Transportation Safety Board of Canada

Bureau de la sécurité des transports du Canada

MARINE INVESTIGATION REPORT

M03C0016

GROUNDING

TANKER *EMERALD STAR*

APPROACH TO PURVIS MARINE LIMITED DOCK

SAULT STE. MARIE, ONTARIO

15 APRIL 2003

Canada

Marine Investigation Report

Grounding

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Sault Ste. Marie, Ontario
15 April 2003

Report Number M03C0016

Summary

On 15 April 2003, the tanker *Emerald Star* was upbound in St. Marys River with a cargo of refined petroleum products for the Purvis Marine Limited dock in Sault Ste. Marie, Ontario. The bridge team consisted of the master, the second officer, a pilot, and the wheelsman.

As the vessel approached Mission Point, the master observed two yellow buoys in the approach to the Purvis Marine Limited dock. The master, who was unaware of the purpose of the yellow buoys, conferred with the pilot, who advised that they were the same buoys used during dredging operations carried out in the previous year. At 1545, as the vessel approached the dock at a shallow angle, leaving the easternmost buoy to port, the vessel grounded.

The vessel sustained structural damage to its hull. There was no pollution.

Ce rapport est également disponible en français.

Other Factual Information

Particulars of the Vessel

	Emerald Star
Official Number	814361
Port of Registry	Halifax, Nova Scotia
Flag	Canada
Type	Tanker - Oil/Chemical
Gross Tonnage	6262.0
Length[1]	123.71 m
Draught[2]	Forward: 6.45 m Aft: 6.60 m
Built	Germany, 1992
Propulsion	One MAN Burmeister & Wain, single-acting, slow-speed, 3700 kW, single controllable-pitch propeller
Cargo	6487.9 tonnes of refined petroleum products and tank washings
Crew Members	14
Operator	Rigel Shipping Canada, Shediac, New Brunswick, Canada
Owners	Rigelchem EMS Ltd., Isle of Man, United Kingdom

Description of the Vessel

The *Emerald Star* is a tanker with the bridge and accommodation aft and a clear view forward. As per the *International Convention for the Prevention of Pollution from Ships* and the United States *Oil Pollution Act of 1990* regulations, the *Emerald Star* is fitted with side and bottom ballast tanks and void spaces. The vessel regularly carries refined petroleum products for ports of the Great Lakes, St. Lawrence River and eastern Canada. At the time of the occurrence, the vessel was on a long-term charter to Ultramar Canada Inc. and subrogated to PetroNav Inc. of Montréal, Quebec, a company specializing in petroleum transportation services.

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[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 of units.

[2] See Glossary at Appendix B for all abbreviations and acronyms.

Description of the Public Port of Sault Ste. Marie

The harbour of Sault Ste. Marie, Ontario, is located in the St. Marys River, which connects Lake Superior with Lake Huron. The navigable waters of the river, which are subject to shoaling, are dredged periodically to maintain channel depths. Vessel traffic services are provided by the United States Coast Guard (USCG).

The Canadian harbour of Sault Ste. Marie is a public port administered by Transport Canada (TC) with a harbour master.

There is a reception manifold at the end of the Purvis Marine Limited (PML) dock for receiving refined petroleum products. The dock was a public port facility and was divested to PML in May 1998.

United States (U.S.) National Oceanic and Atmospheric Administration (NOAA) chart 14884 shows that depths along the outer southern face of the dock are 20 feet, and 20 to 22 feet for the approach to the dock. The dashed line on the chart drawn from buoy QA2 (close southeast to the dock) to the Bayfield Dike light marks the easternmost outer limit of the approach to the dock. The two yellow buoys placed off the PML dock, which were marking the dredged area of the channel, were not indicated on the chart (see Appendix A).

Pilotage

Pilotage is compulsory in the St. Marys River for all foreign-registered vessels and any vessel that does not qualify for exemption from the applicable pilotage regulations. Pilotage for these waters is provided by four Canadian and 21 American pilots on a rotational basis.

Dredging in the Vicinity of the Purvis Marine Limited Dock

Having divested the dock and associated waterlots to PML, TC's position was that any dredging of the approach to the dock is the responsibility of the dock owner.

In 2001, Algoma Central Corporation contracted PML to dredge the approach to and alongside the PML dock to increase the depth of water from 6.0 m to 7.0 m. This would permit vessels to carry more petroleum product for delivery to the dock.

PML was issued a permit on 16 November 2001 by the Sault Ste. Marie Region Conservation Authority to conduct dredging operations. There was no application for authorization from TC to conduct dredging as required under section 35 of the *Public Ports and Public Port Facilities Regulations*. On 18 January 2002, the day on which dredging operations began, PML requested the Canadian Coast Guard (CCG) to issue a Notice to Shipping (NOTSHIP) to inform mariners of dredging operations. PML also requested permission from the CCG to place three new buoys in the approach to the PML dock and to move existing buoy QA2. CCG assistance with determining buoy type and colour was also requested by PML.

CCG's response of 21 January 2002 indicated that, to have a NOTSHIP issued, PML should contact CCG's Marine Communications and Traffic Services (MCTS) in Sarnia, Ontario, and provide them information on the dredging operation. CCG's response also indicated that buoy QA2 was not to be moved and that PML should contact CCG on completion of dredging to arrange a site inspection to determine what aids to navigation would be required to mark the approach.

Based on information provided by PML to MCTS, NOTSHIP C61 was broadcast on 24 January 2002 to advise mariners of dredging operations in the area of the PML dock and to request they exercise caution.

To facilitate dredging operations, PML placed two yellow buoys to mark the area to be dredged. The buoys were of steel construction, spar-shaped and had a conical top. The upper portion of the buoy was approximately 240 mm wide. The buoy's above-water height was at least 1 m. CCG and the harbour master were not made aware of the use of yellow buoys, nor were they noted or reported by the harbour master.

On 04 June 2002, soundings of the approach to the PML dock (the area undergoing dredging operations) were taken on behalf of PML by a private dredging contractor. PML distributed the soundings to the Canadian Hydrographic Service, CCG and some vessel owners and charterers.

On 19 September 2002, PML informed CCG that dredging operations were completed and NOTSHIP C2404 was issued to advise mariners. PML also indicated to CCG its intention to replace one of the buoys with a red lighted buoy to accommodate tankers calling at the dock.

The two yellow buoys used during the dredging operations were the same buoys used to indicate the limits of the dredged channel.

History of the Voyage

In the early morning of 14 April 2003, the *Emerald Star* departed Port Huron, loaded with 2712 tonnes of regular gasoline, 3275.9 tonnes of low sulphur diesel and 500 tonnes of tank washing slops, bound for the PML dock in Sault Ste. Marie. The vessel was loaded for an arrival draught of 6.55 m. Before departing Sarnia for Port Huron, a voyage plan for the trip to Sault Ste. Marie had been prepared by the second officer. The master reviewed the plan and had used the sounding survey (dated 04 June 2002), which had been sent to the vessel by the charterer, to verify the available depth of water at the PML dock.

A U.S. pilot boarded the vessel at Port Huron. At 1607, the *Emerald Star* was abeam of De Tour light and the pilot took the conduct. It was reported that, prior to this, he reviewed and discussed the voyage plan and sounding survey for the PML dock with the master.

As the vessel proceeded upbound, the master was informed that the tanker *Algonova* was berthed and discharging cargo at the PML dock and would not complete operations until the following afternoon. At 1950, the *Emerald Star* anchored in the Lake Nicolet anchorage area and waited for the berth to become available.

On the following day, 15 April, the master of the *Emerald Star* was informed that the *Algonova* would be departing the PML dock. The bridge team consisted of the master, the second officer, a pilot and the wheelsman. At 1400, the *Emerald Star* weighed anchor and proceeded upbound for the PML dock. As the vessel approached Mission Point, located approximately 1.5 nautical miles southeast from the PML dock, the master and pilot noticed two yellow buoys in the approach to the dock. The master, not aware of their intended purpose, asked the pilot about the buoys. The pilot advised that the buoys were placed during last year's dredging operation. Reportedly, the pilot made a cellular telephone call to a fellow pilot to confirm the approach to the dock.

The vessel was maintaining steerageway near Bayfield Dike Light awaiting the departure of the *Algonova*. The *Algonova* made a pre-departure call on very high frequency (VHF) radiotelephone to the USCG Sault Ste. Marie Traffic Centre. At 1522, the master of the *Emerald Star* then called the *Algonova* and asked about which side to pass the yellow buoys. The master of the *Algonova* informed the *Emerald Star* that it was his practice to pass in between the buoys.

There is conflicting information as to what the pilot and the master discussed after receiving this advice, and whether there was agreement on how to approach to the PML dock. In any event, the master decided to make an easy approach to the dock by passing the yellow buoys to port. There was no effective intervention from the pilot to dissuade the master from taking the easternmost approach.

Having discharged its cargo, the shallow draught *Algonova* departed its berth, entered the main channel without passing between the buoys, and proceeded downstream. The *Emerald Star* then continued towards the dock, and the master took over the conduct of the vessel from the pilot for the approach. The second officer left the bridge to prepare for the berthing operation. The vessel proceeded towards the dock intending to keep the easternmost yellow buoy fine on the port bow.

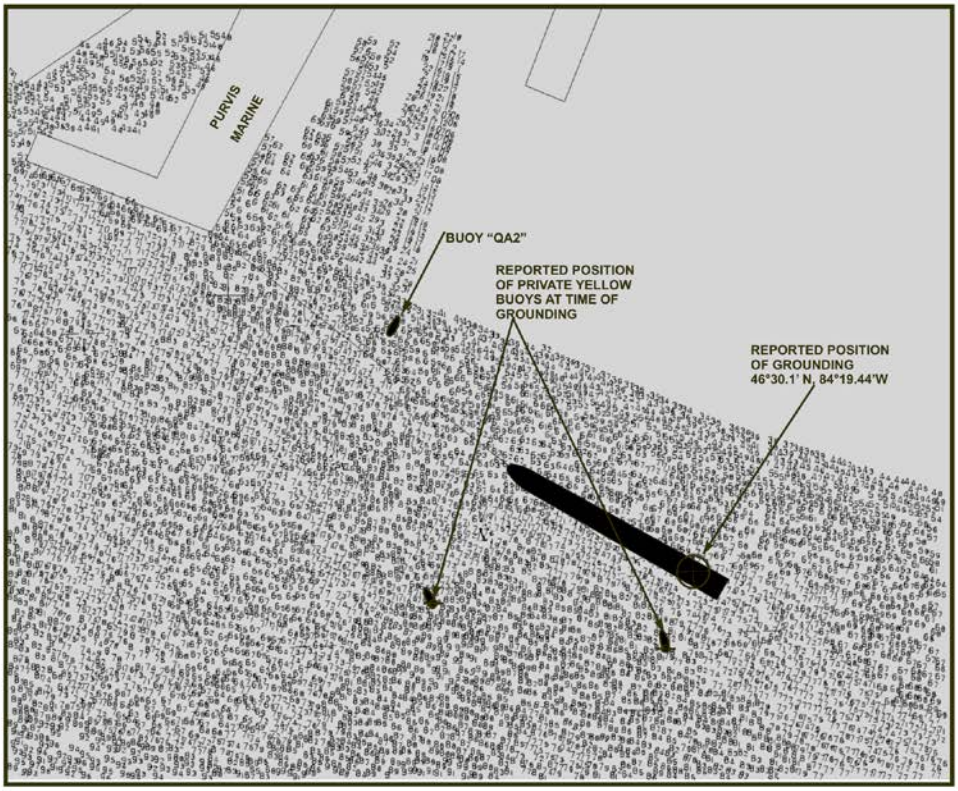
At about this time, a worker at the pump station at the end of the PML dock noticed that the vessel was proceeding outside the yellow buoys and informed PML staff. PML called the *Emerald Star* on VHF radiotelephone to warn the vessel to stay in between the buoys. Shortly after the call and before the master was able to change course, the vessel went aground at 1545. The reported position of the grounded vessel was 46°30.1' N and 084°19.44' W, approximately 1.4 cables off the dock but within the easternmost outer limit of the approach depicted on U.S. NOAA chart 14884. A sketch of the occurrence area is shown in Appendix A. Figure 1 shows the reported position of the grounded vessel in relation to the yellow buoys.

The master ordered that soundings be taken around the vessel and within the hull. It was determined that there was no ingress of water and no release of pollutants. The vessel tried to refloat under its own power but was unsuccessful. As a result of attempting to go astern, wash from the propeller stirred up mud from the harbour bed, which blocked the vessel's intakes. The main engine had to be shut down and the strainers cleaned out.

At 1800, when the Sault Ste. Marie Traffic Centre called the *Emerald Star* to inquire about its intentions, the USCG was informed that the *Emerald Star* was aground. Prior to this, no notification of the accident had been given to any relevant authority.

The tug *Wilfred M. Cohen*, owned and operated by PML, was hired to assist in refloating the vessel. The tug arrived at 2130 and was made fast to the stern of the vessel. By now, cargo had been transferred internally to develop a list to port and lessen stresses on the starboard side. At 2145, the vessel was refloated. The vessel

proceeded to its berth and unloaded its cargo without further incident. The vessel underwent an inspection by TC and a Class surveyor and was permitted to depart. The occurrence was not reported to the harbour master.



CANADIAN HYDROGRAPHIC SERVICE

DEPARTMENT OF FISHERIES AND OCEANS, CENTRAL AND ARCTIC REGION

SUBSET OF FIELD SHEET 1200346
JUNE 2000

PROJECTION
UNIVERSAL TRANSVERSE MERCATOR
ZONE 18, CENTRAL MERIDIAN 87-00-00 W
SCALE 1:2.000

HORIZONTAL DATUM
1983 NORTH AMERICAN

VERTICAL DATUM
SOUNDING DATUM IS 176.38 METRES ABOVE I.G.L.D. 1985

WATER LEVEL REDUCTION WERE OBTAINED FROM A PERMANENT WATER LEVEL GAUGE LOCATED BELOW THE LOCKS AT SAULT STE. MARIE

DEPTHS ARE IN METRES AND DECIMETRES ABOVE SOUNDING DATUM.
POSITIONED BY NOVATEL Rt2 GLOBAL POSITIONING SYSTEM RECEIVERS.

DIFFERENTIAL CORRECTIONS WERE TRANSMITTED FROM CHS STATION SOO WHICH HAS A NAD83 POSITION OF: 46-30-12.654 N, 84-18-19.643 W.

UPRIGHT SOUNDINGS WERE OBTAINED BY THE SIMRAD Em3000 MULTIBEAM SYSTEM AND SLOPED SOUNDINGS WERE OBTAINED BY THE KNUDSEN 320M SINGLE BEAM SYSTEM.

50 0 50 100 150 200 250 300 350 400 450 500

Scale of Metres

Voyage Planning

A voyage plan from Sarnia to Sault Ste. Marie was developed before departure from Sarnia. The plan did not identify all pertinent navigational information for use during the approach to the PML dock. A copy of the sounding survey was kept with the voyage plan. No latitudes or longitudes were marked on the sheet and its orientation differed from the navigation chart.

Company and charterer practices for vessels calling at the PML dock are that the arrival draught of single-hulled tankers provide for an underkeel clearance of at least two feet (61 cm) and double-hulled tankers, at least one foot (30 cm). The *Emerald Star* was loaded for an arrival draught of 6.55 m to allow for an underkeel clearance of 30 cm, after having taken into consideration a predicted water level of 14 cm below chart datum at a time of arrival of 1300.

Damage to the Vessel

The vessel sustained internal and external damage to some of its double bottoms in way of tanks Nos. 2 through 6. Three cracks were also found; a 200 mm-long crack in way of the bottom of the longitudinal bulkhead, a small crack in way of a connecting bracket of a transverse bulkhead, and a 200 mm-long crack at the bottom of a transverse bulkhead. These cracks were repaired, and re-surveyed by a Classification Society surveyor. This damage was to be re-surveyed at the next dry-docking.

Weather, Water Levels and Current

The weather at the time of the grounding was: visibility 10 miles and north to north-north-east winds of 15 to 20 knots.

Water levels recorded below the lock at Sault Ste. Marie for 15 April are listed in Table 1. Water level at the time of grounding was between 17.1 cm and 18.3 cm below chart datum.

Time	1100	1200	1300	1400	1500	1600
Water level (cm)	-12.3	-19.4	-19.3	-17.0	-17.1	-18.3

Table 1. Water levels for different times as recorded below the lock at Sault Ste. Marie on 15 April 2003. The hyphen (-) indicates below chart datum.[3]

The speed of the current was approximately one knot.

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[3] Canadian Hydrographic Service, Tides and Water Levels Section, Central and Arctic Region, Fisheries and Oceans Canada.

Personnel Qualifications and Experience

The master was issued a Master, Intermediate Voyage, certificate in 1997 and had received training in Bridge Resource Management in 2001. He had served as chief mate for some six years and as master for one year. This was his first trip to Sault Ste. Marie that year as master of a vessel. He had made three or four trips to the area over the previous three to four years.

The pilot had been a United States Great Lakes registered pilot for 22 years.

Duties and Responsibilities of a Harbour Master

The harbour master for Sault Ste. Marie was appointed in November 1995. He had no marine port operating experience, nor was it a job requirement for a harbour master. The duties and responsibilities assigned to this harbour master included: collecting harbour dues; reporting breach of regulations, practices and procedures, codes, standards and guidelines relating to the safe use of the public port; and making routine/periodic inspections of the public port to keep informed of activities taking place at the public port.

Public Ports and Public Port Facilities

The majority of regional/local port facilities previously owned by TC have been transferred to interested parties as operating port facilities or, in some cases, for other uses. This process is ongoing.

The term "public ports" is used to describe defined bodies of water regulated and controlled by TC, and all of these waterbodies were originally designated as public harbours under legislation pre-dating the *Canada Marine Act*. The majority of these public harbours were de-designated consequent to the adoption of the National Marine Policy.

The *Public Ports and Public Port Facilities Regulations* provide for the immediate repeal of public port status for all remaining public ports as follows:

- upon transfer of all of the public port facilities located within that public port; or
- for those public ports where the harbour bed is federally owned, upon transfer of the harbour bed.

Of the nine remaining public ports in Ontario, two fall within the first category and seven in the second, including Sault Ste. Marie. Because part of the harbour bed of the public port of Sault Ste. Marie is federally owned, its public port designation continues after transfer of the public port facility to PML until such time as the harbour bed is also divested.

Harbour Navigational Buoys, Sounding and Dredging Responsibilities

Before being transferred to the Department of Fisheries and Oceans (DFO) from TC in 1995, the CCG was responsible for the placement and maintenance of navigation buoys in the main channels and public harbours, and for initiating surveys and dredging operations in the main channels.

When CCG was transferred to DFO, so too was the responsibility for the placement and maintenance of navigation buoys and for the dredging of the main channels. CCG deploys and maintains the Canadian aids to navigation owned by the federal government within the public port.

TC retained responsibility to operate TC ports and do sounding and dredging as necessary at TC-owned facilities. TC is not responsible for dredging at public ports or ports under the responsibility of Canada Port Authorities. A person conducting a dredging operation in a public port requires authorization from a port official pursuant to the *Canada Marine Act*.[4]

With respect to the placing of or operating a light or day marker in a public port, authorization from a port official is required.[5]

Reporting Vessel Incidents to the Pilotage Authorities

Where an incident occurs within the Canadian Great Lakes compulsory pilotage area and the holder of a licence or pilotage certificate is on board the ship at the time of the incident, such holder and any other person who had the conduct of the ship at the time are required to report the incident forthwith by the fastest available means to the Great Lakes Pilotage Authority (GLPA).[6] Further, any person who has the conduct of the vessel is required to submit a written report on the occurrence to the GLPA. The data contained in these reports is used by the GLPA to initiate measures to reduce the risk of recurrence.

No written report of this accident was received by GLPA from the master of the vessel. The U.S. pilot on board the vessel at the time of the accident submitted a written report to the USCG. As per general practice, U.S. pilots do not provide a written report on occurrences to the GLPA.

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[4] Section 36, Schedule 4, *Public Ports and Public Port Facilities Regulations* of the *Canada Marine Act*. As defined in these regulations, "port official includes, with respect to a public port or a public port facility, a wharfinger or harbour master appointed under section 69 of the Act."

[5] The requirement to seek authorization is set forth in section 36 of the *Public Ports and Public Port Facilities Regulations* of the *Canada Marine Act* and the authorization by the port official is outlined in section 35 of the regulations.

[6] Section 18 of the *Great Lakes Pilotage Regulations*

Analysis

Local Knowledge of Marine Pilots

Compulsory pilotage areas are established to enhance operational safety and to protect the environment from marine accidents. Pilots provide knowledge of local navigation conditions prevailing in the area. The pilot is responsible to the master solely for the safe navigation of the vessel. The master retains overall responsibility for the safety of the vessel but relies on the pilot's local knowledge and ability to handle the vessel in a safe and efficient manner.

As the master has to rely on the pilot's in-depth local knowledge, it is essential that pilots keep abreast of new developments in the waterways they are required to navigate. Furthermore, they need to obtain all pertinent navigational information for the intended passage prior to boarding the vessel, especially when they are required to pilot vessels to ports that are not frequented.

Some personnel engaged in pilotage activity, be they ship masters or pilots, were aware of the presence of the buoys and that the approach was to pass in between the yellow buoys that marked the dredged area. The bridge team on board the *Emerald Star* sought information about the approach to the dock; the pilot was reportedly aware that the yellow buoys marked the dredged channel and that the vessel must transit between them.

Voyage Planning

A well-planned voyage and continuous monitoring and updating is crucial to ensure safety of navigation and protection of the environment. TC's *Recommended Code of Nautical Procedures and Practices* (TP 1018), the basic principles of which shall be taken into account on all vessels, states that the "intended voyage shall be planned in advance taking into consideration all pertinent information and any course laid down shall be checked before the voyage commences."[7] International Maritime Organization (IMO) requirements concerning voyage planning also state that "the planned route shall be clearly displayed on appropriate charts and shall be continuously available. . . ."[8] IMO *Guidelines for Voyage Planning* provide further details on the development of a voyage plan.[9]

A voyage plan was developed; however, the plan did not identify all pertinent navigational information to safely navigate the approach to the PML dock.

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[7] Part I, paragraph 6, TP 1018E, 1985

[8] *Seafarers' Training, Certification and Watchkeeping (STCW) Code, 1995*, as amended in 2001, Part A of Chapter VIII, "Standards Regarding Watchkeeping," Section A-VIII/2, Part 2, "Voyage Planning."

[9] Resolution A.893(21), adopted on 25 November 1999

Although U.S. NOAA chart 14884 showed depths for approaching the PML dock were sufficient for the vessel, depths in the vicinity of the dock were indicated to be insufficient. The sounding survey was therefore used only to verify the available depth of water at the dock. Information contained in the sounding survey was not readily comparable with that on the navigation chart. This information was not transferred to the navigation chart for ease of reference, nor was the chart information transferred to the field sheet to better assist the bridge team in navigating the approach to the dock. The incorporation of this information at the planning stage would have provided the bridge team with an opportunity to carefully consider all pertinent information essential for the safe navigation of the vessel and provided them with the tools to closely monitor the vessel's progress in the narrow approach towards the dock.

Furthermore, the sounding survey indicated only one yellow buoy—the position of the easternmost yellow buoy was off the limits of the survey. The buoy that was indicated on the survey was labelled "Yellow East" but was in fact the westernmost yellow buoy, indicating the southwestern edge of the dredged approach to the PML dock. This had the potential to generate confusion. Given the scale of the U.S. chart in use and the approach to the dock, information contained on the sounding survey was critical to safely navigate the vessel. Consequently, the incorporation and use of this safety critical information during the planning stage would have provided the bridge team with an opportunity to better plan and execute the passage plan.

It is noted that mariners are cautioned not to rely solely on buoys for navigation.[10] However, given the scale of the chart and the nature of approach to the dock, reference to the buoy with a measure of caution would assist the mariner in better negotiating this approach.

Decision Making

On passing Mission Point, the master and the pilot saw two buoys at the approach to the PML dock, although only one buoy was marked on the sounding sheet. Given that the operational environment may be subject to change, and consistent with good navigational practices, the master and the pilot reviewed the vessel's approach at this stage.

Yellow buoys are used to indicate caution, but on this occasion, were used to mark the dredged channel. Following discussions between the pilot and the master, it was mutually agreed that the master would take over the conduct of the vessel for berthing operations.

In determining how best to approach the dock, the master considered the following:

- that cautionary buoys mark an area where mariners are, amongst other things, warned of areas where no safe through passage exists;
- that the buoys may have been those left over from the dredging the previous year;
- that a course steered between the buoys would lead to a difficult, steep approach to the dock;

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[10] *2003 Annual Edition - Notices to Mariners*, Section N/M No. 2, Fisheries and Oceans Canada

- that by steering close to the easterly buoy, the master would be able to take an easy, normal approach to the dock; and
- that as long as he stayed close to the easterly buoy, he would have sufficient depth for the vessel.

The master decided that the most appropriate course would be to avoid the area between the caution buoys by passing as close to the easterly buoy as practicable. In doing so, the master manoeuvred the vessel into closer proximity to shallow water without fully recognizing the dangers associated with the vessel's arrival draughts.

Effectiveness of Bridge Resource Management

Navigation with a pilot on board creates a situation where the pilot is teamed with an existing crew to carry out a coordinated job. Generally, the pilot has the local navigational knowledge to analyze local cues more readily and take rapid action as necessary and the ship's crew has a greater understanding of the ship's handling characteristics. Because pilots, masters and officers of vessels have different areas of experience and training, it is essential that the skills of each be combined in the working relationship of a bridge team. Consequently, it is essential that pilots play an effective role as a bridge team member. In this instance, the master elected to berth the vessel. However, he was aided in his manoeuvre by the navigational information, assistance and guidance provided by the pilot.

The master had received information from the master of the *Algonova*, berthed at the dock, that it was his practice to pass in between the buoys; however, proper weight was not given to this information in the final decision-making process. Consequently, an opportunity to seek clarification from PML with respect to the purpose of the buoys and the single buoy position as plotted on the sounding sheet was lost. This resulted in less than complete information being available to the bridge team.

Although the pilot on board the *Emerald Star* was reportedly aware that the yellow buoys marked the dredged channel and that the vessel should transit between them, contrary to Bridge Resource Management principles and objectives, the pilot did not effectively intervene to dissuade the master from proceeding outside the area marked by the buoys.

Availability of Sounding Survey Information

Upon completion of the dredging in 2002 and placement of the yellow buoys near the PML dock, vessels were provided copies of the sounding survey in advance of their calling at the dock by either the vessel owners or charterers. The sounding survey was also provided to the Canadian Hydrographic Service, who forwarded it to the NOAA National Ocean Survey (NOS) for their consideration for use in their chart of the area and/or Notice to Mariners. As a general rule, NOS will only prepare a Notice to Mariners for soundings outside of a channel if the depths are 10 per cent shallower than existing data. As there was no feature identified in the sounding survey considered to be a danger to navigation, no Notice to Mariners was prepared.

Sounding surveys in the vicinity of other private port facilities in the port of Sault Ste. Marie were provided to local pilotage authorities when they became available or upon request. There is no documentation to indicate that the local pilotage authorities were provided with copies of the sounding surveys for the PML dock. On the other hand, the pilotage authority and the pilots ought to have been aware that dredging operations in the vicinity of the PML dock, which had been broadcast in the NOTSHIP, had been completed and that a copy of the sounding sheet was essential for pilots to safely navigate. However, this information was not requested.

Use and Assessment of Private Marine Aids

In addition to the use of marine aids to navigation operated by a federal or provincial government or agency, other aids to navigation may be placed by private individuals, organizations, companies or other groups for their own use. Known as private aids to navigation, use of these aids have increased over time. When the federal government divests itself of a port facility, it also divests responsibility for sounding, dredging and maintenance of the berths and channels leading to it. Owners and operators of divested port facilities are then required to make more use of private aids to ensure the safety of navigation of vessels calling at their facilities.

Owners of private aids are responsible to ensure that their aids meet all of the requirements of the *Private Buoy Regulations*[11] and the *Boating Restriction Regulations*. CCG may conduct a quality assurance check of a private aid to determine its appropriateness when CCG is aware of the presence of the aid. In addition, CCG offers a service to provide advice on the placement of aids. CCG's *The Canadian Aids to Navigation System* (TP 968E) provides a comprehensive view of the aids to navigation system in Canada. CCG has also developed a guide entitled *An Owner's Guide to Private Aids to Navigation* to assist private owners in understanding the related legislation, requirements and responsibilities involved with the establishment of a private aid to navigation.

In this occurrence, no information about the deployment of yellow buoys in the vicinity of the PML dock was provided to CCG or TC before the occurrence. PML did request advice on the design of the aids; however, CCG did not provide advice other than to offer to review the site to determine which proper aids to navigation would be required to mark the channel once the dredging was completed. CCG was notified when dredging operations were completed and it was also provided with a sketch of the placements of the buoys that were in use. The harbour master of the public port was never informed about the placement of the new buoys. Although 10 months had expired since the completion of dredging operations, neither the PML nor the CCG initiated further action to review these buoys.

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[11] Section 3 states "No person shall place in any Canadian waters a private buoy that interferes with or is likely to interfere with the navigation of any vessel, or that misleads or is likely to mislead the operator of any vessel."

The harbour master of the public port of Sault Ste. Marie did not have knowledge about the buoyage system, and because he was not informed of the use of the buoys, he did not note the anomaly. Therefore, he did not initiate any discussion within TC or with other authorities and port users.

CCG does undertake activities to stay aware of the latest placement of private aids to navigation. CCG staff identify the use of private aids by reviewing NOTSHIPs after they are issued. However, the process is informal without a supporting procedure or tools to ensure the tracking of information concerning new placements. A proper assessment of the yellow buoy in the vicinity of the PML dock would have provided an opportunity for the placement of proper aids to navigation to better assist vessels in negotiating the approach to the dock. It is noted that, in the U.S., the placement of a private aid to navigation requires pre-approval.

Divestiture Process

Considerable work is undertaken by TC staff managing the divestitures in analyzing the financial aspects of each divestiture; however, the divestiture process does not include a risk analysis of the safety issues of transferring the port to a private owner. Limited information is provided to the prospective purchaser to advise them of their responsibilities in relation to the safe operation of the port facility. Many purchasers only become aware of the implications of their responsibilities as issues arise after purchase. The majority of public port facilities have been divested.

Public Port Overview

TC appoints a harbour master to assist regional staff to oversee a public port. Typically, a harbour master of a port is responsible for the administration and safety of port operations, and overseeing the safe movement of vessels using the port. A review of the roles of responsibilities of the harbour master for this public port indicated that he was acting as the "eyes and ears" of TC, reporting to TC regional staff. To effectively manage the overview of a public port, there needs to be a balance between the level of supervision by regional staff against the level of knowledge and skills of the harbour master.

Harbour masters are required to have the necessary knowledge to effectively carry out their responsibilities, such as the granting of clearance for vessels and the reporting of a breach of practices and procedures. Initial training provided by TC, Ontario Region, is only to ensure that harbour masters know who to contact in TC and how to collect and record harbour dues. The harbour master assigned to this public port did not possess the knowledge or experience, nor did TC provide training to acquire the necessary knowledge or skills for carrying out all of his assigned duties/responsibilities. The training was limited to the requirements of the *Canada Labour Code*.[12]

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[12] In 2003, harbour masters in the Ontario Region were provided personnel safety training to satisfy the requirements of the *Canada Labour Code*.

Review and Approval of Dredging in Public Ports

For activities where a number of departments/agencies may need to be consulted, there is not always a means of ensuring that the applicant is aware of the necessity to involve all relevant departments/agencies. In the case of dredging operations in a public harbour, TC, the DFO, and the local conservation authority may all need to be involved. In this occurrence, although the DFO and the Ontario Ministry of the Environment were aware of PML's application for dredging to the Sault Ste. Marie Region Conservation Authority, they were unaware that permission to dredge should have been granted by TC.

To help facilitate the review and approval process for commercial dredging proposals in Ontario, DFO developed a guidance document.[13] The guidance document provides information to proponents of dredging activities as to which department/agency (i.e. DFO, Parks Canada, Ontario Ministries of Natural Resources and Environment, or local conservation authorities) should be contacted for review and approval. There is no mention of TC's residual responsibilities concerning dredging at divested port facilities within a public port.

Use of a coordinated approach for approvals ensures that, when one authority is made aware of a proposed activity, all the necessary authorities are informed. Such an approach provides a framework around which informed decisions, essential to the safety of navigation, safe operation of the port and public safety, can be made. However, in the events leading up to this occurrence, this was not the case.

The absence of a coordinated approach for the review and approvals of dredging for private port facilities in public ports increases the potential that the risks associated with such activities may not be fully assessed.

Reporting an Accident

Following the grounding of a vessel, it is incumbent upon the owner to take timely and appropriate action to respond to the situation and initiate remedial action. Furthermore, the activation of any emergency response to supplement that taken on board the vessel can only occur once the appropriate agencies, authorities and organizations have been informed. In this occurrence, the vessel did not inform its owner, charterer or the authorities until more than two hours after the time of the grounding and only after the USCG inquired about the vessel's intentions.

Notwithstanding the vessel in this occurrence was of double-hulled construction and there was no pollution, emergency situations generally tend to be dynamic and their outcomes may not be as anticipated. Delays in reporting emergency situations to those who have expertise for responding to such situations may pre-empt an opportunity to take necessary precautionary measures that might otherwise not have been considered by the crew of the vessel, thereby unnecessarily exacerbating the situation.
Corrective action can be taken if occurrence-related information is disseminated to the authorities that are in a position to effect change. Although reports of occurrences are required to be made to the GLPA by those who have the conduct of a vessel at the time of the occurrence, the practice of U.S. Great Lakes pilots is that they do not submit reports to the GLPA nor does GLPA request one. Consequently, an opportunity to identify, correct

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[13] *DFO-Ontario Great Lakes Area/Navigational Waters Protection Program 2003 Operational Statement for Commercial Dredging Proposals in Ontario*

and learn from non-conformities, and analysis of safety-critical incidents and near misses is lost and the potential safety benefits to the marine community cannot be fully realized. Further, given that there are common elements in the waters shared by the U.S. and Canada, safety benefit can be fully realized by sharing information on occurrences and by identifying safety deficiencies associated with all occurrences. However, there is no such system in place.

Findings as to Causes and Contributing Factors

1. A voyage plan was developed; however, the plan did not identify all pertinent navigational information, including that contained in the sounding survey, to safely navigate the approach to the Purvis Marine Limited (PML) dock.

2. Yellow buoys are used to indicate caution, but on this occasion, they were used to mark the dredged channel. The dredging of the channel had been completed some months earlier and neither PML nor the Canadian Coast Guard (CCG) took measures to have the buoys replaced with appropriate navigational markers.

3. Although the pilot was reportedly aware that the yellow buoys marked the dredged channel, contrary to Bridge Resource Management principles and objectives, he did not effectively intervene to dissuade the master from proceeding outside the area marked by the buoys.

4. The master manoeuvred the vessel into shallow water without fully recognizing the dangers associated with the vessel's draught.

Findings as to Risk

1. In the absence of a system for exchange/transfer of information between the U.S. and Canadian pilotage authorities on occurrences, and by identifying safety deficiencies associated with all occurrences, safety benefit cannot be fully realized in the waters shared by the U.S. and Canada.

Other Findings

1. To effectively manage the overview of a public port, there needs to be a balance between the level of supervision by regional staff against the level of knowledge and skills of the harbour master.

2. The absence of a coordinated approach for the review and approvals of dredging for private port facilities in public ports increases the potential that the risks associated with such activities may not be adequately assessed.

3. A delay in reporting an emergency situation to the competent authorities has the potential to delay corrective action.

Safety Action

Action Taken

Private Aids to Navigation in the Vicinity of Purvis Marine Limited

Purvis Marine Limited (PML) painted the buoys red and green. Subsequently, at the request of Imperial Oil, they were removed from service on 18 July 2003.

Vessel Owners, Operators and Charterers

Rigel Shipping Canada prepared a recommended docking plan for the port of Sault Ste. Marie and PML dock for the guidance of all company masters. A general circular was issued in which the minimum acceptable underkeel clearance is 0.30 m. Company masters were reminded of the necessity to ascertain the qualifications, experience and capability of pilots.

Algoma Tankers Limited informed their vessels calling at the PML dock to ensure that the minimum arrival underkeel clearance of one foot for double-hulled tankers and two feet for single-hulled tankers be based on a 21-foot "chart datum."

Imperial Oil instructed their vessels calling at the PML dock to restrict their draught to that compatible with the available water depths as published in the official hydrographic chart of the area (i.e. U.S. National Oceanic and Atmospheric Administration [NOAA] chart 14884) and the prevailing water level.

Transport Canada

Following the occurrence, Transport Canada (TC) initiated the following measures:

- The Ontario Regional TC office has been added to the Ontario Conservation Authority list of affected department/agencies for activities taking place in TC public ports.

- The duties and responsibilities of this particular harbour master have been reviewed and amended to require him to carry out more frequent inspections/tours of the public port.

- TC will request that all regional offices review the frequency of the required inspections/tours assigned to individual harbour masters/wharfingers as part of their duties and responsibilities.

- TC Ontario Region held its annual harbour master/wharfinger seminar on 20 and 21 March 2004. The agenda for the seminar included: emergency plans and planned exercises, and discussion of the lessons to be learned from this occurrence.

- Under reorganization, the return of the Navigable Waters Protection Program to TC is expected to foster a closer working relationship.

Safety Concern

Private Aids to Navigation Systems for Commercial Shipping

It is noted that the onus for ensuring that private aids to navigation comply with all applicable regulations and standards rests with the owner of the aid to navigation; however, the regulations and standards do not provide information regarding the determining of proper aids and their placement for a waterway. Owners are asked to contact the Canadian Coast Guard (CCG) for advice on the design of a navigation system for a waterway. In this occurrence, neither the CCG nor the owner of the private aids to navigation took follow-up action to have the approach to the PML dock inspected to determine the proper aids to navigation to mark the channel. CCG staff identify the use of private aids by reviewing Notices to Shipping; however, the process is informal without supporting procedures or tools to ensure the tracking of information concerning new placements. CCG may also be made aware of the presence of private aids by their own vessels, when they come across them.

As the level of federal marine-related infrastructures and services continues to be rationalized for cost effectiveness and efficiencies, more owners and operators are expected to make use of private aids to navigation to ensure the safe navigation for commercial vessels calling at their ports and facilities. Commercial vessels, such as petroleum tankers, pose a substantial risk to the environment when involved in an accident. As a consequence, the Board is concerned that, without adequate procedures in place to ensure the appropriateness of private aids to navigation systems, commercial vessels will continue to be placed at risk. The Board will continue to monitor the situation.

This report concludes the Transportation Safety Board's investigation into this occurrence. Consequently, the Board authorized the release of this report on 18 May 2004.

Visit the Transportation Safety Board's Web site (www.tsb.gc.ca) for information about the Transportation Safety Board and its products and services. There you will also find links to other safety organizations and related sites.

Appendix A –Sketch of the Occurrence Location

Appendix B – Glossary

CCG	Canadian Coast Guard
cm	centimetre
DFO	Department of Fisheries and Oceans
GLPA	Great Lakes Pilotage Authority
IMO	International Maritime Organization
m	metre
mm	millimetre
MCTS	Marine Communications and Traffic Services
N	North
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Survey
NOTSHIP	Notice to Shipping
PML	Purvis Marine Limited
TC	Transport Canada
TP	Transport Canada publication
TSB	Transportation Safety Board
U.S.	United States
USCG	United States Coast Guard
VHF	very high frequency
W	West
°	degree
’	minute