug, with two persons on board, was between the barges and the request for assistance was reiterated. The steering problem will be investigated and MCTS advised. On-scene weather was SE 25 knots with 3-4 moderate seas.
	MCTS	JRCC	Apprised of the *Manson* situation.
0306	MCTS	MA	Attempts to communicate with vessel were unsuccessful.
0311	–	–	*Manson* echo last observed on radar.
0322	JRCC	MCTS	A "hit" had been received from the *Manson*'s emergency position indicating radio beacon (EPIRB).
	MCTS	JRCC	Attempts to contact *Manson* were unsuccessful and that the tug *N.A. Champion* was en route to the *Manson*'s location.

JRCC Joint Rescue Coordination Centre
MA *Manson*
MCTS Comox Marine Communications and Traffic Services
Note: MCTS radar is located at Victoria MCTS

At 0333, the *N.A. Champion* informed Comox MCTS that it had acquired two targets on its radar, 2.5 miles away. Earlier, when the targets were 3 miles distant, bright white lights had also been observed in the same vicinity, but these were no longer visible. Comox relayed this information to the Joint Rescue Coordination Centre (JRCC), which then tasked search and rescue (SAR) resources. At 0348, Comox MCTS advised the JRCC that the *N.A. Champion* was 800 m from the targets and that its crew could see a strobe light and a steady light.

An investigation determined that the strobe light was from the *Manson*'s emergency position indicating radio beacon (EPIRB) and that the steady light was from the inflated four-person liferaft. The liferaft was empty. Under instructions from the JRCC, the *N.A. Champion* set the liferaft adrift so it could serve as a drift indicator for SAR purposes. A total of one air resource

and ten marine resources were used in SAR operations. The body of the deckhand was recovered three days after the accident. The cause of death was listed as hypothermia. The body of the master remains missing.

The *Manson*'s two four-person liferafts, life rings, and its EPIRB were recovered. One of the liferafts had inflated; the other had not. Post-occurrence inspection and testing of the latter at a service depot revealed that

- the fibreglass canister was damaged;
- the painter had parted close to the canister; and
- the liferaft inflated within its specifications.

Despite extensive search using a remotely operated vehicle (ROV), the vessel was not found.

Vessel Traffic Services

The *Manson* operated within three sectors of the Vancouver Vessel Traffic Services (VTS) zone. These sectors are monitored by MCTS officers. VTS sectors 1 and 2 are monitored by Victoria MCTS and sector 4 is monitored by Comox MCTS on the VHF channels shown below:

VTS Sector	Identifier	Geographic Area	VHF Channel
2	*"Victoria Traffic"*	Fraser River	74
1	*"Victoria Traffic"*	Georgia Strait - South	11
4	*"Comox Traffic"*	Georgia Strait - Central	71

The *Manson*'s passage began in VTS sector 2, transferred to VTS sector 1 upon entering the Strait of Georgia at Sand Heads, and then to VTS sector 4 when the vessels crossed the Merry Island/Ballenas Island line. Victoria MCTS has radar coverage of much of the waters within the two sectors it monitors. A vessel calling Victoria MCTS when exiting the Fraser River at Sand Heads will switch from monitoring VHF channel 74 to VHF channel 11. Victoria MCTS will then "tag" that radar target to assist in monitoring the traffic in the area.

Towing Equipment and Maintenance

There was no structured approach to examine, evaluate and make informed decisions on the maintenance and replacement of towing gear.

Emergency Position Indicating Radio Beacon

EPIRB owners are required to register each beacon with the Canadian Beacon Registry, which maintains a database. The registry contains information about the beacon, the vessel it is on, and the vessel owners. In September 2003, ownership of the *Manson* changed hands, but the registry was not advised and the database was not updated.

The *Manson* was fitted with a 406 MHz EPIRB rigged to deploy automatically in the event of capsizing. Upon receipt of the EPIRB signal on November 6, the JRCC accessed the database and made contact with the vessel's previous owner, who then directed the JRCC to the current owner.

Damage to the Vessels

The *Manson* sank and was declared a total loss.

There was no discernible damage to either of the barges, the *M.B.D. 32* or the *McKenzie*, nor was there any indication of either barge having made contact with the *Manson*. The parted couplers were recovered for examination. The *Manson*'s tow wire, which had been attached to the *McKenzie*, was recovered intact. It was found to have run off the winch.

Damage to the Environment

The *Manson* had approximately 15 000 litres of diesel fuel on board. A small oil slick was observed in the area for several days afterward. In the relatively open waters of the Strait of Georgia, this oil was soon dispersed.

Certification of the Vessels

The *Manson* was last inspected at Vancouver on 26 September 2001 and was issued a full-term (four years) ship inspection certificate (SIC) 22, for home-trade voyages, Class III. This certificate permitted a 24-hour operation and stipulated a crew complement of four, including the master, for a two-shift tug with 12-hour operations. The majority of the time, however, the *Manson* was operated in the Vancouver/Fraser River area as a shift boat, with a two-person crew for an approximate maximum of 12 hours. Under this arrangement, the vessel was either berthed after the completion of work or else the crew was relieved by another two-person crew.

Both the *McKenzie* and the *M.B.D. 32* were uncrewed barges on domestic voyages and were not required to be inspected or certificated by Transport Canada.

Personnel Certification and History

The master of the *Manson* was certificated for the class of voyage that was being undertaken. He had many years' experience in the towing industry in British Columbia, including a number of years on board the *Manson* and similar vessels.

The deckhand had served on small tugs for a number of years and had previously worked with the master on other occasions. Both were on their first assignment following five days off duty.

Marine Emergency Duties

Consequent to changes in the *Crewing Regulations*, Marine Emergency Duties (MED) training is now mandatory and is being phased in by July 2007. In this instance, the master of the *Manson* held a MED certificate, but the deckhand did not.

Weather and Current

The weather in the Strait of Georgia was typical for the time of year. The winds had been from the southeast for several days. The Environment Canada forecast included a Small Craft Warning indicating sustained southeast winds between 20 and 33 knots with visibility reduced, at times, by rain. The *Manson* experienced southeast winds at 25 knots and seas of 1 to 1.4 m.

In this section of the Strait of Georgia, the tidal height is referenced on Point Atkinson. The tidal cycle is mixed, mainly semi-diurnal with two complete tidal oscillations daily, featuring inequalities in both height and time. High water at Point Atkinson was predicted for 2215 on November 5 with a height of 3.1 m, and low water was predicted for 0525 on November 6 with a height of 1.9 m. The range of this tidal cycle was 1.2 m, which is below the 3.2 m mean tide range for Point Atkinson.

On an ebb tide, the water flows to the southeast. At the time of the occurrence, the tidal water flow was opposing the wind-driven waves, resulting in a shorter wave period and choppy seas.

Analysis

Chain of Events

With the loss of the *Manson* and both crew members, the exact sequence of events leading up to the vessel's capsizing and loss could not be determined.

At about 0301, the speed vector for the *Manson/McKenzie* on the MCTS radar reduced and then disappeared as the two vessels stopped to the west of the *M.B.D. 32*. The *Manson* was an estimated 120 m from the *M.B.D. 32*, with the *McKenzie* some 75 m astern. By 0302, the *Manson* had lost steering, and at 0305, it stopped between the two barges to investigate the steering failure.

Following the 0305 communication with the MCTS, the crew's attention was focussed on determining the cause of steering failure. Because access to the engine room and lazarette was through hatches in the main deck, both crew members would be away from the wheelhouse. The latter could account for the MCTS experiencing difficulty in raising the *Manson* and the developing dangerous situation going unnoticed. Additionally, the floodlights on deck used to illuminate the work area in conjunction with rain on a dark night would have impaired the crew's vision and hampered their ability to detect the movement of the barge relative to the tug's position.

With the vessels tethered by some 75 m of tow wire, southeasterly seas and the 25-knot southeasterly winds acting on the larger sail area of the *McKenzie*, the *McKenzie* would have drifted downwind in a northwesterly direction more quickly than the *Manson*. This difference in the rate of drift would cause the tow wire to become taut, possibly with a jerk or jarring motion, and would result in the tug eventually being dragged sideways until it was placed in irons.[3] This in turn would cause the tug to heel over quickly, taking on water and downflooding into the lower compartments through the open hatchways and/or the open deckhouse door. The vessel would then eventually lose all reserve buoyancy and sink.

The precise reason why the *Manson* was not found attached to the tow wire could not be established. However, the activation of the abort mechanism by the crew at a late stage or the weight associated with the sinking of the tug are possible explanations.

Safe Crewing

The vessel's SIC was endorsed for a crew of four, including the master. It was recognized that there would be two watchkeeping crew standing 12-hour watches while the other two crew members would be off watch. The *Manson* did not have a regular work cycle and frequently operated in and around Vancouver Harbour and the Fraser River for a duty cycle of 12 hours or less. It was therefore customary for the off-watch crew to remain ashore. This sea passage was undertaken in darkness and would have exceeded 12 hours between ports. Additionally, during adverse weather, the crew members were challenged by the loss of a barge and steering failure. When their workload increased, there was insufficient crew to handle the emergency. This led to the development of the dangerous situation and deprived the crew of timely important information to initiate corrective measures before capsizing.

Emergency Beacon Database

After the *Manson* capsized, its 406 MHz EPIRB deployed and functioned as designed. Its identifier signal was relayed via satellite and routed to the JRCC in Esquimalt, British Columbia.

The Canadian Beacon Registry contains information about the beacon, the vessel it is on, and the vessel owners. To keep registry information current, EPIRB owners are required to report ownership changes; this was not done for the *Manson*.

Due to the large number of false EPIRB (distress) alerts, it is necessary to validate a distress signal before tasking valuable and appropriate SAR resources. Information available indicates that many SAR centres, with increasing frequency, are encountering instances where the emergency beacon database information has not been updated or is inaccurate.

The successful outcome of a SAR mission depends upon timely, accurate, and pertinent information, which includes the vessel's position. A delay in obtaining this information may compromise appropriate and timely deployment of SAR resources. In this instance, because of

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[3] The term refers to a ship unable to turn freely, such as a tugboat with towline secured right aft.

prior communications and radar information available to MCTS, validating the distress signal by establishing contact with the new owner was not critical. However, in other cases, valuable rescue time may be lost validating the distress signal.

Connection of Tugs and Tows

To ensure safe passage during a marine towing operation, the gear used to connect a tug with its barge(s) needs to be strong, yet flexible enough to withstand the forces likely to be encountered during a voyage.

As control over the tow is paramount when towing in sheltered waters, such as a harbour or river, it is a common practice to use couplers for towing operations. However, in exposed waters where changing wave height and frequency – such as in typical rough November waters – are likely to place a greater stress on the towing equipment, it is essential that the towing gear be robust and long enough to absorb shock. The catenary in the long tow wire increases the wire's ability to withstand shock absorptions associated with severe weather and environmental conditions. For this reason, in exposed waters, an all-wire towing arrangement is the preferred mode for towing.

In this occurrence, when connecting the *M.B.D. 32* to the *McKenzie* for the tow across the Strait of Georgia in November – a time when rough weather and sea conditions are to be expected – short, synthetic-rope couplers were used instead of a longer, more robust wire arrangement that would have been better suited to the conditions. The towing arrangement of the *Manson* was configured with a wire pendant so that an all-wire option was available to the crew; it is not known why the crew members chose to use shorter, synthetic-rope couplers.

Records for Towing Equipment

Neither the owner nor the vessel had a structured approach to examine, record, evaluate, and make informed decisions on the renewal/replacement of towing gear.

Cargo gear or anchors and cables used on board vessels are required to be clearly identified, marked, tested and certificated on a periodic basis. This, together with routine inspection, examination and maintenance information, is required to be recorded in a register. This is essential to ensure that critical components on board the vessel are inspected, serviced and retired before they fail to reduce risk of human injury. Although the risk posed by towing gear is equally high, similar practices are not universally embraced in the towing industry.

Findings as to Causes and Contributing Factors

1. The *Manson*'s inspection certificate stipulated a crew of four, but only two persons were on board for this passage. It is likely that the under-crewing of the *Manson* permitted a developing dangerous situation, which culminated in the tug's capsizing to go unnoticed.

2. The inappropriate towing arrangement – shorter, synthetic-rope couplers instead of a longer, all-wire arrangement – used for towing in open waters resulted in the couplers parting and the *M.B.D. 32* becoming adrift, precipitating the onset of an emergency situation.

3. The failure of the steering gear – the cause for which could not be ascertained – occurred at a critical time in the vessel's operation.

Findings as to Risks

1. The Canadian Beacon Registry is not always notified when emergency position indicating radio beacons (EPIRBs) are purchased or when a vessel's ownership changes, resulting in database inaccuracies. Valuable time lost in obtaining information related to search and rescue (SAR) compromises appropriate and timely deployment of SAR resources.

2. Although the risks and consequences of towing gear failure are high, there is no regulatory requirement or industry standard for record-keeping and maintenance of towing gear similar to that required for cargo gear.

Other Finding

1. The Marine Communications and Traffic Services (MCTS) watch officer's vigilance resulted in initiating action that recovered the drifting barge, and the officer's close monitoring of the developing situation led to timely SAR action.

Safety Action Taken

The industry has taken action to address the problems associated with the Canadian Beacon Registry database. The Council of Marine Carriers (CMC), representing the regional towing community, and the B.C. Seafood Alliance, representing the fishing community, have informed their memberships to ensure that emergency position indicating radio beacons (EPIRBs) are properly registered. The National Search and Rescue Secretariat (NSS) has established communication with Transport Canada (TC) Ship Registration Office to develop a method of advising vessel owners to update the NSS database when changes are made to the vessel's registry.

Following a series of tug/barge occurrences in 2004, TC convened an internal tug/barge task force, mandated to develop guidance relating to tug/barge combinations, and provide recommendations to the Regulatory Reform team on amendments to related regulations. In December 2005, the task force submitted a report that recommended, *inter alia*, that mooring winches, tow cut-offs, cables, chains and towlines on tugs and barges should be recognized as ship's equipment and be properly examined and documented.

Furthermore, at the Canadian Marine Advisory Coucil (CMAC) November 2006 meeting, a tug/barge working group was formed with participation from 13 marine industry organizations, labour unions, and TC. Consideration is being given to creating a CMAC standing committee to deal solely with tug/barge issues.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 25 April 2007.

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