



National Transportation Safety Board

Marine Accident Brief

Grounding of Freighter *Roger Blough*

Accident no.	DCA16FM040
Vessel name	<i>Roger Blough</i>
Accident type	Grounding
Location	Gros Cap Reefs, Sault Sainte Marie, Ontario, Canada 46° 30.8' N, 084° 37.2' W
Date	May 27, 2016
Time	1312 eastern daylight time (coordinated universal time – 4)
Injuries	none
Damage	\$4.5 million
Environmental damage	None
Weather	Partly sunny, visibility 10 miles, winds south-southeast at 10 mph, air temperature 52°F
Waterway information	From Whitefish Bay at the southeast corner of Lake Superior, the St. Marys River flows in a general southeast direction to empty into Lake Huron. Birch Point Course is the entry channel to the St. Marys River. On the accident date, the water level in eastern Lake Superior was 1.01 feet higher than the charted depth at low water datum. ¹

At 1312 local time on May 27, 2016, the US-flagged lake freighter (laker) *Roger Blough* ran aground near the Gros Cap Reefs Light off Sault Sainte Marie, Ontario, Canada.² The grounding occurred as the vessel entered the Birch Point Course section of the St. Marys River federal navigation channel from Whitefish Bay in eastern Lake Superior. There were no injuries and no pollution reported. The vessel sustained \$4.5 million in damage to its hull and cargo system.



***Roger Blough* aground on Gros Cap Reefs. (Photo by US Coast Guard)**

¹ Waterway description from National Oceanographic and Atmospheric Administration (NOAA), *Coast Pilot 6*, 47th Edition, Washington, DC: Department of Commerce, 2017.

² *Laker* is a term used for a ship that only trades in the Great Lakes of North America, usually carrying grain and ore cargoes. Source: Monroe, Jeffrey and Robert Stewart, *Dictionary of Maritime and Transportation Terms*, Centerville, Maryland: Cornell Maritime Press, 2005.

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Accident Events

On May 26, 2016, the *Roger Blough* departed Superior, Wisconsin, en route to Conneaut, Ohio, a voyage of 890 miles.³ The vessel was loaded with a cargo of 45,093 tons of taconite iron ore pellets, and the recorded departure drafts were 27 feet 10 inches forward, 27 feet 11 inches midship, and 28 feet aft, with a trim of 2 inches by the stern.⁴ The vessel's intended route, which was programmed into the ship's electronic chart precise integrated navigation system (ECPINS), closely followed the Lake Carriers' Association (LCA) recommended downbound trackline for Lake Superior.

On the same day, the Canadian-flagged laker *Tim S. Dool*, in ballast, lost all electrical power and propulsion approximately 65 miles northwest of Whitefish Point in eastern Lake Superior (about 89.5 miles from Gros Cap Reefs Light). Two tugboats, the *Anglian Lady* and the *W. I. Scott Purvis*, were contracted to tow the *Tim S. Dool* to a repair facility in Sault Sainte Marie, Ontario, Canada. The lead tug, *Anglian Lady*, took the *Tim S. Dool* under tow and began transiting at 5 knots.

At 1130 the next day, when the *Roger Blough* was about 24.5 miles from Gros Cap Reefs Light, the second mate and an able seaman took over the laker's normal navigational watch as deck watch officer and wheelsman, respectively. The second mate held a merchant mariner credential for unlimited mate on Great Lakes and inland waters, with a first-class pilot's endorsement, and had sailed on the lakes for 17 years in both licensed and unlicensed positions. During the watch turnover, the second mate was informed that the *Tim S. Dool* was being towed by the *Anglian Lady* and was about 5 miles from Gros Cap Reefs Light, making a speed of about 5 mph. Fog was prevalent throughout the area, and thus fog signals were sounded and an extra lookout was posted on the bow.

At 1138, the *Roger Blough* second mate called Vessel Traffic Service (VTS) St. Marys River ("SOO Traffic") on VHF radio about one-hour before entering the VTS area to make a mandatory voice position report ("pre-call").⁵ VTS St. Marys River advised him that the *Anglian Lady* tow was about 4.9 miles from Gros Cap Reefs Light. The VTS watchstander told the second mate that he did not know if the *Roger Blough* would be able to overtake the tow.

At 1211, the *Roger Blough* second mate hailed the *Anglian Lady* master and proposed to overtake the tow. The *Anglian Lady* master agreed. Soon after this communication, the downbound laker *Sam Laud*, following behind the *Roger Blough*, hailed the *Anglian Lady* and proposed to overtake the tow in the same way as the *Roger Blough*.

³ NOAA, *Distances Between United States Ports*, 12th Edition, Washington, DC: Department of Commerce, 2012. Distances of the Great Lakes and other inland waters are in given in statute miles. Speed is presented in miles per hour.

⁴ *Taconite* is a low-grade iron ore that is crushed and processed into pellets to ship to steel mills.

⁵ *VTS* is a Coast Guard service implemented in certain high-traffic areas around the US to improve the safety and efficiency of vessel traffic and to protect the environment. VTS has the capability to interact with marine traffic and respond to traffic situations developing in the VTS area. The VTS St. Marys River area consists of the navigable waters of the St. Marys River and lower Whitefish Bay from the De Tour Reef Light to the south to the Ile Parisienne Light to the north. Source: Title 33 *Code of Federal Regulations* Part 161.

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At 1230, the second mate directed the wheelsman to make a course change from 148 degrees to 140 degrees, per the LCA recommended downbound trackline, and to “hold the red buoy [left] side of the channel” in anticipation of passing the *Anglian Lady* tow. The wheelsman took the steering control out of autopilot, made the course change in hand steering, and then placed the steering back in to autopilot. About this time, the fog dissipated and visibility improved.

The *Roger Blough* was making full “sea speed” of 113 revolutions per minute (RPM), approximately 14.5 mph, and was about 10 miles behind the *Anglian Lady* tow, which was continuing to make a speed of about 5 mph. All vessels were on the LCA recommended downbound route toward the St. Marys River navigation channel.

The master of the *Roger Blough* held a merchant mariner credential for unlimited master on Great Lakes and inland waters, with a first-class pilot’s endorsement, had sailed on the lakes for 28 years in both licensed and unlicensed positions, and had been the vessel’s permanent master for seven years. Crewmembers told investigators and the second mate acknowledged that the master had given verbal instructions to the mates to reduce speed to 100 RPM (about 13.5 mph speed through the water) when the vessel was two miles north of Gros Cap Reefs Light. Then, when the vessel was abreast of Gros Cap Reefs Light, the RPM were to be reduced to 90 RPM (about 11.5 mph).

At 1232, the second mate called the *Anglian Lady* and arrangements were confirmed for the *Roger Blough* to overtake the *Anglian Lady* and its tow in the Birch Point Course section of the St. Marys River.⁶ The *Anglian Lady* was to keep its tow to the right of the channel and the *Roger Blough* would pass on the left side of the channel. The second mate positioned the *Roger Blough* to enter the Birch Point Course lined-up on the far-left side of the channel. Two minutes later, the *W. I. Scott Purvis* met the *Anglian Lady* tow near Gros Cap Reefs Light and made-up to the *Tim S. Dool*’s stern.

At 1305, the master of the *Roger Blough* and an observing captain entered the wheelhouse. While the observing captain went to the aft port side of the wheelhouse to get a cup of coffee, the master went to use the ship’s phone on the aft starboard side to confirm delivery of provisions as the vessel passed Sault Sainte Marie, Michigan.

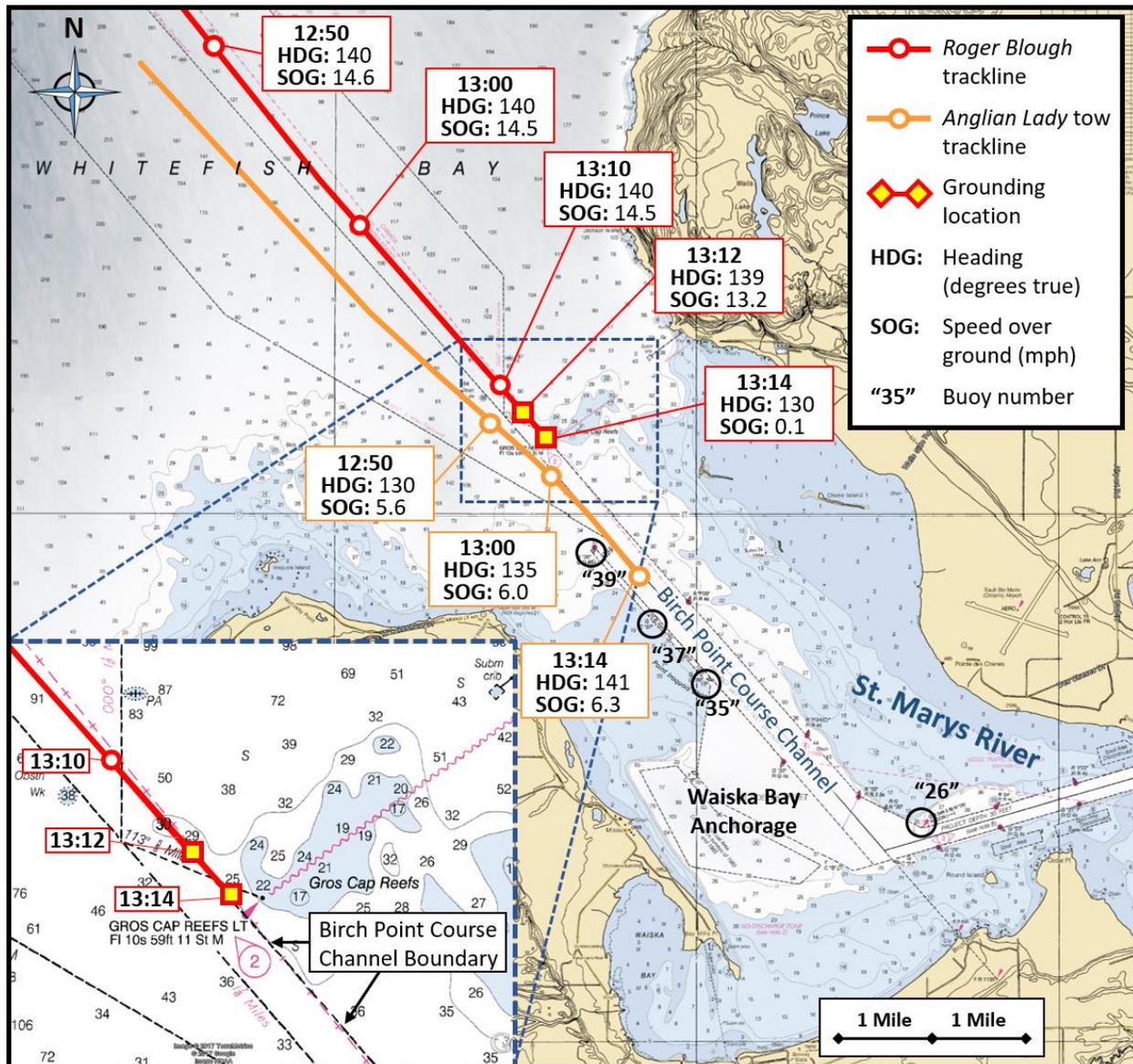
At 1310, the *Anglian Lady* and its tow were about a third of the way down the Birch Point Course channel, between green buoys 39 and 37, moving slowly from the center to the right side of the channel. The tow was on a course of about 140 degrees at a speed of about 6.1 mph.

At the same time, according to ECPINS and automatic identification system (AIS) data, the *Roger Blough*’s centerline was on the outer edge of the left side of the channel, with its port side outside the channel. The vessel was on a course of 140 degrees true at a speed through the water of 14.4 mph when the its speed began to slow. At 1312, the *Roger Blough* passed over a charted 30-foot depth curve near the Gros Cap Reefs. About this time, the vessel hit the bottom.

⁶ The Birch Point Course navigation channel is about 4-miles long on a bearing of 138.6 degrees true. It extends from just northwest of the Gros Cap Reefs Light to the turn at Round Island Light 26 to the southeast. It has a projected depth of 30 feet and is 2,000 feet wide. There are no VTS-mandated speed restrictions. Source: NOAA, *Coast Pilot 6*.

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The *Roger Blough's* heading shifted about 8 degrees to port as the vessel continued to move forward for two minutes, dragging the hull an additional ship-length over the reef's bedrock until the vessel came to rest.



Portion of NOAA chart 14884 showing AIS data for the *Roger Blough* and *Anglian Lady* tow in the approaches to the Birch Point Course navigation channel of the St. Marys River. Inset is a close-up of the accident location near Gros Cap Reefs Light.

Immediately following the accident, the crew began sounding tanks. At 1324, the second mate informed the *Sam Laud*, which was astern of the *Roger Blough*, and then VTS St. Marys River that his vessel was aground at Gros Cap Reefs Light. VTS St. Marys River alerted Coast Guard Sector Sault Sainte Marie Command Center of the marine casualty.

The grounding caused multiple punctures and large fractures to the hull: the forepeak, no. 1 port ballast, and no. 2 port ballast tanks were breached and flooded to the waterline; no. 1 port void space located in the double bottom was breach and fully flooded; other ballast tanks, void spaces, and the port side cargo belt tunnel were flooded; there was significant deflection of

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the steel deck in the forward end of the portside cargo belt tunnel; and the cargo belt pulley system was misaligned.⁷

Coast Guard Sector Sault Sainte Marie activated its Incident Command System to manage the response to the grounding and salvage operations. Transport Canada was notified because the *Roger Blough* came to rest on the US-Canada border. Cargo lightering operations were conducted on June 6 and 7 and the *Roger Blough* was refloated. After two weeks of temporary repairs at anchorage and a month of permanent repairs in a Sturgeon Bay, Wisconsin, shipyard totaling \$4.5 million, the *Roger Blough* returned to commercial service on August 6, 2016.

Analysis

Navigation and Watchstanding

The second mate was piloting the *Roger Blough* to overtake the *Anglian Lady* tow (*Tim S. Dool*) and had positioned his ship straddling the outer limit of the left side of the Birch Point Course channel. The *Roger Blough*, with a beam of 105 feet, was at least 52.5 feet outside of the navigational channel. The *Roger Blough* continued on this track until it went aground on the shoals outside of the channel near Gros Cap Reefs, where charted depths were less than 30 feet. The vessel's ECPINS clearly displayed that the vessel was straddling the edge of the channel, but the second mate told investigators that he was looking out the bridge windows and was not monitoring the track on the electronic chart.

The company's *Deck Department Operations Manual* states, "When underway, bridge watches shall be set by the Master according to the prevailing conditions as follows: Restricted Waterway Navigation (entering or departing port/limited maneuvering room: a) Clear weather, little or no traffic – Bridge Watch II." The manual defines Bridge Watch II as "two licensed deck officers on the bridge." In accordance with the company's policy, another officer should have been on the bridge and could have alerted the second officer to the dangerous situation. The master and observing captain were in the wheelhouse at the time of the grounding, but they were not actively engaged in the safe navigation of the vessel.

Squat

Squat is a phenomenon that causes an increase in the overall draft and alters the trim of a vessel when it is making way through the water. Its effects are greatest in restricted navigation conditions such as shallow water or narrow channels. The magnitude of squat is relative to the vessel's speed, with the effect increasing exponentially with increases in speed (twice the speed may result in more than four times as much squat, depending on water depth and other factors). Because the second mate intended to overtake the *Anglian Lady* tow in the Birch Point Course, he did not slow the ship's speed prior to entering the channel, in accordance with the master's verbal instructions. Investigators could not accurately determine the impact of squat on the *Roger Blough* with the available information. However, given that the vessel was transiting at full speed in shallow water, it is likely that the effect of squat increased at 1310 when its speed began to slow, about two minutes before the accident. This exacerbated the existing dangerous

⁷ American Bureau of Shipping, *ABS Class Survey Report*, May 27, 2016.

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situation presented by the vessel's position straddling the channel boundary near Gros Cap Reefs.

Vessel Traffic Service

Two persons were on duty at VTS St. Marys River on the day of the accident. The civilian VTS watchstander had worked there for 14 years as active duty military and as a civilian. He had over 26-years' active duty with the Coast Guard as a quartermaster and a warrant officer boatswain.

The Coast Guard's VTS watchstanders are trained to apply their authority by using four vessel traffic management activities.⁸ These activities, from the least to the most assertive level of traffic management, are *monitor*, *inform*, *recommend*, and *direct*. In practice, they can be implemented in any order (for example, a traffic watch may have to direct a vessel away from an immediate hazard without first attempting to inform or recommend). The four activities are defined as the following:

- **Monitor:** the use of surveillance, communications equipment, and other resources to collect, organize, display, and analyze information.
- **Inform:** the use of communication resources to disseminate information that vessel operators, shore-side facilities, and other organizations use to facilitate vessel traffic movements, safety, and security.
- **Recommend:** the use of communication resources to highlight particular information or recommend particular actions to vessel operators, shore-side facilities, and other organizations. Recommendations usually are given to resolve miscommunications or otherwise call attention to particular circumstances, hazards, or conflicts when there is doubt that appropriate action is being taken.
- **Direct:** the use of communication resources to direct a course of action when necessary. A VTS center may direct the movement of vessels to promote compliance with navigation regulations and to minimize the risk of collision or damage to property or the environment. Directions to vessels are normally given in the form of a desired outcome.

VTS watchstanders told investigators that they were not aware that the *Roger Blough* was standing into danger until the crew reported that it had run aground. Had the watchstanders effectively monitored the vessel's track, they likely would have identified that the *Roger Blough* was operating at the edge of the channel and approaching the shallow water near Gros Cap Reefs.

In September 2016, the NTSB concluded an assessment of the Coast Guard's VTS system.⁹ The study suggested that an opportunity exists for the VTS system to further reduce the risk of accidents, such as the *Roger Blough* grounding, by taking a more proactive role in traffic management. The NTSB issued 17 safety recommendations to the Coast Guard as a result of the assessment.

⁸ Coast Guard, *Vessel Traffic Service National Standard Operating Procedures Manual (VTS NSOP)*, COMDTINST M16630.3A., Washington, DC: US Department of Homeland Security, 2011.

⁹ NTSB, *An Assessment of the Effectiveness of the US Coast Guard Vessel Traffic Service System*, Safety Study NTSB/SS-16/01, September 13, 2016.

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Water Level

The National Oceanographic and Atmospheric Administration (NOAA) *Coast Pilot 6* states that “from day to day, the [St. Marys River water] level fluctuates somewhat due to changes of wind and barometric pressure; such fluctuations frequently amount to several inches and sometimes to 1 foot or more.” At 1306 on May 27, 2016, NOAA’s Point Iroquois, Michigan, monitoring station reported that the water near Point Iroquois, including the area around Gros Cap Reefs Light, was approximately 1.01 feet higher than the low water datum shown on the charts. Thus, low lake water level did not contribute to this accident.

Aids to Navigation

On June 8, 2016, Coast Guard Sector Sault Sainte Marie conducted an aids to navigation (ATON) verification check in the Birch Point Course. The ATON verification found that green buoys 35 and 37 were off station. Green buoy 35 was off station by 42.9 feet bearing 328 degrees true from its charted position, and green buoy 37 was off station by 44.7 feet bearing 343 degrees true. Buoys 35 and 37 were on the opposite side of the channel and over 2.5 miles from the grounding site; consequently, investigators determined that aids to navigation were not a factor in this accident.

Actions by the Company Following the Accident

Based on the Coast Guard investigating officer’s report of the accident, the company provided vessel information on the bridges of all vessels in its fleet and set speed restrictions in various waterways.¹⁰ Further, the company amended vessel deck department operations manuals to:

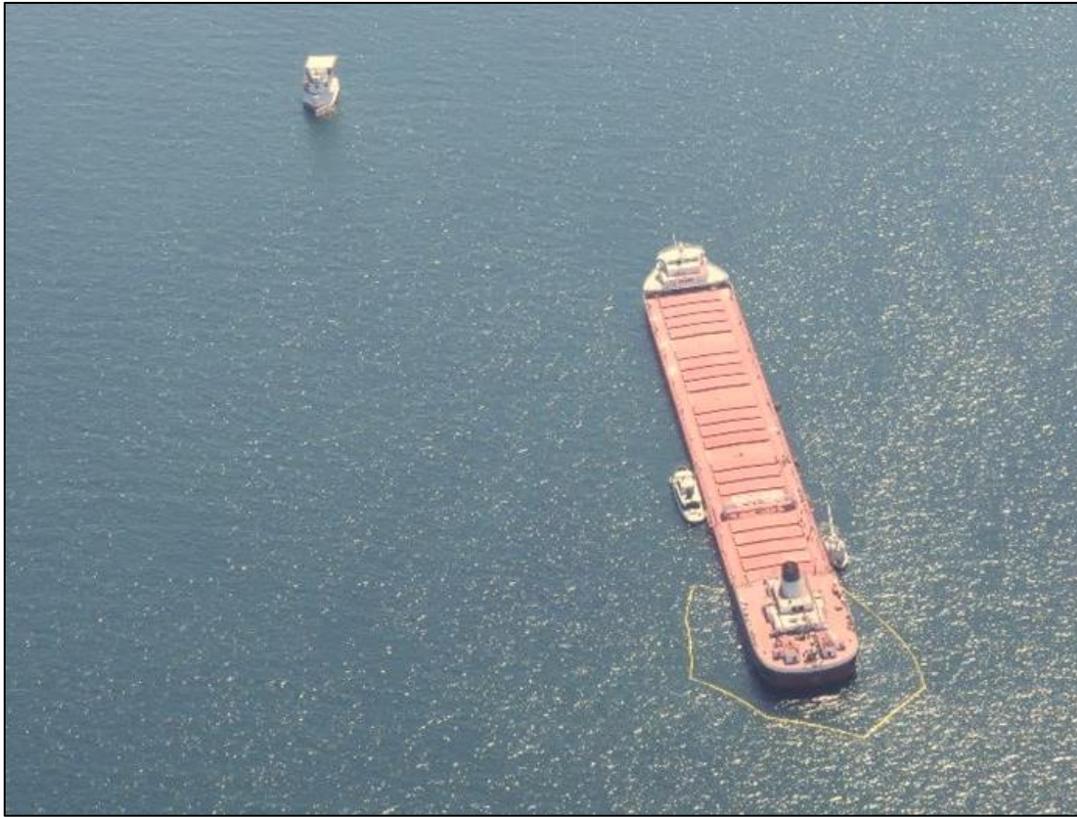
- reinforce the duties of deck officers in each bridge watch condition;
- ensure transit/passage planning is well documented in the master’s standing orders, including marking “no-go” areas; and
- reduce standing verbal orders by making them part of the master’s written standing orders or night orders.

The topics of the company’s annual fleet seminar training for its masters were lessons learned from the accident and ECPINS refresher training on “no-go” areas.

Additionally, the company installed Simplified Voyage Data Recorders (S-VDRs) on two of its vessels, with plans to install S-VDRs on all company vessels. VDRs maintain continuous, sequential records of data relating to a ship’s equipment and its command and control and capture bridge audio from certain areas in the pilothouse and on the bridge wings. S-VDRs are retrofitted on older vessels and are not required to capture all the parameters of a standard VDR.

¹⁰ Coast Guard, *Roger Blough Grounding at Gros Cap Reefs in Eastern Lake Superior on 27 May 2016 Investigating Officer’s Report*, February 14, 2017.

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Roger Blough aground near the Gros Cap Reefs Light. The distance to the light was 240 yards. (Photo by US Coast Guard.)

Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding of the lake freighter *Roger Blough* was the second mate's failure to use all navigational resources to determine the ship's position as it approached shallow water near Gros Cap Reefs. Contributing to the accident was inadequate monitoring of the vessel by Vessel Traffic Service (VTS) St. Marys River.

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Vessel Particulars

Vessel	<i>Roger Blough</i>
Owner/operator	Great Lakes Fleet, Inc.
Port of registry	Duluth, Minnesota
Flag	US
Type	Lake freighter, bulk, self-discharging
Year built	1972
Official number (US)	533062
IMO number	7222138
Classification Society	American Bureau of Shipping
Construction	Steel
Length	858 ft (261.5 m)
Draft	27.9 ft (8.5 m)
Beam/width	105 ft (32 m)
Gross tonnage	22,041 gross tons
Engine power; manufacturer	14,000 hp (10,444 kW); 2 16PC2V-400 Pielstick diesel engines
Persons on board	24

NTSB investigators worked closely with our counterparts from Coast Guard Sector Sault Sainte Marie, Michigan, throughout this investigation.

For more details about this accident, visit www.nts.gov and search for NTSB accident ID DCA16FM040.

Issued: July 6, 2017

The NTSB has authority to investigate and establish the probable cause of any major marine casualty or any marine casualty involving both public and nonpublic vessels under 49 *United States Code* 1131. This report is based on factual information either gathered by NTSB investigators or provided by the Coast Guard from its informal investigation of the accident.

The NTSB does not assign fault or blame for a marine casualty; rather, as specified by NTSB regulation, “[NTSB] investigations are fact-finding proceedings with no formal issues and no adverse parties . . . and are not conducted for the purpose of determining the rights or liabilities of any person.” 49 *Code of Federal Regulations*, Section 831.4.

Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by conducting investigations and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report. 49 *United States Code*, Section 1154(b).
