



DI

#815-06-01



Divisional Inquiry

Incident

Queen of the North
Grounding and Sinking
March 22, 2006

Chair

Executive Vice President
New Vessel Construction & Industry Affairs

Investigation Dates

March 24, 2006
April 20 & 21, 2006
May 24 & 25, 2006
June 22, 2006

DIVISIONAL INQUIRY QUEEN OF THE NORTH

#815-06-01

Date of Incident: March 22, 2006
Location of Incident: *Queen of the North* in Wright Sound
Type of Incident: Grounding and Sinking

DIVISIONAL INQUIRY OUTLINE

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PANEL MEMBERS

Executive Vice President, New Vessel Construction & Industry Affairs (Chair)

Vice President, Fleet Operations

Vice President, Engineering

Vice President, Employee Relations

Ships Officer's Component, BCFMWU

LIST OF INTERVIEWEES

Interviewees have been identified by job description or EDN (Emergency Duty Number) where appropriate.

Master – EDN #1
Chief Officer – EDN #2
2nd Officer – EDN #3
4th Officer – EDN #5
Deckhand – EDN #6
Deckhand – EDN #7
Deckhand – EDN #10
Deckhand / OFA – EDN #11
Chief Engineer – EDN #12
1st Engineer – EDN #13
2nd Engineer – EDN #14
3rd Engineer – EDN #16
Chief Steward – EDN #19
Cook – EDN #24
Night Steward – EDN #32
Familiarizing Chief Officer – EDN #41

Director, Business Development
Manager, Terminal Operations
Marine Superintendent
Project Manager
Senior Master
Terminal Operations Supervisor

Captain, F/V *Lone Star*
Captain, F/V *Sandra M*
Captain, Tug *Castle Lake*

GLOSSARY OF TERMS

1/O	First Officer
2/O	Second Officer
3/O	Third Officer
4/O	Fourth Officer
Call in points	As directed by Transport Canada, at various positions along the Inside Passage. Vessels of certain tonnage are required to notify MCTS of their location and ETA at upcoming points. This is a form of vessel traffic service advising mariners of other surface traffic they might encounter along their track.
CCGS	Canadian Coast Guard Ship
CHS	Canadian Hydrographic Service
COG	Ship's course over the ground
COLREGS	Collision regulations are the regulations for the prevention of collision at sea also known as the rules of the road
CSA	<i>Canada Shipping Act</i>
ECDIS	The Electronic Chart Display and Information System is an integrated bridge system which indicates the ship's current position on the current chart and is IMO approved
ECS	The Electronic Chart System is a digital chart display system which is not International Maritime Organization (IMO) approved.
EDN	Emergency duties number
EPIRB	Emergency Position Indicating Radio Beacon
F/V	Fishing Vessel
IMO	International Maritime Organization
Knots (kn)	Nautical measure of speed. One knot is equivalent to one nautical mile per hour.
MCTS	The Marine Communications and Traffic Services centre is the Canadian Coast Guard vessel traffic management system on specific VHF radio channels for specific geographic areas. MCTS tracks commercial vessel traffic by radio (calling in points) and is usually supported by radar.
M/V	Motor Vessel
nm	Nautical Mile – 6,080 feet or 1,852 metres (equivalent of one minute of latitude)
OOW	Officer of the Watch
PFD	Personal Flotation Device
QM	Quartermaster
Radar	(From <u>radio detection and ranging</u>) A radio system which measures distance and usually direction by a comparison of reference signals with the radio signals reflected or retransmitted from the target whose position is to be determined.
SOG	Ship's speed over the ground
TCMS	Transport Canada Marine Service

SYNOPSIS

On March 21, 2006, the *Queen of the North* departed Prince Rupert at 2000 hours bound for Port Hardy. There were one hundred and one (101) passengers and crew aboard. At approximately 0022 hours on March 22, 2006 the vessel struck bottom at 17.5 knots along the north side of Gil Island in Wright Sound sustaining significant hull damage. The vessel lost propulsion and drifted for approximately eighty (80) minutes before sinking in approximately 430 metres of water in Wright Sound at a position of 53° 19.917' N 129° 14.729' W (refer to Attachment 4 – Chartlet 3742). Passengers and crew abandoned ship and were evacuated by BC Ferries lifeboats and liferafts before the vessel sank. Some of the passengers and crew were taken to the village of Hartley Bay by fishing vessels from the community and by the F/V *Lone Star*. Hartley Bay is approximately seventy-five (75) nautical miles (nm) south of Prince Rupert and approximately six (6) nm from the scene of the sinking. Others were taken aboard the Canadian Coast Guard vessel, *Sir Wilfred Laurier*. Eleven (11) passengers and selected crew were transported to Prince Rupert via helicopter from Hartley Bay. All remaining passengers and crew were then transported to Prince Rupert via the Canadian Coast Guard vessel. Two (2) passengers are missing and presumed to have been on board when the vessel sank. Vessel Traffic Services, The Transportation Safety Board, Transport Canada, the RCMP, the Canadian Coast Guard, Federal and Provincial Environmental agencies, and the Provincial Government were notified of the incident.

HISTORY OF VESSEL

Particulars of *Queen of the North* and its history with BC Ferries are set out in Attachment 1.

ANNUAL REFIT

- The *Queen of the North* underwent its annual refit and maintenance period at Deas Pacific Marine Inc. from October 3, 2005 to February 27, 2006. Details of the refit are found in Attachment 2. The total expenditure for the refit including drydocking was \$3,339,000.
- Within this period the vessel was drydocked at Vancouver Drydock from November 9 to November 25, 2005.

ANNUAL INSPECTIONS

- During the refit and at its completion, there are numerous inspections conducted by Transport Canada, Lloyd's Register of Shipping and a variety of authorized service agents and ship's crew before the vessel returns to service.
- Bridge equipment was inspected during refit as detailed in Attachment 2.
- The final inspection by Transport Canada leads to the issuance of the vessel's license to sail, also known as a Steamship Inspection Certificate (SIC-16). On March 2, 2006

the vessel was issued a Steamship Inspection Certificate SIC 16 with SI-07 (Marine Safety Notices). (Refer to Attachment 20(a) and 20(b))

- Marine Safety Notices (SI-07) dated March 2, 2006 issued by Transport Canada to the *Queen of the North* following the ship's annual refit have been reviewed during the course of this investigation. These Marine Safety Notices are a listing of items the vessel and company need to complete in a specified time, however no major or "no sail" items were generated during the annual Transport Canada inspection, as evidenced by the full term Inspection Certificate (SIC 16) issued on March 2, 2006. The outstanding Marine Safety Notice issues did not materially cause or contribute to the incident. (Refer to Attachment 20(c))

BACKGROUND INFORMATION

Crewing Arrangements

- The *Queen of the North* was crewed as follows: there were two crews, each working two (2) weeks on, two (2) weeks off. The deck (navigational) watch schedule on the *Queen of the North* was divided into two (2) watch sections. The "day watch" stood from 0600 hrs to 1800 hrs while the "night watch" was in charge of navigation from 1800 hrs to 0600 hrs.
- The crew aboard the *Queen of the North* on March 21/22, 2006 was referred to as "B" crew. "B" crew would be assigned to work twenty-six (26) weeks per year less vacation.
- The "B" crew had come on shift aboard the *Queen of the North* at Prince Rupert on Wednesday, March 15, 2006 at 1200 hrs. "B" crew made three (3) round trips to the Queen Charlotte Islands (Skidegate) and one round trip to Port Hardy via the Inside Passage, totalling over 1,100 nm, prior to the evening of March 21, 2006.
- There were four (4) deckhands assigned to the night watch of "B" crew. While working in the wheelhouse, these deckhands were referred to as "Quartermasters" (QM), a title indicative of their membership in the navigational watch team.
- The four (4) deckhands assigned to the twelve (12) hour navigational watch rotated through various duties:
 - Deck (navigational) watch duties as QM (lookout or helmsman). QMs stood one (1) hour watches on the bridge each four (4) hours;
 - Fire and security rounds;
 - Miscellaneous deck department work (Bosun locker / deck maintenance / car deck loading and unloading).
- Crew were quartered in compartments below the main car deck in two areas:
 - Forward berthing area (frames 95 to 148);
 - After berthing area (frames 8 to 56).

Charts and Navigation

- Charts 3772 / 3773 (from the Sailing Directions published by the Canadian Hydrographic Service)
 - Grenville Channel (53°22'N, 129°19'W), which leads 45 miles NW from Wright Sound, is part of the main Inside Passage route leading north toward Alaska.
 - The channel is deep throughout except near its NW end where some shoals lie along the south side of the fairway. The narrowest part of Grenville Channel is 0.2 mile wide in the vicinity of Ormiston Point. Both sides of the channel are mountainous and for the most part densely wooded.
 - Tides – Tidal differences in Grenville Channel, from those experienced in Bella Bella, are given for Lowe Inlet (Index No. 9195) in the Tide Tables, Volume 7.
 - Tidal streams flood from seaward through the NW and SE entrances of Grenville Channel and meet off Evening Point (53°40'N, 129°45'W); the separation of the ebb tidal stream takes place about 1 mile farther NW. These meeting and separation points of the tidal streams are subject to considerable change, depending on the winds outside. At maximum tidal current condition, the current in the narrow portion of Grenville Channel can attain two (2) knots. The ebb current continue to run for one (1) hour thirty (30) minutes after low water by the shore. Strong eddies can be encountered abreast Lowe Inlet with the ebb stream.
- Chart 3772 (from CHS Sailing Directions)
 - Sainty Point (53°22'N, 129°19'W) is at the SE end of Grenville Channel. Mount Pitt rises 2.2 miles NW. Sainty Point light (665) is shown at an elevation of 15 feet (4.6 m) from a white tower.
- Fleet Routing Manual (refer to Attachment 8 – Fleet Routing, Route 10)

The Fleet Routing Manual is a controlled document that outlines designated ferry routes traveled by ships of the BC Ferries fleet. The manual further provides route guidelines for the areas where BC Ferries vessels can be expected to transit under normal conditions and states:

“The application of these routing guidelines shall be with full compliance of the International Regulations for Preventing Collisions at Sea (1972) with Canadian modifications, the Canada Shipping Act and the Vessel Traffic Services system. Nothing in these routing guidelines shall exonerate any vessel, or the owner, master, or crew thereof from the consequences of any neglect to comply with the International Regulations for Preventing Collisions at Sea (1972) with Canadian modifications, or any section or article of the Canada Shipping Act or of the neglect of any precaution which may be required by the ordinary practice of seaman, or by the special circumstances of the case. Any apparent confliction shall be resolved in favour of the Collision Regulations or the Canada Shipping Act.”

In constructing and complying with these routing guidelines due regard shall be had to all dangers of navigation and collision and to any special circumstances, including the limitations of the vessel involved, which may make a departure from these routing guidelines necessary to avoid immediate danger.”

The specific courses through the area in question as set out in the Fleet Routing Manual are:

- Keeping to the centre of the channel, the base course on the south bound transit of Grenville Channel is 136° True.
- At Sainty Point, the recommended “course made good” changes to 118° True, being a course change of 18° to port.
- Chart 3742 (from CHS Sailing Directions)
 - Wright Sound (53°21’N, 129°14’W) is the junction of seven channels and forms part of the main Inside Passage leading north toward Alaska. The Inside Passage is heavily used by coastal vessels and consists, in this locality, of McKay Reach, Wright Sound and Grenville Channel. Whale Channel, Lewis and Cridge Passages all enter the south side of Wright Sound and are approach routes from seaward; they are described in Sailing Directions booklet *PAC 206 – Hecate Strait, Dixon Entrance, Portland Inlet and Adjacent Waters and Queen Charlotte Islands*. On the north side of Wright Sound, Douglas Channel leads north toward Kitimat and Verney Passage leads NE to the junction of Gardner Canal and Devastation Channel leading to Kitimat.
 - Tidal stream charts are referenced above. Tidal streams can be increased or decreased by as much as one knot due to weather conditions. From observations in Wright Sound, Douglas, Verney and Devastation Channels, the range of tide appears to have little effect on the velocity of the stream, though there are large inequalities in the tidal stream rates. Due to the amount of fresh water drainage into these channels, the subsurface current can, at times, flow in an opposite direction to the surface current.
- Land masses on the Inside Passage normally provide clear radar images. (Refer to Attachment 17)

SUMMARY OF EVENTS

This Divisional Inquiry Report has been prepared without the benefit of an accounting by the 2/O (EDN #3) and 4/O (EDN #5) regarding the sequence of events which occurred between Sainty Point at the southern end of Grenville Channel and the grounding on Gil Island. These officers were formally requested to provide information but on the advice of their legal counsel refused to answer the Panel's questions regarding the occurrences during this critical time period of approximately fourteen (14) minutes.

Key events and activities are summarized below in Table 1. Additional information by Incident Stage follows the Table.

TABLE 1

Incident Stage	Time	Location	Situation
Refit Complete	March 3, 2006	Deas Pacific Marine	<ul style="list-style-type: none"> ▪ <i>Queen of the North</i> leaves Tsawwassen terminal after Deas Pacific Marine annual refit. Transport Canada SIC-16 Inspection Certificate issued ▪ Senior Master posted new steering changeover procedures ▪ "A" crew on board ▪ No bridge equipment defects reported
Crew Change	March 15, 2006 1200 hrs	Prince Rupert	<ul style="list-style-type: none"> ▪ "B" crew on board: Master's handover given ▪ Crew complement/ qualifications confirmed to meet CSA requirements
Pre-Departure	Prior to 2000 hrs on March 21, 2006	Prince Rupert	<ul style="list-style-type: none"> ▪ Pre-departure procedures completed although landed crew list not signed by Master or designate ▪ Initial passenger stateroom assignments completed
Departure	March 21, 2006 @ 2000 hrs	From Prince Rupert	<ul style="list-style-type: none"> ▪ <i>Queen of the North</i> departs with 101 passengers and crew
Transit	March 21, 2006 Time unknown	Ormiston Point Grenville Channel	<ul style="list-style-type: none"> ▪ Full away order given ▪ 2/O (EDN #3) assumes con; 4/O (EDN #5) to break ▪ QM (EDN #7) relieved for lunch by QM (EDN #11)
	March 21, 2006 @ 2237 hrs	Pitt Island Light	<ul style="list-style-type: none"> ▪ MCTS position reporting call made
	March 21, 2006 Time unknown	Mosley Point	<ul style="list-style-type: none"> ▪ 4/O (EDN #5) returns to bridge, assumes con from 2/O (EDN #3) ▪ 2/O (EDN #3) went to officer's mess with a handheld radio
	March 21, 2006 @ 2350 hrs		<ul style="list-style-type: none"> ▪ QM (EDN #6) relieved by QM (EDN #7)
	March 22, 2006 @ 0003 hrs	Approaching Sainty Point	<ul style="list-style-type: none"> ▪ 4/O (EDN #5) makes MCTS position reporting call approaching Sainty Point
Grounding	March 22, 2006 @ 0008 – 0022 hrs	Sainty Point to Gil Island	<ul style="list-style-type: none"> ▪ ECS data indicates no course alteration or speed change until the grounding
	March 22, 2006 @ 0022 hrs	Gil Island	<ul style="list-style-type: none"> ▪ <i>Queen of the North</i> impacts bottom ▪ QM (EDN #7) leaves bridge to call Master
		Wright Sound	<ul style="list-style-type: none"> ▪ Master arrives on bridge; 1/O (EDN #2), 2/O (EDN #3), 3/O (EDN #4) already on bridge
		Wright Sound	<ul style="list-style-type: none"> ▪ On-watch Engineer contacts bridge after initial impact
Post Grounding			
	March 22, 2006 @ 0022 – approx. 0100 hrs	Wright Sound	<ul style="list-style-type: none"> ▪ Announcement for passengers to proceed to outer deck ▪ Cabin search commences on decks 6 and 7 ▪ Master orders port lifeboat and rescue boat swung out

Abandon Ship	Time unknown	Wright Sound	<ul style="list-style-type: none"> Master orders abandon ship
	March 22, 2006 @ 0112 hrs	Wright Sound	<ul style="list-style-type: none"> Abandon ship completed
		Wright Sound	<ul style="list-style-type: none"> Passenger counts undertaken once rafts and lifeboats are marshalled together
Assistance from Other Vessels	March 22, 2006 @ 0145 hrs	Wright Sound	<ul style="list-style-type: none"> F/V <i>Lone Star</i> arrives on scene
	March 22, 2006 @ 0150 hrs	Wright Sound	<ul style="list-style-type: none"> Boats from Hartley Bay start arriving on scene
Sinking	March 22, 2006 @ approx. 0140 hrs	Wright Sound	<ul style="list-style-type: none"> <i>Queen of the North</i> sinks below surface
Transport of Passengers and Crew to Safety	March 22, 2006 from 0156 hrs	Wright Sound	<ul style="list-style-type: none"> Fast rescue boat from <i>Sir Wilfred Laurier</i> arrives 63 passengers and crew transported to Hartley Bay by local vessels 36 passengers and crew taken aboard <i>Sir Wilfred Laurier</i>
	March 22, 2006 @ 0706 hrs		<ul style="list-style-type: none"> 11 passengers and crew transported from Hartley Bay to Prince Rupert by helicopter
	March 22, 2006 @ 1016 hrs		<ul style="list-style-type: none"> All remaining passengers and crew from Hartley Bay taken aboard <i>Sir Wilfred Laurier</i> and <i>Sir Wilfred Laurier</i> proceeds to Prince Rupert
Passengers and Crew Return to Prince Rupert	March 22, 2006 @ 1700 hrs	Prince Rupert	<ul style="list-style-type: none"> Passengers and crew safely transferred ashore in Prince Rupert

INCIDENT STAGES

Refit Complete

- The *Queen of the North* completed refit at DPMI on February 27, 2006 and moved to Tsawwassen Terminal to load stores and conduct crew training. Transport Canada issued the SIC-16 on March 2, 2006. The vessel sailed for Port Hardy on March 3, 2006.
- Bridge electronics equipment – there was a detailed system in place for reporting and correcting any deficiencies noted in any bridge electronics equipment aboard vessels of BC Ferries, including the *Queen of the North*.
- The Senior Master reported all bridge electronic equipment operating properly following refit and initial operation. (Refer to Attachment 2 - no defects noted) (refer to Attachment 13 – Master’s Handover Notes.)
- The ship sailed from Port Hardy on March 3, 2006 with “A” crew on board.

Crew Change

- “B” crew relieved “A” crew on March 15, 2006 at 1200 hrs in Prince Rupert, BC. “B” crew sailed the *Queen of the North* for approximately 1,100 nm between March 15 and the incident. This includes:
 - three (3) round trips to/from the Queen Charlotte Islands;
 - one (1) round trip to/from Port Hardy.
(refer to Attachment 12- Sailing Schedule)

- The Master reported all bridge electronic equipment operating properly during his command of the vessel commencing on March 15 until incident on March 22, 2006 (i.e., no defects noted).
- Prior to the incident, there were no reports of bridge equipment defects by the 2/O (EDN #3) or the 4/O (EDN #5).
- The Chief Engineer stated no defects were reported to him concerning bridge electronics or electrical equipment during this shift from March 15 to the time of the incident on March 22, 2006.
- The navigational night watch (1800-0600 hrs) complied with the *Canada Shipping Act* and *Crewing Regulations* and consisted of the:
 - Second Officer (2/O) as Senior Watch Officer (Officer of the Watch);
 - Fourth Officer (4/O), the “additional person”;
 - Four deckhands of which one would act as Quarter Master (QM) on a rotating basis, the “second additional person”.
- Deckhand/QM (EDN #7) on the deck (navigational) watch had been cleared as a deckhand aboard the *Queen of Prince Rupert* and the *Queen of the North*. QM (EDN #7) had fourteen (14) months experience on the North Coast ships (*Queen of Prince Rupert* and *Queen of the North*). All of the QM’s (EDN #7) ship time was as a deckhand and the QM (EDN #7) had enough sea time to write the bridge watchman’s exam, although at the time of the incident had not yet written the exam and was considered to be a “rating under training”. Prior to joining the deck department, the QM (EDN #7) was hired into BC Ferries in April 2001 and had worked as a Terminal Attendant.
- The 2/O (EDN #3) was the senior deck officer during the night watch aboard the *Queen of the North*. He started with BC Ferries in May 1980 and had various positions of increasing responsibility. He was cleared as a Second Officer aboard the *Queen of the North* and *Queen of Chilliwack* and as a Chief Officer on the *Queen of Prince Rupert*.
- The 4/O (EDN #5) had the con (conduct of the navigational direction of the vessel) during the south bound transit from Sainty Point until the eventual grounding. He started with BC Ferries in May 1990 and was cleared as a Third Officer and Fourth Officer on both *Queen of the North* and *Queen of Prince Rupert*.
- Steering changeover procedures – the Senior Master had approved and posted a procedure/protocol to be followed by the deck (navigational) watch for operation of the autopilot covering all operations, including arrangements and procedures for changing modes as well as normal operating procedures (refer to Attachment 14 – Steering Changeover Procedures).
- The Senior Master prepared written handover notes for the Master, which were received by the Master on March 15 at the time of the watch changeover from “A” crew to “B” crew in Prince Rupert (refer to Attachment 13 – Master’s Handover Notes).

Pre-Departure

- Passenger counts verified (note: passenger manifests not required by the applicable regulations).
- Crew accounted for.
- Clearance procedures completed except as noted below.
- The landed crew list was not signed by the Master or designate before the *Queen of the North* departed Prince Rupert at 2000 hrs on March 21, 2006 because the Master had not received crew status reports from Department Heads. While a deviation from established practice, this was not causative of the loss.
- Passenger cabins were assigned for those with cabin reservations. If cabins were available, passengers without cabin reservations could purchase cabin space on board from the Chief Steward. Some passengers changed cabin assignments.
- Documents evidencing final cabin assignments were lost with the vessel.

Departure

- The *Queen of the North* departed Prince Rupert on schedule at 2000 hrs on March 21, 2006 bound for Port Hardy. She was carrying forty-two (42) crew, fifty-nine (59) passengers, sixteen (16) vehicles, and approximately 220,000 litres of fuel oil (marine diesel #2) and engine lube oil. Included amongst the passengers travelling were five (5) BC Ferries employees not assigned to vessel duties.
- The vessel departed Prince Rupert under Master's orders with the 2/O (EDN #3) and QM (EDN #7) on the bridge. The QM was hand steering the vessel. The QM gave evidence of being a bit nervous at the start of the watch regarding helmsman duties departing port and in restricted waters around the harbour. Therefore, another deckhand (EDN #11) stayed with the QM (EDN #7) until *Queen of the North* had departed from Prince Rupert. Deckhand (EDN #11) departed the bridge at 2030 hrs. Both the 2/O (EDN #3) and 4/O (EDN #5) stated to the Divisional Inquiry Panel that they had confidence in the helmsman abilities of deckhand (EDN #7).

Transit

- Within Prince Rupert Harbour limits, the Master handed the navigational watch over to the 2/O (EDN #3).
- The 2/O (EDN #3) and 4/O (EDN #5) were on watch from 1800 hrs on March 21, 2006 until 0600 hrs on March 22, 2006. Standard operating procedure required one of the navigating officers to be on the bridge with a QM when the autopilot was in use. When on hand steering, the deck (navigational) watch consists of three. This is in accordance with section 40(5) of the *Crewing Regulations*.
- At 2237 hrs on March 21, 2006 the deck (navigational) watch made the MCTS position reporting call abeam Pitt Island Light.
- At 2250 hrs, Deckhand (EDN #6) reported to the wheelhouse for his watch as part of the navigation team. The ship was transiting Grenville Channel on hand steering so his assignment was as helmsman. When interviewed, QM (EDN #6) described the QM handover procedure. After allowing his eyes to adjust to the darkness, he

ascertained the vessel's current position, ordered course to steer, current speed through the water, observed weather conditions, whether steering with one or two steering pumps, location and description of any surface contacts and other watch team members. He then asked the Officer of the Watch for permission to relieve the QM on the ordered course.

- Both the 2/O (EDN #3) and 4/O (EDN #5), plus a deckhand serving as QM (EDN #6), were on the bridge in a condition of “stand by”, being one of enhanced readiness, abeam Ormiston Point on Pitt Island. This point is in a restricted portion of Grenville Channel where the channel is approximately five hundred (500) yards wide.
- After passing Ormiston Point, where the channel widens, the bridge went off stand by, the 2/O (EDN #3) assumed the con, and the 4/O went for a break off the bridge. About this time QM (EDN #6) was directed to change to autopilot on the base course. While on autopilot his primary duty was lookout.
- At Mosley Point, the 4/O (EDN #5) returned to the bridge and took over the con from the 2/O (EDN #3). The 2/O (EDN #3) relayed to the 4/O (EDN #5) the course, speed, location, traffic, weather, and that there were no defects reported. The 2/O (EDN #3) reported a single south bound vessel fine on the port bow just south of Sainty Point. The vessel was visible by sight (single white light) and was acquired and was being tracked by the automatic tracking feature of the ship's radar. The white light ahead was in all likelihood the masthead light of the F/V *Lone Star*. Wind was reported as twenty (20) knots off the starboard beam. The 2/O (EDN #3) testified the port radar (X band) was on a three (3) mile range offset and starboard radar (X band) was on half (0.5) mile range offset. Both radars were reported as functioning properly.
- At approximately 2350 hrs, Deckhand (EDN #7) came onto the bridge for an hour navigational watch. QM (EDN #6) relayed all relevant navigational information (as described above when he assumed the helm at approximately 2250) to QM (EDN #7). The vessel was on autopilot and all systems were operating normally. QM (EDN #6) does not recall any surface contacts or passing on any information about other vessels.
- The relieving QM (EDN #7) could not confirm to the Divisional Inquiry Panel that any surface contacts were visible. The channel is approximately 1200 yards wide at this point.
- After exiting Grenville Channel, the F/V *Lone Star* subsequently turned north, rounding Waterman Point, and proceeded between Promise Island and the mainland (refer to Attachments 3, 4, 5, and 6), in order to gain shelter from high cross winds in Wright Sound.
- The lights of the F/V *Lone Star*, after rounding Waterman Point, would not have been visible to *Queen of the North* while *Queen of the North* was still in Grenville Channel. The F/V *Lone Star*'s lights would not have been visible again to the *Queen of the North* until the *Queen of the North* had proceeded sufficiently south to be able to view up the channel between Promise Island and the mainland.
- Prior to exiting Grenville Channel, the 2/O (EDN #3) went for lunch to the Officers' Mess. It takes less than thirty (30) seconds to walk from the bridge to the mess (refer to Attachment 23 – Plan View). The 2/O (EDN #3) carried a radio with him so he could be contacted immediately if needed.

- At 0003 hrs, on March 22, 2006, at the southern end of Grenville Channel, the 4/O (EDN #5) called MCTS notifying the vessel's location as approaching Sainty Point, giving an estimated time of arrival (ETA) at the next call-in point of Kingcome Inlet at 0100 hrs. The ECS data recording shows the *Queen of the North* abeam Sainty Point at approximately 0008 hrs.
- To this point, the voyage had been uneventful and routine.
- The 4/O (EDN #5) reported calling in to MCTS (Prince Rupert Traffic) at Sainty Point on CH 11 VHF-FM (156.55 MHz). For the period from Sainty Point until the grounding on Gil Island, the 4/O (EDN #5) refused to answer questions from the Divisional Inquiry Panel as to the conduct of the vessel or events on the bridge.
- Evidence was given that QM (EDN #7) did not know the location of the *Queen of the North* when assuming the duties of lookout and that until trees were sighted, neither the shore nor any lights were visible. QM (EDN #7) remembered making one or possibly two small course alterations as directed by the 4/O (EDN #5) after taking over the watch. QM (EDN #7) stated that, when suddenly ordered to steer 109° by the 4/O (EDN #5) in a loud voice, QM (EDN #7) questioned the order as it was a bold alteration. QM (EDN#7) looked out the window and sighted trees. QM (EDN #7) stated that the 4/O (EDN #5) ordered the autopilot to be switched off. The QM (EDN #7) stated not knowing where the switch was located.
- As the autopilot disengages simply with a single switch (refer to Attachment 15) and would have been operated numerous times by the QM, this testimony is difficult to reconcile. The deck officers had previously advised that they were comfortable with the helmsman's capabilities.
- Music is clearly audible during routine radio telephone conversations between the vessel and MCTS (Prince Rupert Traffic) (refer to Attachment 19 – MCTS Radio Recording Transcription 21/22 March 2006) at:
 - 2237 hrs, March 21, at Pitt Island light;
 - 0003 hrs, March 22, approaching Sainty Point.

Grounding

- At approximately 0022 hrs on March 22, 2006 the *Queen of the North* ran aground at a speed of approximately 17.5 knots on the rocky shore of Gil Island (approximately 59° 19.2'N, 129° 14.3' W) in Wright Sound. This position is over one nm from the standard 118° True trackline (refer to Attachment 3 – Chartlet 3742).
- The QM (EDN #7) left the bridge to call the Master for help. QM (EDN #7) reported hearing the 4/O (EDN #5) say to the 2/O "*I'm sorry I was trying to go around a fishing boat*".
- The Master, then in his stateroom (refer to Attachment 23), stated that he was awoken from sleep by shouting and screaming. The Master felt the ship grounding and got out of his bunk. He stated that it felt like they were on an icebreaker. He proceeded immediately to the bridge.
- The Master stated that when he arrived on the bridge, the 1/O (EDN #2), 2/O (EDN #3) and 3/O (EDN #4) were already on the bridge. The X band radar was on the half (0.5) nm range and both the main engine controls were set at full astern. The Master

reported seeing a steady white light to the south about two (2) or three (3) nm away and that the main engines were silent. The grounding location would allow a clear view up the channel to the west of Promise Island.

- The on-watch engineering officer gave evidence that he contacted the bridge following the first grounding to report the engine room was bilged (flooding). All watertight doors were ordered closed as soon as the Master reached the bridge.
- The senior engineer of the watch accounted for all of his crew, started necessary equipment and ordered the immediate evacuation of the engine room. All engine room crew reached safety, closing watertight doors behind them as they egressed.
- The general alarm was sounded in crew areas and shortly thereafter the general alarm was sounded in the passenger areas followed by an announcement over the public address (PA) system instructing passengers to muster on the outer decks. There was a report of the signal for boat stations, seven short blasts followed by one long blast, on the general alarm bell. Accounts vary regarding the exact wording of the public announcements and the frequency of the announcements; however, those interviewed recalled passengers being instructed over the public address (PA) system to muster on outer decks.
- Both anchors were let go.
- The crew commenced a search of all cabins and public spaces to account for all crew and passengers. Alarm bells were ringing and there were regular PA announcements. Crew banged on all cabin doors with a shout of evacuation instructions. Fifty-three (53) of fifty-five (55) cabins were confirmed as having been physically searched.
- Emergency generator and emergency lights functioned normally after the engine room was flooded.
- Red rocket flares were deployed to indicate distress.
- A call was made on VHF-FM channel 11 advising MCTS of the grounding.
- Passengers and crew had lifejackets on when mustered. The deck lights were functioning.
- Fleet House Corporate Operations Centre (COC) was activated within twenty-five (25) minutes of notification.

Abandon Ship

- Passengers and crew were mustered on the boat deck (Deck 7) port and starboard as the ship began to list to starboard (refer to Attachment 11 – Fire and Boat Station Muster List). All those mustered on the starboard side were ordered to the port side. When the crew thought all those on board were assembled on Deck 7 port side, the Master gave the order to swing out the port lifeboat and rescue boat to embarkation. He then gave the order to abandon ship as water was up to the starboard side rubbing strake and the deck plates in the engine room. From the port side, three liferafts, the port rescue boat and the port lifeboat were launched. In all, eighty-two (82) persons were evacuated on the port side. One raft that was inflated malfunctioned and failed. This raft was cut away. The canopy of one liferaft that was deployed did not inflate properly.

- Although the order to abandon ship was given and acted upon, the ship's whistle was not used to signal "boat stations" (that is, prepare to abandon ship).
- The starboard lifeboat was the last survival craft to leave the *Queen of the North*. Although one of the lifeboats was initially hung up by the tricing pennants in the chocks, the crew freed it and it was swung out. Seventeen crew were aboard when cast off. Just prior to lowering the starboard lifeboat, it was reported the ship had a fifteen (15) degree list to starboard. The Master was last to board. The abandon ship process was completed at 0112 hrs.
- The ship's logs were inadvertently left on the ship.
- The rafts were towed away about one-half mile from the ship by the rescue boat and lashed together with the port lifeboat.
- Running counts of passengers and crew were undertaken on several occasions; however, they proved difficult. After a number of counts, there was confusion as to whether there were ninety-nine (99) or one hundred and one (101) persons in the rafts and boats.
- The rescue boat went back to the ship to search in case there was anyone remaining on deck or in the water.
- According to ship's officers, the sea was now calm with a light rain falling.
- Passengers in one liferaft were complimentary regarding the leadership of the person in charge. They were kept informed, felt safe and were kept in good spirits. Passengers in the other liferaft commented that they did not feel as confident.

Assistance from Other Vessels

- The F/V *Lone Star*, a 37 foot shrimper with a Captain and one deckhand on board was proceeding southbound in Grenville Channel ahead of the *Queen of the North* on the evening of March 21. He could not see the ferry behind him. When he reached the southern end of the channel, the weather deteriorated and the *Lone Star's* Captain decided to turn into the channel between Promise Island and the mainland. The *Lone Star* was almost at Harbour Rock light in Coghlan Anchorage when he overheard the call of the *Queen of the North* at approximately 0024 hrs reporting the grounding. At 0029 hrs, the *Lone Star* contacted Prince Rupert Radio and offered assistance. The *Lone Star* continued to circumnavigate Promise Island in a clockwise fashion and was the first vessel to arrive on scene at the liferafts and lifeboats at approximately 0145 hrs, just after the sinking of the *Queen of the North*. The *Lone Star* took a number of survivors aboard for transportation to Hartley Bay.
- Alert citizens from the village of Hartley Bay almost seven (7) nm to the north heard the initial call from the *Queen of the North*. Residents quickly took to all manner of vessels and proceeded to the stricken *Queen of the North*. Shortly after the arrival of the *Lone Star* on scene a number of small craft began arriving from the village of Hartley Bay to offer assistance to the survivors of the sinking.
- On the evening of March 21, the F/V *Sandra M* (a 40 foot fibreglass shrimp dragger) was proceeding south in Grenville Channel with a Captain and one deckhand and was overtaken by the *Queen of the North*. No radio calls were exchanged between the *Queen of the North* and the *Sandra M*, although the *Sandra M* monitored the radio

communications between Prince Rupert Radio and reporting surface traffic. The *Sandra M* heard the radio call from the *Queen of the North* concerning the grounding and continued to the scene off Gil Island. The *Sandra M* arrived on scene at approximately 0230 hrs, and volunteered its services in the rescue effort to the CCGS *Sir Wilfred Laurier*. The *Sandra M* stayed in the area patrolling the float/debris line and recovered flotsam from the sinking for about eight hours. The *Sandra M* recovered PFDs and miscellaneous debris. *Sandra M* offloaded all recovered debris to the *Sir Wilfred Laurier*. No passengers or crew from the *Queen of the North* were transported aboard the *Sandra M*. The Captain saw no other vessels that evening prior to the incident nor heard any other vessels other than the F/V *Lone Star* on the radio.

- At the time of the grounding (0022 hrs on March 22, 2006), the tug *Castle Lake* (a 29 foot tow boat with log tow) was on a southwest course in Verney Pass, approximately one nm northeast of Money Point. The Captain reported that it was a dark, cloudy evening with seven knots of wind from south to southeast. The seas in Verney Pass were calm. The tug *Castle Lake* was about six (6) nm northeast from the *Queen of the North* at the time of its grounding on Gil Island. The *Castle Lake* was bound for Prince Rupert with a large log tow and was making about 1.3 knots through the water. The Master reported seeing the deck lights from the stricken *Queen of the North*, and monitored the radio transmissions of the incident. He offered his assistance, if needed, but as there were numerous small boats, fishing vessels and the Canadian Coast Guard vessel enroute to the scene, his assistance was not required. When the *Queen of the North* sank at 0140 hrs, the *Castle Lake* was mid way between Money Point and Cape Farewell in Wright Sound. The tug continued its journey to Prince Rupert.
- CCGS *Sir Wilfred Laurier* was operating in the area and was at anchor in Bernard Harbour. Upon hearing the call from the *Queen of the North*, the *Sir Wilfred Laurier* proceeded with due haste to the scene. The fast rescue boat from the *Sir Wilfred Laurier* arrived on scene at approximately 0156 hrs and the ship arrived at approximately 0210 hrs. *Sir Wilfred Laurier* assumed on scene commander for the rescue effort and directed the search and perimeter control. All remaining passengers and crew in the survival craft were transferred to the *Sir Wilfred Laurier*. The Canadian Coast Guard ship then gathered all survivors from the village of Hartley Bay and ultimately provided for their care and comfort while transporting them to Prince Rupert.

Sinking

- The *Queen of the North* continued to settle on an even keel, sinking to the level of Deck 5. At approximately 0140 hrs on March 22, 2006 the *Queen of the North* settled more quickly by the stern and began to sink beneath the surface, stern first. The bow angled steeply upward, exposing approximately the forward third of the ship, and then slipped beneath the surface, accelerating in the descent. As the ship sank, trapped air caused numerous windows on the passenger deck to explode outward, and a cloud of dust was formed at the scene.

Transport of Passengers and Crew to Safety

- The fast rescue boat from the CCGS *Sir Wilfred Laurier*, arrived to assist just after the *Queen of the North* sank. Thirty-six (36) passengers and crew were transported to *Sir Wilfred Laurier*.

- Sixty-three (63) passengers and crew were transported to Hartley Bay by small local vessels.
- Passengers reported that the people of Hartley Bay provided significant support and comfort.

Passengers and Crew Return to Prince Rupert

- Eleven passengers and crew were transported from Hartley Bay by helicopter and were assessed and treated at the hospital in Prince Rupert.
- All other passengers were landed at the Prince Rupert cruise ship terminal from *Sir Wilfred Laurier* at approximately 1700 hrs, then taken in hand by BC Ferries' personnel and accommodated at local hotels and their immediate needs were met. BC Ferries was assisted in this activity by the local Emergency Social Services organization and its volunteers.
- Over the following forty-eight (48) hours, many of the passengers and crew were interviewed, claim processes initiated and critical incident stress counselling services made available. Onward transportation was arranged and almost all passengers had left Prince Rupert by March 24.
- Investigations were initiated by the Transportation Safety Board, Transport Canada, RCMP, BC Ferries, and BC Ferries' underwriters. These activities necessitated interviewing many of the crew.
- BC Ferries established its Emergency Operations Centre (EOC) at its Prince Rupert terminal, from which the responses to the various issues were managed, including the environmental response, passenger support and claims, employee support and claims and service recovery.
- BC Ferries established its Corporate Operations Centre (COC) at BC Ferries Headquarters (Fleet House) in Victoria shortly after 0100 hrs on March 22, to direct the overall response to the event, coordinating logistic support, overseeing environmental response, liaising with investigation agencies, and managing the multitude of human issues for passengers and crew members.

FINDINGS

Transportation Safety Board Deep Submersible Recovery Operations

- On March 26, 2006, a Nuytco Research manned submersible, which had been contracted by BC Ferries, located the sunken wreck of the *Queen of the North*. The Transportation Safety Board (TSB) observed this operation.
- On June 15, 2006, the TSB contracted the services of a deep submersible remotely operated vehicle (ROV) to explore the wreck of the *Queen of the North* (refer to Attachment 21 – Report of a Marine Occurrence (TSB 1808)).
- The ship was discovered on the bottom in 420 meters (approximately 1410 feet) of water, intact and sitting upright on an even keel, slightly down by the stern.

- The ship had settled into the silt and ooze common on the seabed up to the rubbing strake at approximately the main car deck. This silt prevented an examination of the lower portion of the hull.
- The main computer and hard drive from the vessel's Electronic Chart System (ECS) were successfully recovered from the bridge during the June 15 ROV dive operations and sent to TSB investigative laboratories in Ottawa for analysis. Electronic data from the ECS enabled reconstruction of the navigational situation of the evening on March 21/22, 2006.
- On June 30, 2006, Captain George Capacci of the Divisional Inquiry Panel and two other members of BC Ferries management were shown the reconstructed track information from the night of March 21/22, 2006, recovered from the vessel's ECS hard drives.
- The navigational data from the ECS aboard the *Queen of the North* showed evidence of the actual movement of the ship through Grenville Channel and Wright Sound.
- The plot showed the vessel proceeding down Grenville Channel with a course over ground (COG) of approximately 133° True. Speed over ground (SOG) was indicated as 17.9 knots.
- The *Queen of the North* was abeam Sainty Point at the southern extreme of Grenville Channel on substantially the same course at approximately 0008 hrs or eight minutes after midnight on March 22, 2006.
- From that point, the reconstruction of the trackline shows the *Queen of the North* holding a steady course over ground of approximately 132°/133° True and speed of approximately 17.5 knots through Wright Sound. No course alteration took place abeam Sainty Point as would normally have occurred in accordance with established tracks.
- The QM (EDN #7) gave evidence that one or possibly two small course alterations were carried out at the direction of the 4/O (EDN #5) shortly after midnight. This is at odds with the objective evidence from the ECS data that no course changes were made from Sainty Point to the point of impact.
- The ship proceeded through Wright Sound, maintaining a steady course and speed until running aground on Gil Island in the vicinity of Juan Point at 0022 hrs or 22 minutes past midnight on March 22, 2006. According to the QM (EDN #7), a course change was ordered just before impact, but from the ECS data observed the course change does not appear to have been executed prior to the impact.
- The SOG recorded by the ECS went from 17.5 knots to zero in very short order.
- The ECS data then shows the ship's heading fall off to the northeast as the vessel appears to drift Dead in the Water (DIW) with the environmental conditions of current and wind. The ship initially drifted to the north off Gil Island (refer to Attachment 3 – Chartlet 3742).
- The calculated set and drift following the grounding is 326° True at a speed of approximately 0.7 knots.
- From accounts at the scene, the vessel remained afloat until approximately 0140 hrs or one (1) hour and eighteen (18) minutes after grounding.

- The *Queen of the North* ultimately drifted approximately nine-tenths (0.9) of a nm in a north-westerly direction until the ECS data ceases to be recorded at approximately 0140 hrs.
- In summary, the *Queen of the North* failed to make any course change at Sainty Point after exiting Grenville Channel and the ship proceeded straight on a COG of approximately 132°-133° True for approximately four (4) nm over fourteen (14) minutes, until the grounding on Gil Island. There were no apparent alterations of speed at any time during this transit of Wright Sound and the *Queen of the North* impacted Gil Island at 17.5 knots.

Vessel Damage

- RCMP divers identified three distinct impact sites on the northeastern shore of Gil Island:
 - 53° 19.191' N, 129° 14.296' W
 - 53° 19.160' N, 129° 14.169' W
 - 53° 19.128' N, 129° 13.995' W
- This equates to approximately 1,158 feet (353 metres) along the island (approximately three ship lengths).
- At these sites, clear evidence of the impact of the *Queen of the North* was as follows:
 - significant rock disturbance and scrapes of bottom paint from the ship;
 - a propeller blade from one propeller hub;
 - a portion of the steel structure from the starboard “A-frame” or shaft support structure that extends from the hull of the vessel.
- Reports indicate the liferafts and boats were too far away from the ship for close examination of the hull. Other reports indicate the position of the liferafts and boats did not permit a good angle of view of the bottom of the ship as the bow rose at the time of the sinking.
- However, the crew of the rescue boat that was circling the ship reported seeing significant damage to the hull (bulbous bow and forward one-third of hull) as the ship pitched up and sank.
- Video of the wreck by submersible was not helpful as the vessel’s lower hull is embedded in silt on the sea bottom, precluding direct observation.

Bow Section

- Severe damage was reported to the bow section of the vessel. Reports varied between one and two holes located either in the side shell of the bow area or on the bottom (keel) area of the bow section. The track of the vessel was a glancing or side swiping action striking the ground and witnesses reported two to three sequential impacts. These reports are consistent with the bow grounding first, followed by aft sections of the hull.
- There is a possibility some witnesses may have observed the hull opening for the bow thruster tunnel and described this as side shell damage. Even so, the reports of two

sequential impacts and several accounts of bow damage, including from knowledgeable mariners, makes it most probable the bow section of the vessel sustained significant damage.

- There were no eye witness accounts of bow damage from within the vessel at the time of impact as this portion of the ship is not normally visited except during crew rounds.

Machinery Spaces

- The vessel was steaming with two watertight doors in the engine room spaces open on bridge control for the safe working of the vessel. The senior engineer of the watch reported two impacts, one felt from forward of the engine room and one from aft. The machinery spaces began to flood very rapidly following impact. Water was reported entering the main engine room from aft, starboard side (the workshop and starboard shaft tunnel areas). The senior chief engineer reported that the pumps could not keep up with the flooding. From these reports it appears the vessel was holed aft of the engine room in the shaft tunnel compartment or workshop.
- The location and rate of flooding of the machinery spaces indicates the vessel sustained massive damage in the after starboard portion of the hull. The after portion of the hull was not visible to liferaft observers as the vessel reared and sank, so there are no exterior eye witness reports of aft hull damage.
- After the incident, portions of the starboard propeller and the propeller shaft support bracket were retrieved from shallow water along the shoreline of Gil Island. In this same area numerous rocks were stained with the bottom paint of the vessel, indicating the points of contact between the hull and the rocks.
- The nature of the damage to the propeller indicates it was turning at the time of impact and also that it sustained a massive impact. This is supported by reports the engines stalled immediately upon impact, consistent with a large propeller strike. The magnitude of the impact makes it likely the starboard shaft was dislocated within the hull such that watertight integrity may have been breached along the shaft line into the stern compartments of the vessel.

After Crew Quarters

- Based on evidence given by crew members in their quarters, the ship's hull between frames 8 and 56 was significantly holed during the grounding as demonstrated by rapid in-flooding of sea water. Crew members reported water depths up to two to three feet as they evacuated.

Damage Summary

- Based on witness reports from the engine room at the time of impact and from observations from liferafts as the vessel settled, it is apparent there were at least three serious hull breaches in three separate compartments. The first, in the bow section, was caused by the initial impact with the island. The second, the workshop compartment or shaft seal compartment, likely occurred when the hull in way of the workshop and/or the shaft seal compartment struck. The degree of damage to the salvaged propeller parts also indicates it is likely the starboard propeller shaft was dislocated within its stern tube by the impact. Thirdly, in the after crew quarters where the hull was breached causing rapid flooding into this compartment.

- It was reported that the car deck flooded from water coming up via the casing and flooded the aft section of the car deck first. The water topped the subdivision doors into the second section mid ship.

Crewing

- While BC Ferries had implemented and introduced a new computer-based scheduling system – SmartStaff – into various operational areas, at the time of the incident the crewing for Prince Rupert-based ships was still being effectively managed and scheduled using the historical paper-based systems while technical issues related to the new system were resolved.
- Accurate and current personnel information was used by the crewing offices to dispatch the crew.

Manifests

- Passenger manifests were not required by regulation.
- A landed crew list was sent ashore by the *Queen of the North* but was not signed by the Master or designate.
- An accurate passenger count was sent ashore.
- Shore-side management were not provided with final cabin allocations for passengers as on-board changes can occur.
- Shore-side reservation lists did not reflect an accurate list of those on board due to “no-shows”, changes, and non-reserved arrivals.

Logs

- No official documents were removed from the *Queen of the North*:
 - The official bridge log was inadvertently left on the ship.
 - The engine room logs were left in the engine room.

CONCLUSIONS

Equipment

- There were no propulsion, mechanical or control defects on the *Queen of the North* on the evening of March 21, 2006, up to the grounding.
- The Senior Master had posted and instructed the deck (navigational) watches to follow certain procedures in respect of steering changeovers between steering stations on the bridge. The “B” crew chose to operate the steering controls in a different manner. However, this choice does not appear to have been causative of the grounding.
- There is no evidence that the autopilot or steering system malfunctioned. While the after steering mode selector switch was renewed during the refit period, its operation was not a causative factor in the grounding. (Refer to Attachments 15 and 16)
- All electrical navigational equipment in the wheelhouse was operating within normal limits. It was reported by some deck officers after the incident that the ECS could not be dimmed enough and that its brightness affected night vision. There were no written reports of any such issues with bridge navigational equipment submitted to the Master, the Chief Engineer, shoreside management or the shoreside maintenance team. There are no known problems with this equipment. The manufacturer of this equipment is a reputable worldwide supplier of electronic chart systems for marine applications.
- As the ECS was recording the vessel’s movements during the approach to Gil Island, such data was available to the deck (navigational) watch. (Refer to Attachment 18 as a representative ECS image.)
- The traditional “keyhole” style personal flotation devices (PFDs), while widely in use worldwide, are somewhat restrictive for crew members performing their duties during emergencies.
- Although in compliance with the applicable regulatory regime, the liferafts were not float free and would not automatically deploy.
- The panel heard testimony that the open lifeboats left the occupants exposed to the weather. The panel notes that the BC Ferries vessel replacement strategy for the north coast includes enclosed lifeboats. The last remaining north coast vessel with open lifeboats is scheduled to shift to summer time only service in April 2007 and be retired in 2009.

Bridge Team

- Bridge team personnel assigned to the *Queen of the North* were certified by Transport Canada and the deck (navigational) watch at the time of the incident met the requirements of the *Crewing Regulations*.
- The QM (EDN #7) was a rating under training as was permitted by regulation.
- The 4/O (EDN #5) made the appropriate MCTS position reporting call when approaching Sainty Point.
- The evidence obtained from the retrieved ECS hard drive clearly demonstrates that the *Queen of the North* neither changed course nor speed from leaving Sainty Point until the grounding on Gil Island.

- The 2/O (EDN #3) and 4/O (EDN #5), on watch for the period 1800 hrs to 0600 hrs and responsible for the safe navigation of the vessel, have refused to give an accounting to the Divisional Inquiry Panel of the occurrences during the period of time after the vessel passed Saintry Point until grounding.
- Based on the ECS data the 4/O (EDN #5) failed to make a necessary course alteration or verify such alteration was made in accordance with pre-established Fleet Routing Directives and good seamanship.
- The 4/O (EDN #5) and QM (EDN #7) lost situational awareness sometime after Saintry Point and failed to appreciate the vessel's impending peril prior to the grounding on Gil Island.
- Navigational aids and resources were available to the deck (navigational) watch to enable them to recognize the lack of a course change and to act in a manner to permit safe navigation and prevent the grounding.
- The deck (navigational) watch failed to maintain a "proper lookout" by "all available means" as required by Rule 5 of the *International Regulations for the Prevention of Collisions at Sea (COLREGS)* which states "Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and of the risk of collision."
- A casual watchstanding behaviour was practiced at times when operating the *Queen of the North*, based on evidence given by the Senior Master and further demonstrated by music playing on the bridge as overheard on radio calls. (Refer to Attachment 19 – MCTS Radio Recording Transcription 21/22 March 2006)

Emergency Procedures

- Many abilities and proficiencies were displayed by the ship's crew during the evacuation process. Effective teamwork was demonstrated readying lifesaving equipment. Effective crowd management skills were displayed preparing passengers for abandoning ship; however, room for improvement exists.
- After the grounding there was a ringing of the general alarm bells and numerous PA announcements which effectively advised passengers to go to outside decks and crew to muster at boat and raft stations.
- Immediately after the grounding, the vessel reported its situation to the MCTS Centre, although the word "MAYDAY" was not used. The initial report to the Centre advised of the grounding and was generally descriptive of the geographical location.
- The vessel was subsequently unable to provide an accurate description of its location by latitude and longitude. However, at 0027, the vessel provided MCTS with an accurate grounding location "near Juan Point".
- There were challenges with the cabin sweep given:
 - the absence of a passenger cabin assignment list;
 - multiple pass keys were required to open passenger staterooms and crew cabins;

- once a cabin is entered and searched, the door should be marked with chalk to indicate the cabin is clear to others conducting a sweep; however, chalk could not be located by those conducting searches.
- Although there was an adequate number of handheld radios available on the vessel, additional radios for the catering crews conducting the accommodation search may have assisted in coordinating these efforts.
- Passenger manifesting, although not required by regulation, was inadequate as it existed on March 21, 2006, for rapid and clear identification of all passengers onboard the *Queen of the North*. Information on the identity of passengers that was available at the terminal was incomplete.
- At sea it was normal practice on the vessel that all watertight doors were closed except two in the engine room spaces which were open for the safe working of the engine room. While exiting the engine room, the engineers were only able to close one of the watertight doors as the other became jammed with debris after the grounding.
- The subdivision doors on the main car deck were closed and secured properly. Given the significant damage sustained by the *Queen of the North* and the rapid progressive flooding along the entire length of the hull and then onto the car deck, the subdivision doors on the main car deck slowed progressive flooding and reduced the free surface effect sufficiently to allow the ship to settle on an even keel, and ultimately permitted the successful evacuation of the mustered passengers and crew.
- Immediately after the grounding, the Captain ordered all watertight doors closed from bridge command, as was appropriate.

Missing Passengers

- The Divisional Inquiry Panel has been unable to establish the movement or location on the vessel of the two missing passengers.

Outside Assistance

- The heroic and extraordinary assistance provided by the residents of Hartley Bay, the F/V *Lone Star*, and the CCGS *Sir Wilfred Laurier* was invaluable. Their timely and courageous response surely prevented further tragedy and is recognized as a maritime rescue of tremendous significance.

RECOMMENDATIONS

Recommendation	Office of Primary Interest
Equipment	
1. Develop standardized procedures and training for use of the ECDIS/ECS system.	Vice President, Fleet Operations
2. Conduct a review of the illumination of navigational equipment.	Vice President, Engineering
3. Investigate and if appropriate procure alternate style PFDs to facilitate the crew in the performance of their duties and to distinguish the appearance of crew from passengers for ease of identification.	Vice President, Fleet Operations
4. Initiate a review of fleet inflatable lifesaving equipment and establish a fleetwide program of phased replacement for inflatable systems.	Vice President, Fleet Operations
5. Ensure that all fleet shepherd boats and fast rescue boats are suitable for their intended use and area of operation.	Vice President, Fleet Operations
6. Conduct a fleetwide review of current liferaft inventory and consider if non-float free liferafts should be replaced with float free lifesaving equipment (liferafts, PFDs).	Vice President, Fleet Operations
7. Undertake a fleetwide installation of Voyage Data Recorders (VDR) as soon as practicable.	Vice President, Engineering
8. Review practices for training and familiarization of crew with new or modified bridge equipment and navigational aids to ensure that all crew using such equipment and navigational aids are familiar with their operation and that such training is documented.	Vice President, Fleet Operations
9. Reinforce the use of the notice of defect procedures established in the fleet regulations for reporting equipment deficiencies.	Vice Presidents Fleet Operations, Engineering, and Food & Retail Services
10. Consider installing second global positioning system receivers on vessels equipped with ECDIS.	Vice President, Fleet Operations
Bridge Team	
11. Reinforce that Senior Masters should standardize procedures across watches where necessary. To the extent feasible, procedures should be standardized across the fleet.	Vice President, Fleet Operations
12. Bridge Resource Management (BRM) training should be provided to all personnel who work as deck officers as soon as reasonably practicable. Schedules for completion of training should be established and audited.	Vice President, Fleet Operations
13. Investigate the development of a Bridge Resource Management (BRM) training course for unlicensed bridge personnel.	Vice President, Fleet Operations
14. Review the standards and processes for familiarization and clearance of masters, deck officers, deckhands, quartermasters and lookouts.	Vice President, Fleet Operations
15. Review and recommend appropriate refresher training on bridge navigation skills.	Vice President, Fleet Operations
16. Watchstanding protocols aboard the live-aboard vessels should be changed from the current two (2) watch, twelve (12) hours on / twelve (12) hours off rotation to a three (3) watch system of four (4) hours on / eight (8) hours off.	Vice Presidents Fleet Operations and Engineering
17. The company should review, monitor and encourage the attainment of bridge watchman certification for deckhands.	Vice President, Fleet Operations
18. Promulgate standard handover procedures for bridge and engine room watch standers.	Vice Presidents, Fleet Operations and Engineering

Procedures	
19. Passenger manifests by name on Routes 10, 11 and 40 should be kept aboard and ashore and should accurately reflect all passengers onboard noting any special needs.	Executive Director, Customer Care
20. Fleetwide passenger counting systems should be reviewed for accuracy through periodic audits.	Vice President, Terminal Operations and Executive Director, Customer Care
21. Reinforce the requirement that all vessels should sail with the maximum degree of watertight integrity with all watertight doors closed while underway except as necessary for the safe working of the ship.	Vice Presidents Fleet Operations and Engineering
Evacuation	
22. Review the need for additional basic safety training and training with respect to crowd control in emergency situations.	Vice President, Fleet Operations
23. Drill scenarios should be reviewed and developed as necessary to exercise ship's crew in crowd control and accounting for passengers and crew.	Vice President, Fleet Operations
24. Review muster lists to ensure sweeping of passenger spaces is accomplished in situations where the initial signal is to go to boat and raft stations.	Vice President, Safety, Security & Environment
25. Expedite provision of clearly identifiable company uniforms for all BC Ferries shipboard and terminal personnel.	Vice President, Fleet Operations
26. Additional bullhorns and handheld radios should be procured fleetwide where necessary to assist in passenger mustering and control.	Vice President, Fleet Operations
27. Ensure that a sufficient number of master keys are available on vessels to facilitate searching of crew and passenger staterooms. If feasible, one master key should give access to all passenger and crew accommodations.	Vice President, Food & Retail Services
28. Review procedures for identifying occupied cabins and identifying cabins that are cleared and secured.	Vice President, Safety, Security & Environment
29. Investigate availability of a reliable passenger count system for use during emergency situations.	Vice President, Safety, Security & Environment
30. Consider the feasibility of the installation of emergency notification systems in all passenger and crew cabins during new construction.	Vice President, Engineering
Other	
31. All crews on live-aboard vessels should be quartered above the main car deck, to the extent practical.	Vice Presidents, Fleet Operations and Engineering

