July 12, 2024 MIR-24-19

Grounding of Bulk Carrier *John J Boland*

On April 21, 2023, the bulk carrier *John J Boland* grounded twice in Port Dolomite, Michigan, while loading cargo (see figure 1 and figure 2).[1] About 1445, after getting underway, the crew discovered flooding and damage to the hull of the vessel. No pollution or injuries were reported. Damage to the vessel was $776,125.

Figure 1. *John J Boland* discharging cargo from its port side using its self-unloading boom in Lorain, Ohio, after the grounding.

[1] (a) In this report, all times are eastern daylight time, and all miles are nautical miles (1.15 statute miles). (b) Visit ntsb.gov to find additional information in the public docket for this NTSB investigation (case no. DCA23FM029). Use the CAROL Query to search investigations.

Casualty Summary	
Casualty type	Grounding/Stranding
Location	Port Dolomite, Lake Huron, about 4 nm east of Cedarville, Michigan 45°58.98′ N, 84°16.53′ W
Date	April 21, 2023
Time	1030 eastern daylight time (coordinated universal time –4 hrs)
Persons on board	18
Injuries	None
Property damage	$776,125
Environmental damage	None
Weather	Visibility 10 mi, overcast, winds west-southwest 9 kts, gusts 16 kts, seas 1 ft, air temperature 41°F
Waterway information	Privately dredged approach channel, controlling depth 23 ft (alongside dock)

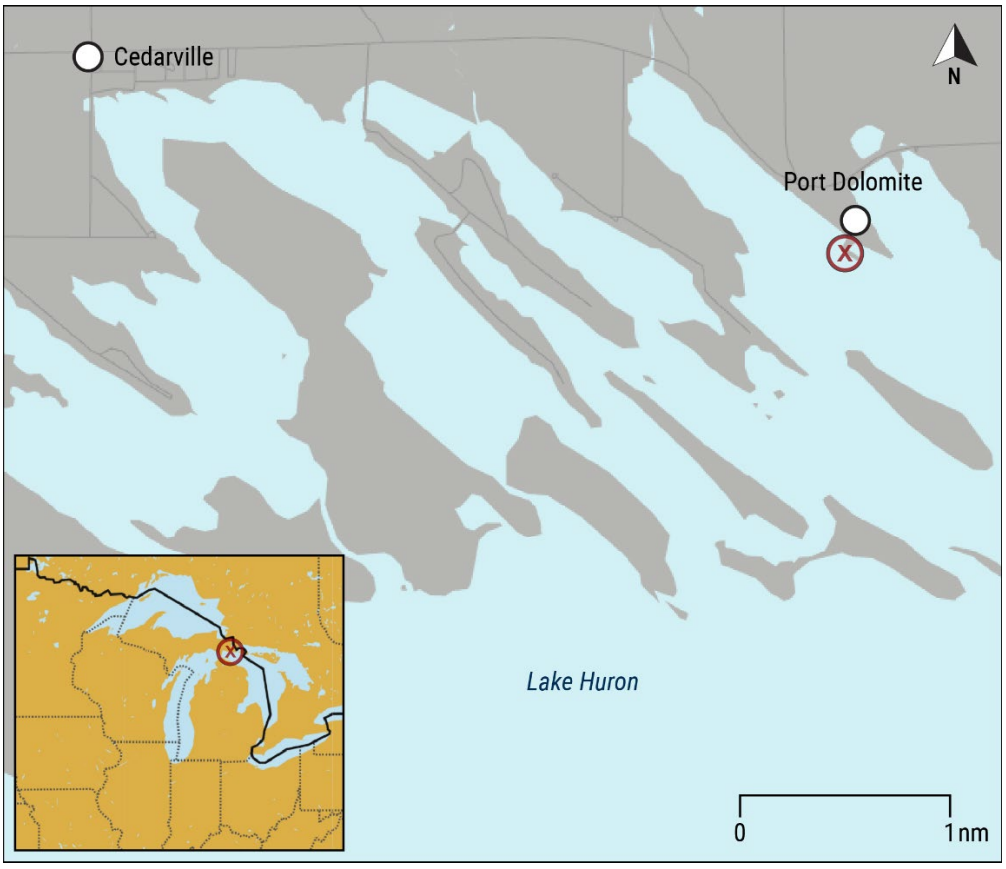

Figure 2. Area where the *John J Boland* grounded, as indicated by a circled *X*. (Background source: Google Maps)

1 Factual Information

1.1 Background

The steel-hulled, 667-foot-long, self-unloading bulk carrier *John J Boland* was built in 1973 by Bay Shipbuilding Corp in Sturgeon Bay, Wisconsin. The American Steamship Company owned the *John J Boland*, and Grand River Navigation, of Traverse City, Michigan, chartered and operated the vessel. The vessel had six cargo holds, which were accessed by 22 cargo hatches on its main deck (see figure 3). There were 14 double-bottom ballast tanks beneath the cargo holds. The vessel had two main diesel engines driving a single propeller and two 1,000-hp thrusters—one on the bow and one at the stern. The vessel's 250-foot-long, self-unloading boom, located forward of the superstructure, allowed the vessel to unload dry bulk cargo without the use of shore-based equipment.

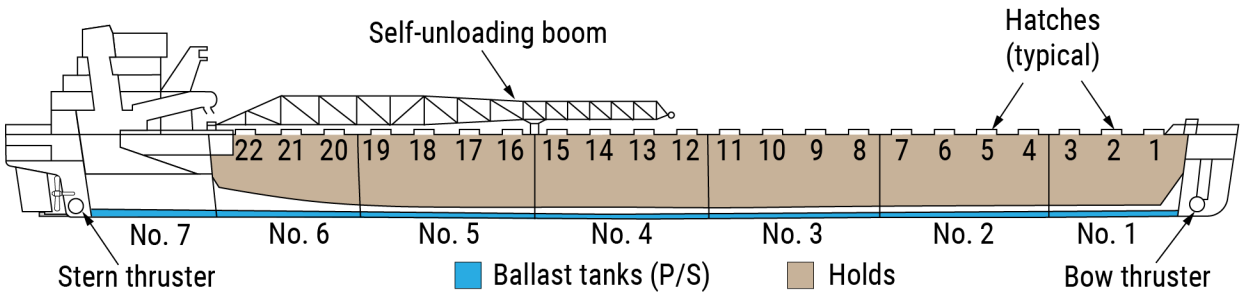

Figure 3. Profile view of *John J Boland*.

Accessed by a privately dredged approach channel, the 620-foot-long Carmeuse Americas dock (also known as the Cedarville dock), located in Port Dolomite, Michigan, about 4 miles east of Cedarville, Michigan, was a private dock used to load various grades of limestone onto vessels (see figure 4). It had a one-belt conveyor loader system capable of loading 3,200 short tons of material per hour.[2] In 2004, the controlling depth alongside the dock was 23 feet.[3] The nearest gage was located at De Tour Village, Michigan, about 16 miles east of the dock, and was

[2] One short ton is equal to 2,000 pounds. All references to cargo tons in the report are in short tons.

[3] The *controlling depth*, or minimum depth, is the least known depth of a channel. This depth is determined by periodic hydrographic surveys and restricts use of the channel to drafts less than that depth. See https://nauticalcharts.noaa.gov/publications/coast-pilot/xml2html.html?book=6).

maintained by the National Oceanic and Atmospheric Administration (NOAA).[4] Another gage, also maintained by NOAA, was located at Mackinaw City, Michigan, about 22 miles southwest of the dock.

Figure 4. The Cedarville dock in Port Dolomite, Michigan. (Background source: Google Earth)

1.2 Event Sequence

On April 20, 2023, about 1431, the *John J Boland* arrived and tied up port side to the Cedarville dock, where the crew planned to load 30,000 tons of three types of aggregate stone. The vessel's first mate had created the load plan and was responsible for loading and ballast operations on board. The load plan, which was approved by the master, required that the drafts of the *John J Boland* be "no deeper" than 26 feet 8 inches (see section 1.3.2 for more information about the load plan).

[4] Water level heights in the US Great Lakes are measured using gages in accordance with the International Great Lakes Datum vertical reference system. This system references low water datum, which identifies a surface so low that the water level seldomly falls below it. Different lakes and rivers use different low water datum surfaces. See International Great Lakes Datum and Great Lakes Low Water Datums.

At 1517, loading began via the shoreside conveyor loading system. During loading, the first and second mates, two ordinary seaman, two able seaman, and the third mate rotated watch duty, which involved overseeing cargo and ballast operations, shifting the vessel, opening and closing cargo hatches, conducting draft readings, and maintaining gangway security.

About 2000, a new (replacement) first mate (oncoming first mate) from Grand River Navigation reported on board the *John J Boland* to relieve the first mate (offgoing first mate). That morning, the company had informed the vessel's master that this exchange was going to take place. The two first mates met for about 10 minutes to discuss various aspects of cargo loading before the oncoming first mate went to sleep about 2130. The oncoming first mate had worked as a first mate on other company vessels, but this was his first time on the *John J Boland*. After being relieved by the second mate at 2200, the offgoing first mate departed the vessel about 2210.

Loading and deballasting operations continued throughout the night and into the early morning of April 21. About 0310, the oncoming first mate woke up, and about 30 minutes later, he went out on deck to relieve the second mate.

Between 0744 and 0800, the *John J Boland* was shifted aft using mooring lines so that the shoreside loader could reach the next hatches, which were farther forward. Loading concluded about 0813, after 524 tons were loaded into hatch no. 9, and the crew then switched to trimming (trim loading) the vessel.[5]

The load plan specified that the crew should load cargo into the holds through hatch nos. 2, 5, 7, 17, and 19 to trim the vessel. Before trim loading began, the first mate read the forward draft from the dock at 22 feet. He instructed the loader operator to fill hold no. 1 (hatch nos. 2 and 3) to increase the forward draft to meet the target draft. After the hold was loaded, the first mate checked the forward draft again and found it to be about 24 feet 6 inches. The first mate planned to bring the forward draft to 26 feet 10 inches because he knew that, as the aft hatches were trimmed, the draft aft would increase and tip the bow up to the desired draft of 26 feet 8 inches (since the stern was higher out of the water than the bow at that point).

The first mate had the loader move to load hold no. 2 through hatch nos. 5 and 7. While cargo was being loaded through hatch no. 7, the first mate noticed that the draft at the bow had stopped increasing at "26 feet 7 [inches], maybe 8 [inches]." At

[5] *Trimming* the vessel involved loading the last quantities of cargo in the holds to bring the vessel to the planned forward and aft drafts.

that point, the first mate said he knew the *John J Boland* was "stuck" on the bottom, which he told investigators was "a common occurrence" when loading ships in various Great Lakes ports (the master also said he had previously experienced the ship touching bottom at the Cedarville dock on "numerous" occasions) (see section 1.3.3 for information about the depth near and at the dock).

The first mate and the deck crew attempted to free the vessel from the bottom. The first mate had the self-unloading boom swung out to starboard (outboard), which induced a list to starboard (away from the dock). About 0945, the master went to the wheelhouse to radio the first mate and ask when he expected the loading to be completed. He saw the vessel was "stuck" and had the crew slacken the aft leading no. 4 wire and shift it around to make it a forward lead. When the crew heaved on the wire, the vessel's bow came away from the dock and moved ahead. The master instructed the winch operator to not heave on anything until the vessel came to a stop.

After the vessel moved ahead, the aft hatches could be accessed by the shoreside loader to further trim the vessel (the first mate stated that the forward draft at that time was about 26 feet 10 inches). The master then told the first mate that there was a shoal where the bow was, and that they had to keep the bow 12 feet off the dock for the remainder of the trim loading. He instructed the winch operator to heave the bow to the dock and "let it stay off the dock for the remainder of the load." The first mate had not been aware of the shoal or this requirement until he heard the master's instructions. The first mate said the bow seemed to settle about 15 feet off the dock (south end).

About 1000, the second mate took over the watch from the first mate, and the master left to join a company conference call from his office. Because the load plan required the first mate to conduct trimming operations, the first mate went to the dock where he could read the vessel's drafts during trimming. At 1002, trim loading of hold no. 5 through hatch no. 19 (one of the aftmost hatches) began. The shuttle operator (who operated the loading system) said that halfway through loading, he noticed the vessel was listing to starboard as indicated by its list-o-meter lights.[6] He moved the loader to the port side of the hatch to continue loading to correct the list,

[6] A *list-o-meter* is a five-light indication unit developed to give bulk freighter loading crews a continuous indication of the list of the ship. The white light indicates the ship is upright, and the red and green lights indicate a list to port or starboard, respectively, in inches.

but when he finished, the lights still indicated a starboard list (the third mate read the list at 5 inches to starboard from a display on the ballast control system).[7]

After trim loading of hold no. 5 through hatch no. 19 was complete, the first mate had the loader move to load through hatch no. 17. He stated that, at the time, the draft aft was 26 feet (he could not see the forward draft since the bow was off the dock). Trim loading through hatch no. 17 began at 1030, and during the process, the first mate noticed the aft draft stopped increasing when it was about 26 feet 3 inches.

At 1040, the master left his office and went to the wheelhouse. When he arrived, he saw that the port bow was up against the fendering at the dock, and he asked the first mate over the radio what the drafts were. The first mate replied that the forward draft was 26 feet 10 or 11 inches. The master reminded the first mate that the limiting draft was 26 feet 8 inches. Shortly afterward, the first mate told the master that he thought the ship was stuck again and he had been trying to "pop up the bow" by loading the aft two hatches, but the forward draft was no longer changing.

The master ordered the first mate and loader to stop the loading and asked the loader to run off the remaining product from the conveyor belts. He told the chief mate, "We're done [loading]." The crew attempted to free the vessel by swinging the self-unloading boom outboard to starboard and using the mooring lines as they had done earlier that day, but the ship did not move.

At 1045, control of the main engines and thrusters was transferred to the wheelhouse from the engine control room. The master attempted to use the bow thruster to move the bow away from the dock, but this effort did not work.

About 1100, the master put the propulsion to astern and ordered the aft leading wires heaved on to "wiggle the boat a little bit." As the vessel moved astern, it came free from the bottom. The first mate boarded the vessel, and the master ordered the mooring lines let go and heaved in. The master used the stern thruster to thrust the stern away from the dock, and once the vessel was free, he said it "immediately" listed to port by 13 inches (meaning the draft on the port side had increased by 13 inches). The able seaman on watch said they had to move the self-unloading boom out about 90° to starboard to help free the vessel, and once it was freed, the able seaman brought the boom back in and secured it in its saddle. According to the master, the list to port then increased to 26 inches as measured by the vessel's ballast control system. The master initially thought the port list was because more product had been loaded on the port side of the vessel, since the

[7] According to the operating company, a 5-inch list to starboard meant that the draft increased by 5 inches on the starboard side.

loader did not reach the outboard (starboard) side of the cargo holds. He opted to not order any measures to correct the list until the vessel was out of the channel and in deeper water.

About 1131, the *John J Boland* began to move ahead, away from the dock and out into the channel. Once in deeper water, at 1155, the crew added ballast water to the empty ballast tank nos. 6 and 7 starboard, which eliminated the port list and brought it over to 1 inch to starboard.

Since the *John J Boland* was on the bottom immediately before departure, the crew could not take accurate (free floating) drafts, so, about 1208, the master stopped the vessel to prepare the vessel's workboat for a draft survey of the ship from the water. At 1218, the master and second mate conducted the survey on the ship's port side (according to the master, it was too choppy on the starboard side); the draft was 26 feet 6 inches forward and 27 feet 9 inches aft. The master said that during the draft survey they did not find any damage to indicate the vessel was taking on water.

About 1445, at the master's order, the crew opened the nos. 1 and 2 port ballast tanks to inspect them. They found about 1.5 to 2 feet of water in each tank and observed water bubbling up at the aft end of the no. 1 port ballast tank and forward end of the no. 2 port ballast tank at the turn of the bilge. The crew also checked ballast tank no. 3 port (aft of no. 2) for water but found no damage or flooding. The first mate estimated the nos. 1 and 2 port ballast tanks were flooding at a rate of about 2 feet every 4 hours. He noted the ballast pumps were able to keep up with the flooding. Engine room logs recorded the stripping pumps for ballast tank no. 1 port and no. 1 starboard were started at 1718.

At 1647, the master diverted the *John J Boland* to a protected anchorage in North Bay, Michigan, about 50 miles southeast of the Cedarville dock, and anchored the vessel at 1751.

1.3 Additional Information

1.3.1 Damage

On April 22, an American Bureau of Shipping surveyor boarded the *John J Boland* and examined the damage. The surveyor found that both the nos. 1 and 2 port ballast tanks had sustained four hull fractures (all about 6 inches in length), all on the portside bottom plating at or near the turn of the bilge (near hatch nos. 3 and 4), which allowed for flooding into these spaces. Additionally, the no. 1 port tank had distorted bottom shell longitudinals and transverse web frames, and the no. 2 port tank had distorted longitudinals for the full length of the tank (all about 7 to

10 feet from the portside shell). The nos. 3 and 4 port ballast tanks sustained inset damage to the bottom plates of the tanks with longitudinals distorted and upset for the full length of no. 3 tank and about a quarter of the length of no. 4 tank (but no fractures).

The survey report noted there was lengthy but shallow inset damage from frames 7 to 29 on the port side bottom (generally coinciding with hatch no. 1 back to hatch no. 8). Photos taken by a contracted diving company showed bottom debris and mussel shells in the largest of the fractures (see figure 5). Insets and scrapes that led in a forward and aft direction were found on the hull in this location. The operating company attributed the damage to the vessel being "loaded down onto a shoal located at the forward end of the slip bed."

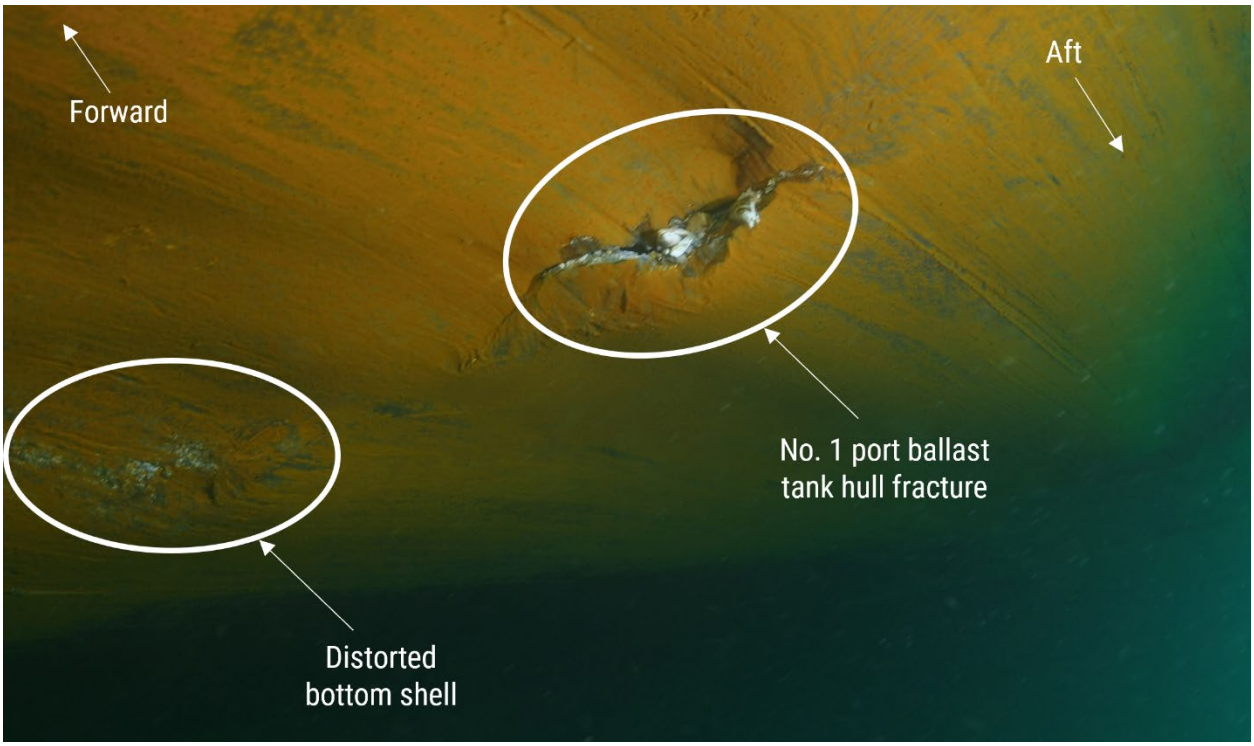

Figure 5. No. 1 port ballast tank hull fracture and distorted bottom shell (both circled). (Background source: Beneath the Surface)

Based on the surveyor's assessment of the damage, and with approval of the US Coast Guard, the *John J Boland* was granted passage to its discharge port (in Lorain, Ohio) where the vessel could be unloaded before transiting to drydock (in Sturgeon Bay, Wisconsin) for permanent repairs. The cost of repairs was $776,125.

1.3.2 Cargo Load Plan Development

According to the operating company's safety management system (SMS), the first mate was responsible for developing and executing a cargo load plan for the *John J Boland*, which included the loading sequence, placement of different grades of cargo, hull stresses, cargo quantities to be loaded in each hold, the vessel's target drafts, and any special instructions. The first mate was required to submit the load plan to the master for approval before each load. The master was responsible for ensuring the load plan included the information required to make informed decisions so that the vessel could be loaded to the desired draft.

About a day before arriving in Cedarville, the master and offgoing first mate referenced the operating company's draft guidance to determine the limiting draft for the ports and waterways on the vessel's voyage plan. The draft guidance was a proprietary spreadsheet that, according to the operating company's SMS, provided "recommended guidance on loading drafts for various ports, docks and waterways."[8] Additionally, they reviewed water levels at each port by checking local NOAA gages near each port. Based on the draft guidance, they determined the limiting draft for the voyage would be at Cedarville and the applicable NOAA gage to use would be the Mackinaw City gage, located 22.4 miles southwest of the Cedarville dock. The operating company's draft guidance for Cedarville specified a draft of 25 feet at low water datum. The first mate believed that this draft guidance included a "built-in safety factor" that was "usually" 18 inches, meaning there would be "at least 18 inches underneath you … when finished." The master and first mate determined the Mackinaw city gage was 20 inches above low water datum for the time the vessel was to be docked at Cedarville, and the offgoing first mate determined that the vessel's draft should be no greater than 26 feet 8 inches (forward and aft).

The offgoing first mate used computer-based software and referenced previous load plans for the Cedarville dock (the ship had loaded there numerous times) to determine the order of loading, quantity, and distribution of the mixed cargo for each hatch. Once loading was completed, additional cargo would be loaded into the trimming hatches to bring the vessel's drafts to the target draft.

The draft guidance for the Cedarville dock also included an entry that stated, "… keep bow at least 12 feet off during trim to avoid shoal along the south half of the

[8] The operating company's draft guidance was developed in 2007 and was reviewed and agreed upon by all masters employed by the company at the time. According to the operating company's SMS, the draft guidance was regularly adjusted and updated based on the latest information reported by vessels transiting the ports and waterways described in the guidance. The guidance had last been updated for the Cedarville dock in 2015.

dock at 24 [feet] 9 [inches] at datum. 5/22/15." The offgoing first mate said that because he never experienced the *John J Boland* getting hung up on the reported shoal off the Cedarville dock, he did not include in the load plan the draft guidance's instructions to keep the vessel 12 feet off the dock while trimming.

1.3.3 Bathymetric Surveys

After the *John J Boland* grounded, Carmeuse Americas contracted a marine construction company to conduct a bathymetric condition survey of the area around the Cedarville dock. The resulting May 8, 2023, survey recorded that the shallowest areas were immediately off the dock, measuring 24 to 26 feet (at International Great Lakes Datum) and extending about 15 feet away from the dock (see figure 6).

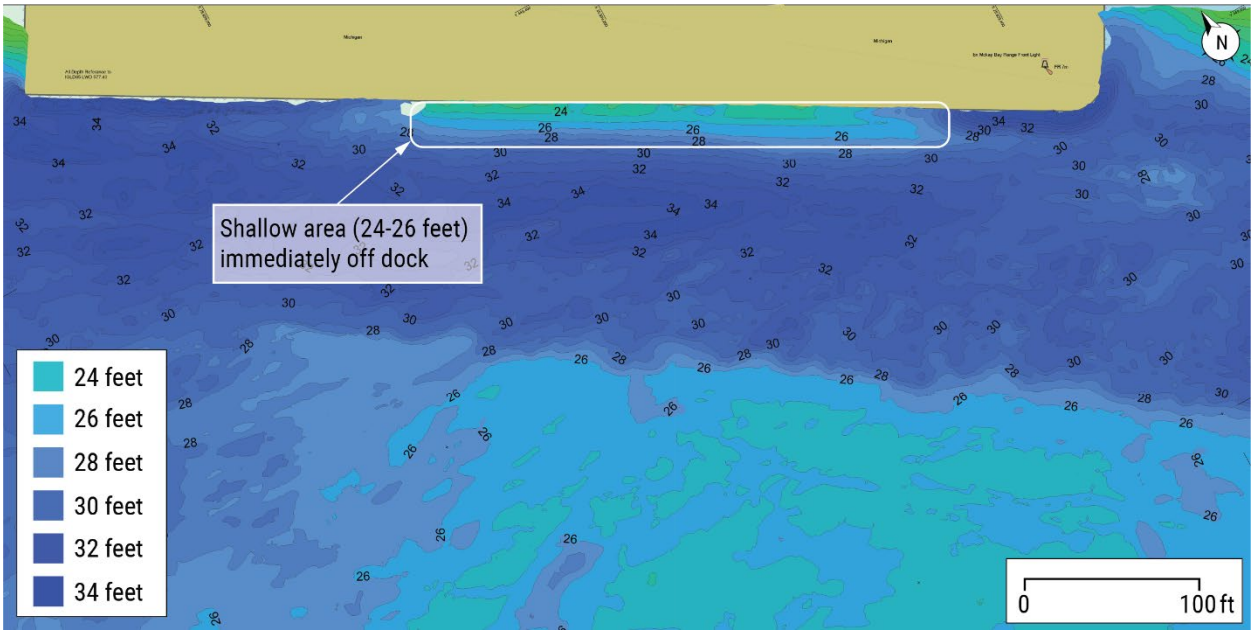

Figure 6. May 8, 2023 (16 days after grounding) bathymetric survey of Cedarville dock (at International Great Lakes Datum). (Background source: Ryba Marine Construction Co.)

After the grounding, a diving company was contracted to examine the bottom of the Cedarville dock. The diver observed no visible signs of damage to the dock. He found a berm of sand and gravel near the south end of the dock. He estimated that the berm was about 6 to 8 feet from the dock and 4 feet high and ran the last 50 feet of the dock. He also found a trench on the bottom that was about 6 to 8 feet wide. The diver found no evidence of hull material or paint in any of the areas he examined.

A previous bathymetric condition survey of the area surrounding the Cedarville dock had been completed in October 2019; it found shallow areas similar to those identified in the 2023 survey. The master was aware of and had access to the 2019

bathymetric survey. The offgoing first mate said that he did not reference, nor was he aware of the availability of, a condition survey at the Cedarville dock when he created the load plan.

1.3.4 Crew

The crew involved in the casualty were tested for alcohol and other drugs, with negative results.

The master of the *John J Boland* had been working for the operating company in multiple deck rating capacities since August 2006. He was first issued a Coast Guard credential as a mate in 2014 and was upgraded to master of self-propelled vessels of unlimited tonnage upon Great Lakes and/or inland waters in February 2023. He assumed his first command as master of the *John J Boland* on April 19, 2023, after training with another master for about a month on board the vessel.

The offgoing first mate held a Coast Guard-issued credential as a third mate of self-propelled vessels of unlimited tonnage upon oceans.[9] He had previously worked for the operating company as a deck cadet and ordinary seaman. In 2022, he worked on the *John J Boland* for about 30 days as first mate. He joined the *John J Boland* on March 20, 2023, as first mate. He had loaded the *John J Boland* at the Cedarville dock previously without issues.

The oncoming first mate held a Coast Guard-issued credential as a third mate of self-propelled vessels of unlimited tonnage near coastal waters since 2000. He had worked for the operating company since September 2001 as a deck officer and had worked as first mate since 2006. He had never worked on the *John J Boland* before joining the vessel on April 20, 2023. He stated he had loaded a smaller company vessel (draft and length) "many times" in the past at the Cedarville dock and had not been concerned about the depth alongside the dock because the smaller vessel "never shifted that far ahead" or "got that deep."

[9] The *John J Boland*'s certificate of inspection required one master first class pilot and three mate first class pilots. The certificate of inspection did not require a credentialed master, chief mate, or second or third mates.

2 Analysis

While the *John J Boland* was tied up at the Cedarville dock, primary loading was completed, and trimming (final loading to the target drafts) began under the supervision of the oncoming first mate. During the trimming operation, the vessel grounded twice. During attempts to free the vessel, the hull was damaged, causing two port ballast tanks to flood. According to the vessel's operating company, damage to the hull was incurred from a shoal along the southern half of the dock.

The offgoing first mate created the load plan based on past load plans, using the ship's loading and stability software and the operating company's draft guidance spreadsheet, which established the depth at the Cedarville dock as 25 feet at low water datum (the master approved the load plan). Based on the established depth in the draft guidance and the application of the preferred reference gage (Mackinaw City), which was 20 inches above low water datum during the time the vessel was to be loaded, the offgoing first mate calculated the vessel could be loaded to no greater than 26 feet 8 inches draft at the Cedarville dock. The offgoing first mate believed that the operating company's draft guidance included an 18-inch "safety factor" that would provide additional underkeel clearance between the vessel and the shoal, and he therefore determined the calculated draft should have been sufficient to load without grounding. However, the operating company's draft guidance did not reference a safety factor. Additionally, the vessel grounded twice as the vessel's draft approached the limiting draft, which indicates that there was no safety factor built into the guidance. Further, the operating company's SMS did not provide guidance related to minimum underkeel clearances to be maintained during loading operations, and there was no explanation as to how the draft guidance (last updated for Cedarville in 2015) was calculated. Therefore, the operating company did not provide adequate guidance to create a load plan with sufficient underkeel clearance.

The draft guidance spreadsheet contained a note that a shoal (at 24 feet 9 inches) existed along the south half of the dock and that the bow should be held off at least 12 feet during trim loading; however, the load plan did not include this instruction. The mates on watch referenced the load plan to load cargo, and the oncoming first mate (who relieved the offgoing first mate during loading) used the load plan to conduct trimming operations. At the time of the grounding, the depth of the shoal referenced in the operating company's draft guidance would have been about 26 feet 5 inches (based on the Mackinaw City gage and dock bathymetry survey completed 16 days after the grounding)—3 inches less than the planned limiting draft (see figure 7). While trimming the vessel, the oncoming first mate intended to load to a forward draft of 26 feet 10 inches (noting that when load trimming aft, this would bring the forward draft to the target draft of 26 feet 8 inches).

However, when the forward draft reached 26 feet 7 or 8 inches, the draft stopped increasing while product was still being added to the hatch, indicating the vessel had touched bottom. Although the forward draft that it stopped at was still within the limits of the load plan, it exceeded the depth of the shoal by 2 to 3 inches. Therefore, the load plan for the *John J Boland* was inadequate because it did not take into account the shoaling at the Cedarville Dock.

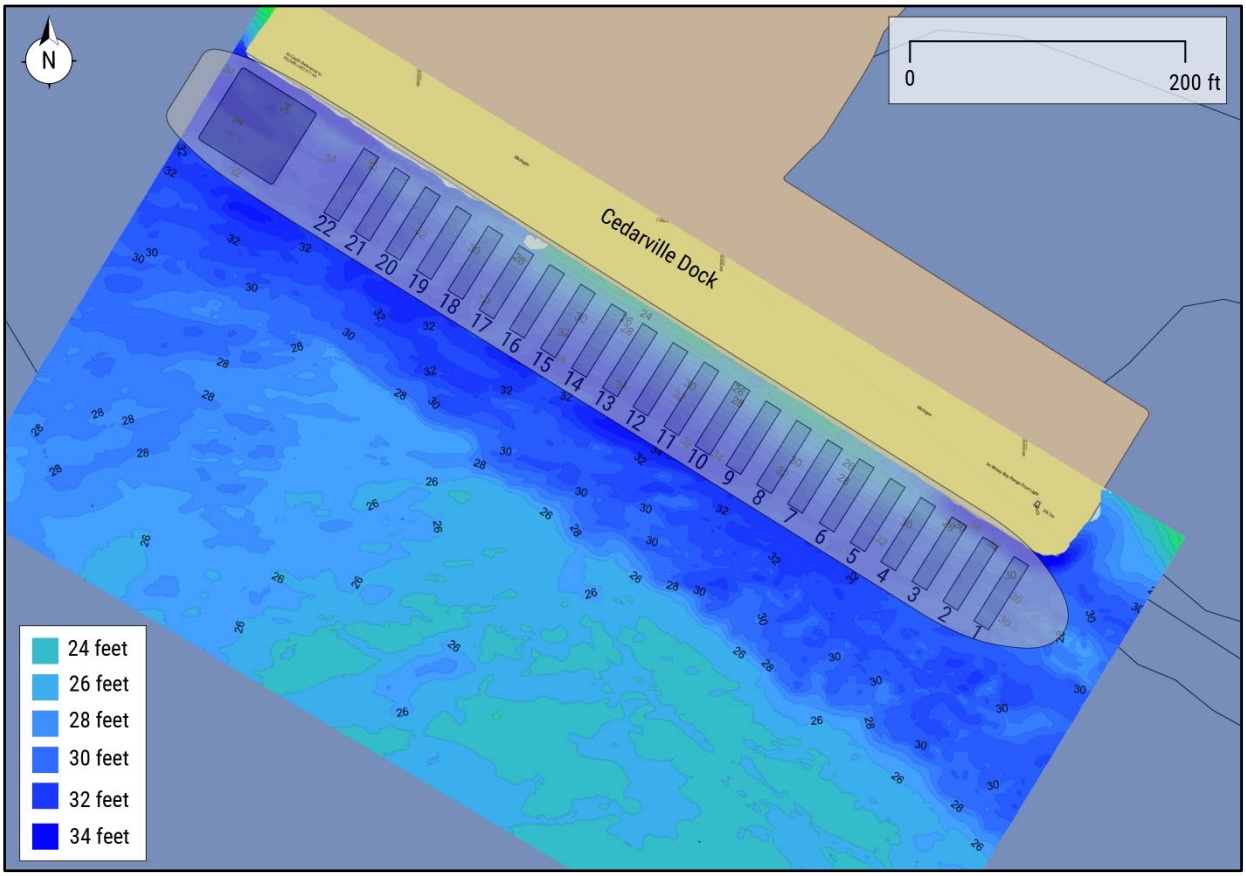

Figure 7. Overlay of *John J Boland*'s position at 0946 after the vessel initially grounded over the 2019 bathymetric survey of the Cedarville dock, which was based on International Great Lakes Datum at Low Water Datum. (Background sources: NOAA Electronic Navigation Chart US5MI53M, Ryba Marine Construction Co.)

After the first grounding, the crew freed the vessel by using mooring lines to move it ahead (see figure 8). The oncoming first mate then began trim loading through the aft hatches. However, when the vessel's aft draft reached 26 feet 3 inches, the aft draft stopped increasing, indicating the vessel had grounded a second time. The oncoming first mate estimated that, at that time, the vessel's draft forward was 26 feet 10 or 11 inches, exceeding the limiting draft according to the load plan, exceeding the depth of the shoal by 5 to 6 inches, and again leaving the vessel with no underkeel clearance near the bow. About the same time the aft draft

stopped increasing, the ship listed to starboard. Although the crew loaded product through the port side of the hatches, intending to correct the list to starboard, their continued loading likely placed the vessel harder onto the shoal. Unlike in the first grounding, when the crew used the mooring lines and the self-unloading boom to free the *John J Boland*, the master decided to use the vessel's main engine (propulsion) to free it and back off the dock after the second grounding because the vessel was ready to depart. The vessel's hull, which was already grounded on the shoal, would have scraped along the bottom as the master backed the vessel off the dock, likely causing the hull damage.

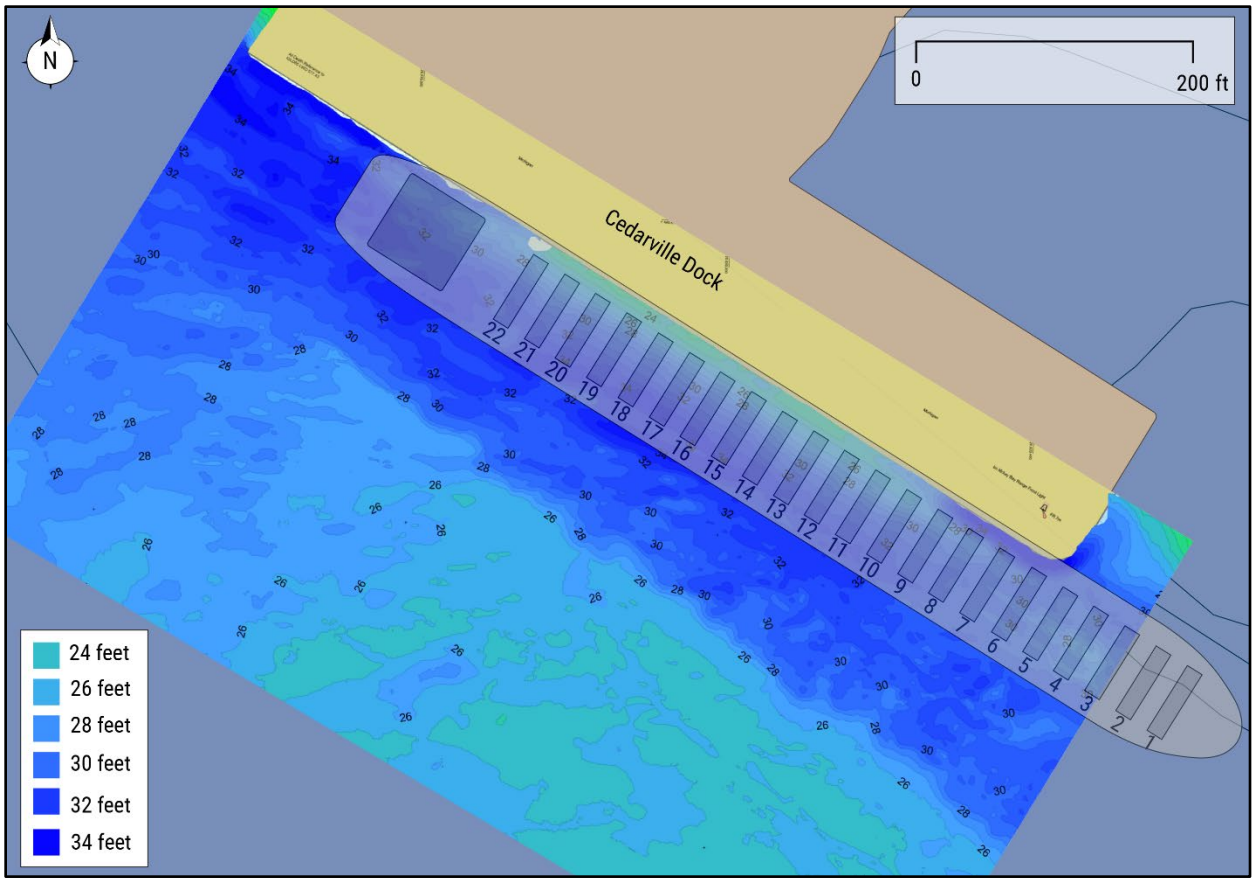

Figure 8. Overlay of *John J Boland*'s position at 0957 after the vessel grounded a second time over the 2019 bathymetric survey of the Cedarville dock, which was based on International Great Lakes Datum at Low Water Datum. (Background sources: NOAA Electronic Navigation Chart US5MI53M, Ryba Marine Construction Co.)

After the *John J Boland* first grounded, the oncoming first mate and master were aware that the vessel had touched bottom. However, instead of discontinuing loading, they directed the crew to free the vessel from the bottom and shift it ahead so that trimming could continue in the aft hatches. They did not stop to address safety concerns or assess the vessel for damage to the hull. After the vessel was free from

the bottom the second time and a starboard list was observed, the master discounted the possibility that damage from the grounding caused the list and misattributed the list to disproportionately loaded cargo. Both the master and oncoming first mate stated they had touched bottom or become "stuck" while loading vessels in various ports in the Great Lakes. Based on their previous experience on vessels that had contacted bottom during loading operations without incurring damage, the master and first mate likely became desensitized to the risk of vessel damage associated with grounding.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding of, and resulting hull damage to, the self-unloading bulk carrier *John J Boland* was inadequate operating company guidance to create a load plan with sufficient underkeel clearance and the master's decision to use the main engine to free the vessel after it was aground. Contributing was the master and first mate becoming desensitized to the risk of vessel damage associated with grounding during loading operations.

3.2 Lessons Learned

Developing Load Plans

To safely carry out cargo loading operations, it is important for vessel crews to understand the characteristics of the facilities where they will be operating, including the depth of water at the dock and potential hazards, such as nearby shoaling, that could impact the loading process. Effective company policies and guidance for cargo loading include pertinent information, such as clear expectations for required underkeel clearance, to assist personnel developing load plans with identifying and mitigating hazards. Additionally, crewmembers can consult nautical charts and surveys, tidal and/or water gage information, ship-specific stability and loading information, and information from the dock/facility when developing a load plan.

Vessel Particulars

Vessel	*John J Boland*
Type	Cargo, Dry Bulk (Bulk carrier)
Owner/Operator	American Steamship Company / Grand River Navigation, Inc. (Commercial)
Flag	United States
Port of registry	Wilmington, Delaware
Year built	1973
Official number (US)	550954
IMO number	7318901
Classification society	American Bureau of Shipping
Length (overall)	680.0 ft (207.3 m)
Breadth (max.)	78.0 ft (23.8 m)
Draft (casualty)	27.8 ft (8.5 m)
Tonnage	13,862 GRT
Engine power; manufacturer	2 x 3,500 hp (2,610 kW); EMD 20-654-E7 diesel engines

NTSB investigators worked closely with our counterparts from **Coast Guard Sector Sault Ste. Marie** throughout this investigation.