June 13, 2024 MIR-24-14

Grounding of Articulated Tug and Barge *Cingluku/Jungjuk*

On May 25, 2023, about 1047 local time, the articulated tug and barge *Cingluku* (tugboat) and *Jungjuk* (barge), was transiting into Shakmanof Cove from Marmot Bay near Kodiak, Alaska, with six crewmembers on board (see figures 1 and 2).[1] While approaching the entrance to the cove, the barge grounded on a submerged rock, damaging the barge's steel hull. No pollution or injuries were reported, and there was no damage to the tugboat. The total cost to repair the damage to the barge was estimated at $1.47 million.

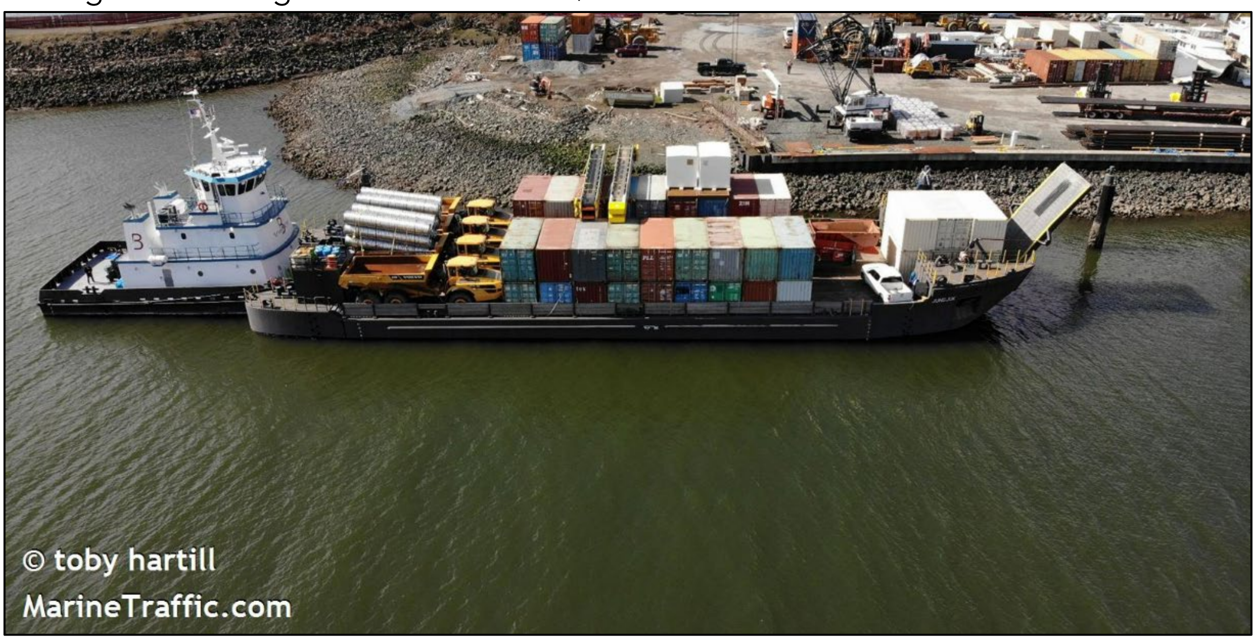

Figure 1. ATB *Cingluku/Jungjuk* on unknown date before the grounding. (Source: marinetraffic.com)

[1] (a) In this report, all times are Alaska 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. DCA23FM033). Use the CAROL Query to search investigations.

NOTE: This report was reissued July 9, 2024, with a space added to the header on pages 2-14 to improve readability.

Casualty Summary

Casualty type	Grounding/Stranding
Location	Shakmanof Cove, near Kodiak, Alaska 57°55.45' N, 152°36.61' W
Date	May 25, 2023
Time	1047 Alaska daylight time (coordinated universal time –8 hrs)
Persons on board	6
Injuries	None
Property damage	$1,467,649 est.
Environmental damage	None
Weather	Visibility 10 mi, clear, winds east at 15 kts, seas 2 ft, air temperature 45°F, water temperature 43°F
Waterway information	Bay, depth 210 ft

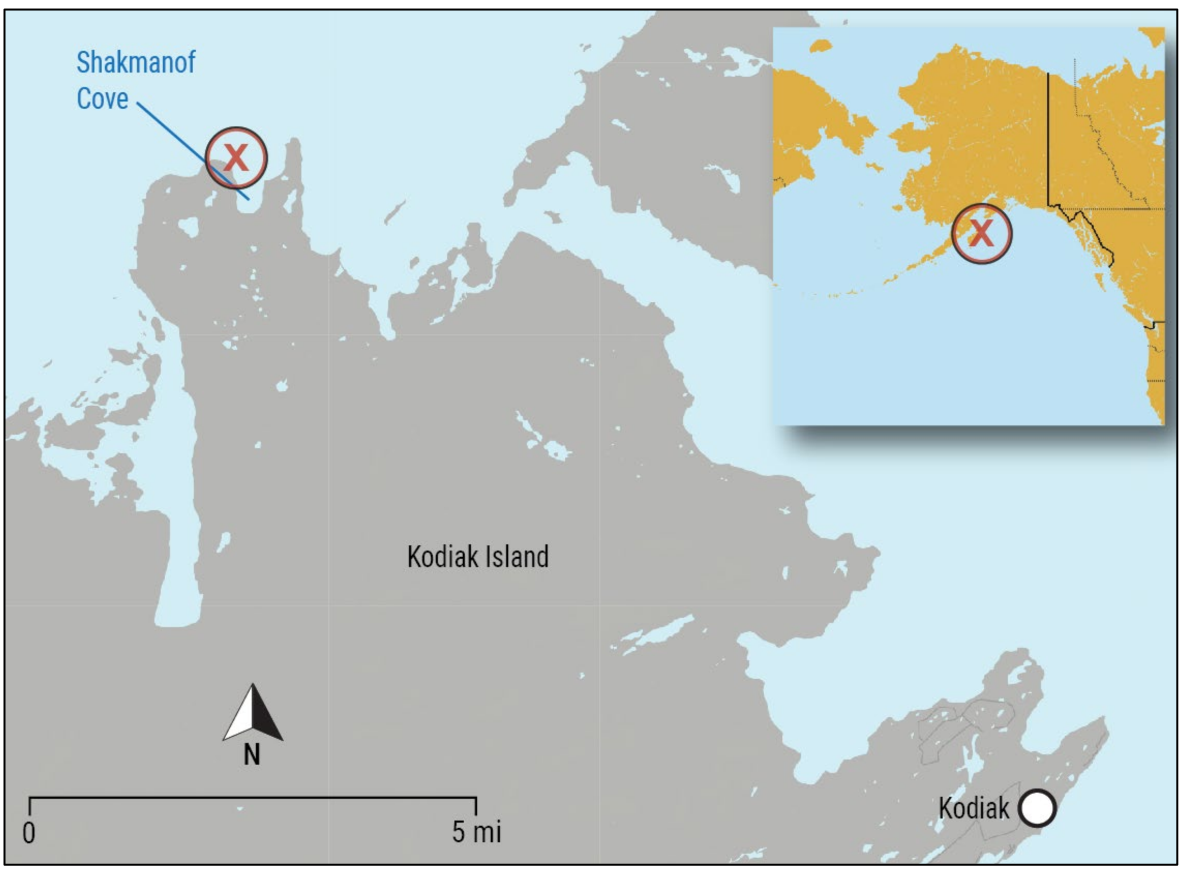

Figure 2. Area where the *Cingluku/Jungjuk* grounded, as indicated by a circled *X*. (Background source: Google Maps)

1 Factual Information

1.1 Background

The *Cingluku* and *Jungjuk* operated together as an articulated tug and barge (ATB) and were primarily used to transport containerized cargo and vehicles. Both vessels were built in 2022 by Halimar Shipyard in Morgan City, Louisiana, and were owned and operated by Brice Marine. The *Cingluku* was a 79-foot-long towing vessel powered by three 600-hp diesel engines driving three fixed-pitch propellers. The *Jungjuk* was a 185-foot-long-by-55-foot-wide deck barge fitted with a 30-foot-long-by-17-foot-wide bow ramp for loading and offloading cargo. When the two vessels were coupled, the ATB *Cingluku/Jungjuk* was 259 feet long and 55 feet wide.

In January 2023, the US Coast Guard issued both the *Cingluku* and the *Jungjuk* a certificate of inspection. The *Cingluku* was inspected under Title 46 *Code of Federal Regulations* (*CFR*) Subchapter M, and the *Jungjuk* was inspected as a freight barge under 46 *CFR* Subchapter I. As required by Subchapter M, the operating company of the *Cingluku* maintained a safety management system (SMS) compliant with towing safety management system requirements.

1.2 Event Sequence

On May 22, 2023, at 0650, the ATB *Cingluku/Jungjuk* departed Togiak, Alaska, en route to Seward, Alaska. The route to Seward took the ATB southwest through False Pass, and then northeast toward Seward. Along the route, the vessel planned to stop in Shakmanof Cove on Kodiak Island near Marmot Bay to drop off supplies for another vessel (see figure 3). The crew on board consisted of the captain, a mate, engineer, and three deckhands. The *Jungjuk* was not fully loaded with cargo and therefore partially ballasted. For the transit, the deepest draft of the ATB was 5.5 feet at the stern of the barge.

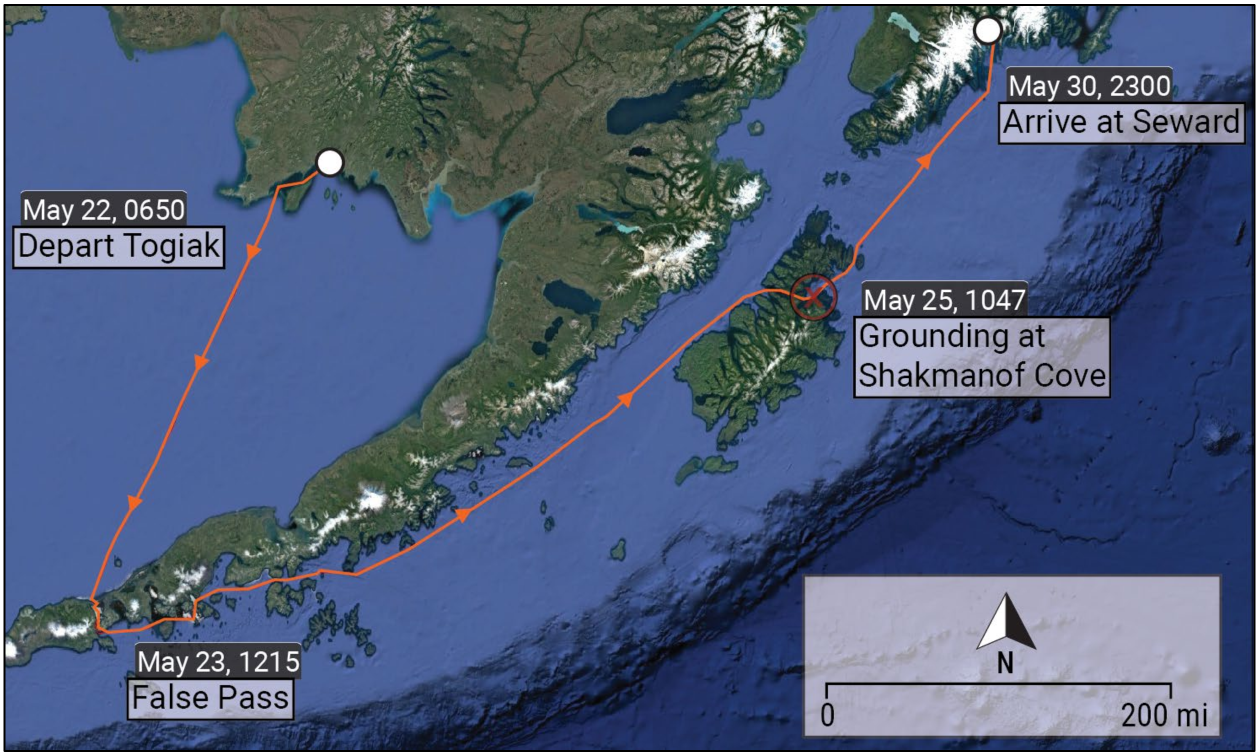

Figure 3. Approximate voyage trackline of the *Cingluku/Jungjuk*. (Background source: Google Earth)

The captain and mate each stood a 12-hour navigation watch, with the captain assigned to the 0600–1800 watch and the mate assigned to the 1800–0600 watch. In accordance with the company's SMS, a navigation assessment addressing sea and weather conditions, traffic, and other relevant conditions was required at the change of each watch. If the offgoing watchstander identified any issues, they would add comments to the navigation assessment and discuss the issues with the oncoming watchstander and other oncoming crew.

On May 23, at 1215, the *Cingluku/Jungjuk* transited through False Pass. About this time, the captain plotted a route into Shakmanof Cove in the vessel's electronic chart system (ECS) using the National Oceanic and Atmospheric Administration (NOAA) electronic navigational chart (ENC) for Marmot Bay and Kupreanof Strait (NOAA ENC US4AK5PM). This was his first time navigating into Shakmanof Cove.

Throughout the day on May 24, the ATB transited northeast between False Pass and Kodiak Island. The next morning, May 25, at 0600, the captain assumed the watch from the mate while the vessel transited the Shelikof Strait off the coast of Kodiak Island. The required navigation assessment was completed with no issues noted, and the mate departed the wheelhouse to go to sleep. Over the next several hours, the ATB transited near Kodiak Island, through the Kupreanof Strait, and into Marmot Bay.

About 1035, as the ATB approached Shakmanof Cove, the mate joined the captain in the wheelhouse; the engineer and two deckhands were positioned on the bow of the *Jungjuk* to prepare for the landing. The crew stated that their forward visibility over the bow was partially obscured by the *Jungjuk*'s 30-foot-long bow ramp, which was secured at about a 70° angle extending over the bow.

About 1047, the ATB was turning near the entrance to Shakmanof Cove and transiting between 9–10 knots, when the barge grounded on a submerged rock just west of the cove entrance (see figure 4). The captain stated that the rock was not visible from the wheelhouse, nor did it appear on radar. The tug did not contact the rock and remained coupled to the *Jungjuk*.

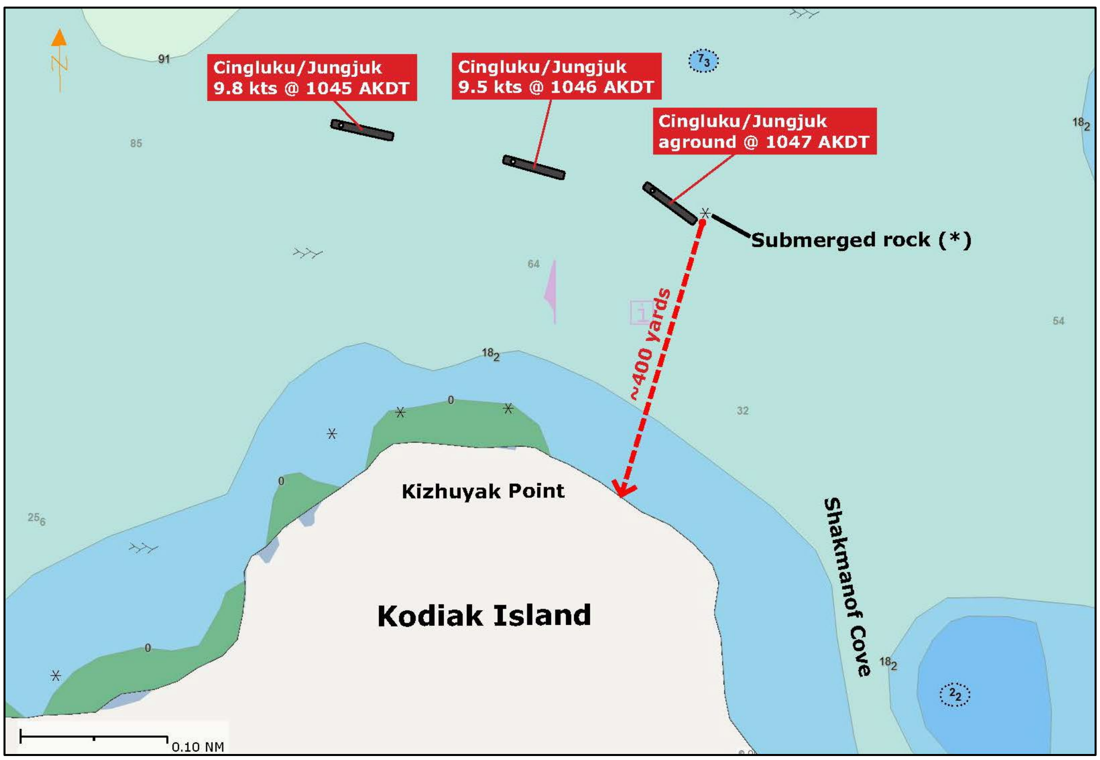

Figure 4. Track of the *Cingluku/Jungjuk* as it approached Shakmanof Cove, overlaid on NOAA ENC US4AK5PM. (Background source: NOAA ENC as viewed on Made Smart automatic identification system)

The crew discharged ballast water from the barge but were unsuccessful in freeing the barge from the rock. The crew also performed an internal damage assessment of the *Jungjuk*, finding that there were no broken welds or hull punctures, and no water ingress.

Around 1500, the rising tide lifted the *Jungjuk* off the rock, and the ATB continued into Shakmanof Cove without issue. The ATB and crew remained in Shakmanof Cove for two days following the grounding awaiting favorable weather conditions for the transit to Seward. During this time, contracted salvage divers met the vessel to assess the condition of the *Jungjuk*'s hull. The divers confirmed that the barge was not taking on water and there were no punctures in the hull or broken welds.

On May 27, the ATB departed Shakmanof Cove, and, on May 30, it docked in Seward without incident.

1.3 Additional Information

1.3.1 Damage

On May 31, the ATB's classification society performed a damage assessment of the *Jungjuk* in Seward. The damage assessment noted hull indentations between 16 and 20 feet long along the bottom plating and related damage to the barge's framing along the centerline forward ballast tank (see figure 5). According to the company, the total cost to repair all the damage to the barge was estimated at $1.47 million.

Figure 5. *Left to right:* Damage to the bottom of the *Jungjuk*'s hull looking aft along the centerline and damage to the barge's internal structure and framing. (Source: Coast Guard)

1.3.2 Personnel

The captain of the *Cingluku* had 30 years of maritime experience, and he had worked the previous 20 years on towing vessels. He has held a valid Coast Guard Credential as a master of towing vessels upon near coastal waters since 2004. The captain had been on board the ATB since delivery in 2022 and began working with the ATB a year prior while it was under construction.

The captain was not tested for alcohol on board the vessel immediately following the casualty because, in his initial report to the Coast Guard, it was indicated that the grounding did not and likely would not meet the threshold for a serious marine incident (requiring drug and alcohol testing of involved crewmembers). However, once a complete damage assessment was conducted when the ATB arrived in Seward, it was determined that the damage amount did meet that threshold. Since 5 days had passed since the grounding, the captain was not tested for alcohol, but the captain submitted to a postcasualty drug screen, with negative results.

The captain completed a 96-hour work/rest report for the 4 days before the casualty, which showed that he received between 8 and 9 hours of sleep each day and maintained a consistent work and sleep cycle.

1.3.3 Chart and Navigational Information

Both the captain and mate used the vessel's Rose Point ECS (version 4.0.23003.1611) for route planning and navigation. The company did not offer any formal training on the ECS; however, tutorials were given on an as-needed basis by company management. The ECS user interface could display either ENCs or raster navigational charts (RNC).[2] The company SMS did not direct the exclusive use of either ENCs or RNCs.

[2] ENCs are vector maps–graphical representations of geospatial data. Elements on vector maps can be grouped into layers containing different types of information; users can then show or hide layers as needed. ENCs can also provide real-time ship positioning, as well as collision and grounding avoidance. RNCs are static digital images of NOAA paper nautical charts. When used with a GPS-enabled ECS, real-time vessel positioning can be displayed on an RNC.

1.3.3.1 ECS Grounding Avoidance Features

When viewed on an ECS, ENCs provide the added functionality to "display the same feature differently depending on user settings and other conditions, such as a ship's draft."[3] Based on a vessel's draft, ECS users can also set safety, shallow, and deep contour depths that customize the information displayed on the ENC, reducing display clutter and highlighting situationally relevant information.[4] Entering vessel draft and contour depth values also sets the preconditions for the use of the ECS grounding avoidance features such as isolated danger symbols and route obstacle alerts. RNCs do not provide this level of functionality when displayed in an ECS.

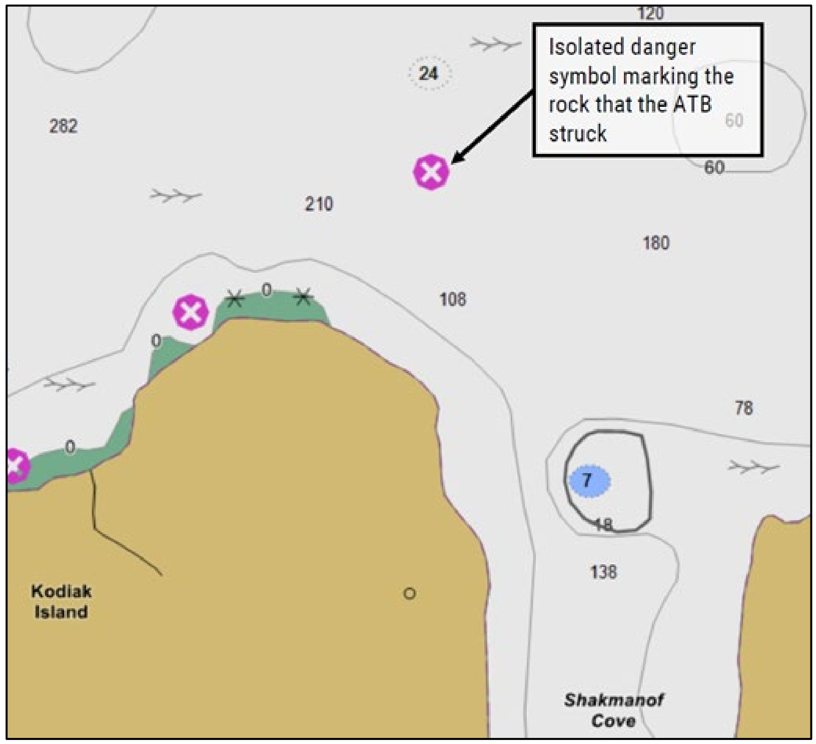

Figure 6. ENC US4AK5PM, as viewed by investigators using an equivalent ECS. The chart shows an isolated danger symbol over the rock that the ATB struck. (Background source: NOAA ENC as viewed on Rose Point ECS)

The ATB crew stated that they did not use the contour depth feature on their ECS because "for most of the spots we operate, the soundings don't really mean anything." The company's SMS did not specify the configuration of the ECS or

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[3] NOAA and National Geospatial Intelligence Agency (NGA), "U.S. Chart No. 1: Symbols, Abbreviations and Terms used on Paper and Electronic Navigation Charts," 2019.

[4] The contour depth settings on an ECS control the colorized shading and contour lines displayed on an ENC, allowing users to customize the appearance of different depth areas based on operational requirements or vessel characteristics, such as draft. For example, users can enter a shallow contour depth value (displayed as a single color on the ENC to show areas with a depth between zero and the shallow contour depth value), a safety contour depth value (displayed as another color on the ENC to show areas with a depth between the shallow contour depth value and the safety contour depth value), and a deep contour depth value (displayed as a third color on the ENC to show areas with a depth between the safety contour and the deep contour depth value). Areas deeper than the deep contour depth value will be displayed as a different color.

require any vessel-specific preconditions, such as vessel draft or contour depths, be entered into the system.

According to NOAA, wrecks, rocks, or obstructions will appear on an ENC as an isolated danger symbol if the charted hazard is shallower than the entered safety contour depth of the vessel (see figure 6).

When NTSB investigators used an equivalent ECS and NOAA ENC Chart US4AK5PM, they found that the ECS settings allowed isolated danger symbols to be enabled or disabled. The captain realized after the grounding that the isolated danger symbol functionality was disabled in the *Jungjuk's* ECS settings. The option to use the isolated danger symbol functionality was added to Rose Point ECS in version 3.1.15005 (released on January 6, 2015). The version update described the isolated danger symbol as "the magenta plus sign." When investigators disabled the isolated danger symbol feature in the ECS settings, the symbol did not appear over the rock that the ATB struck, regardless of the entered safety contour depth value or vessel draft. When the isolated danger symbol feature was enabled, the isolated danger symbol appeared over the rock that the ATB struck, regardless of the entered safety contour depth or vessel draft (this was likely because the rock the ATB struck was classified as "awash" on the ENC).

In addition to the isolated danger symbol, the ECS would provide obstacle alerts when a loaded route crossed a submerged hazard. When investigators used an equivalent ECS and NOAA ENC Chart US4AK5PM, they found that the ECS only provided an obstacle alert to the rock when the vessel's draft was entered into the system, regardless of the entered safety contour depth. If the vessel's draft was not entered, or entered as zero, no obstacle alert was provided even when the course was plotted directly over the rock.

1.3.3.2 NOAA Paper Chart and Raster Navigational Chart

The paper chart, which could be printed or viewed as an RNC, for Marmot Bay and Kupreanof Strait was NOAA chart number 16594. On the chart, the rock struck by the ATB was marked with a "+" sign surrounded by four dots on each corner, which indicated a "Rock awash at the level of the chart datum" (see figure 7).[5] A rock "awash" is "exposed, or nearly so, between the chart sounding datum and mean high water."[6] The chart datum on NOAA chart 16594 shows depths at mean lower low water.[7] The symbol marking the rock was added to the chart in January 2015.

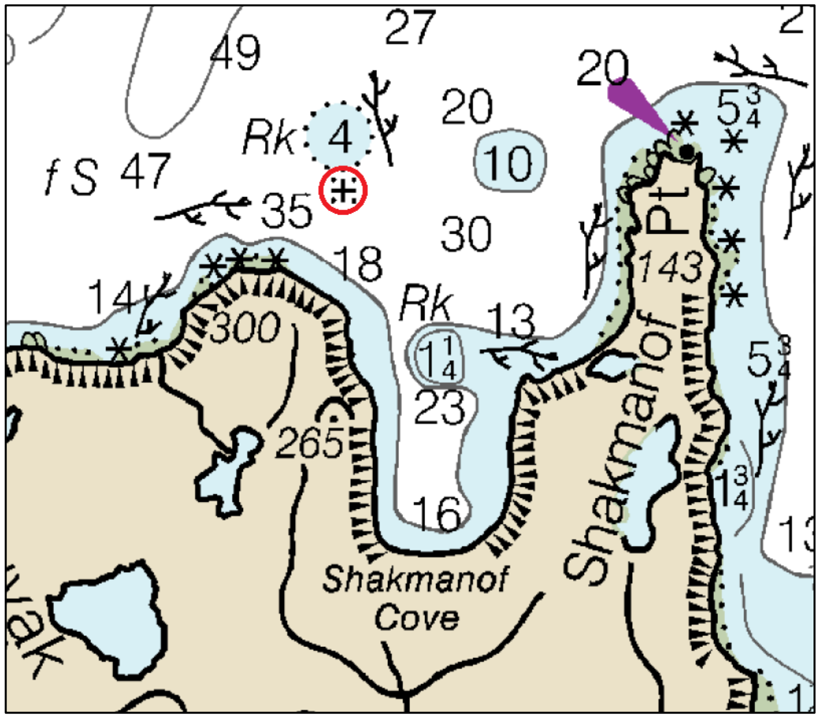

Figure 7. RNC for the area near Shakmanof Cove. The symbol for the rock in the area of the grounding is indicated by a red circle. (Background Source: NOAA Chart 16594, 14th Edition, January 2015)

On May 25, high tide was at 0548 at a height of 8 feet 4 inches above mean lower low water (MLLW). At the time of the grounding, around 1047, the water level had fallen by about 6 feet, but was still 2 feet 2 inches above MLLW. A low tide of 6 inches occurred at 1254.

The captain did not reference the RNC for the area when using the ECS.

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[5] NOAA and NGA, "U.S. Chart No. 1: Symbols, Abbreviations and Terms used on Paper and Electronic Navigation Charts," 2019.

[6] NOAA, "U.S. Maritime Zones and the Determination of the National Baseline," 2007.

[7] *Mean lower low water* is "The average of the lower low water height of each tidal day observed over the National Tidal Datum Epoch" (NOAA).

1.3.3.3 Electronic Navigational Chart

The captain used the NOAA ENC for Marmot Bay and Kupreanof Strait (US4AK5PM), loaded on the vessel's ECS, to plot the planned route into Shakmanof Cove. He reviewed the route for navigational hazards, and he told investigators that he did not receive any alerts or warnings upon loading the route.

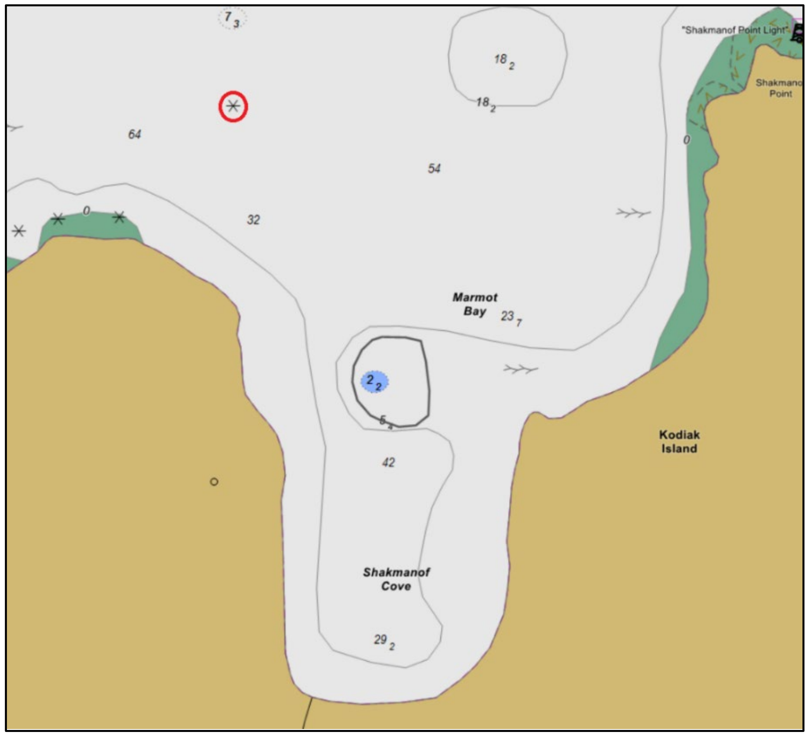

Figure 8. ENC US4AK5PM, for the area near Shakmanof Cove, as viewed by investigators using an equivalent ECS. The asterisk symbol for the rock in the area of the grounding is indicated by a red circle. (Background source: NOAA ENC as viewed on Rose Point ECS)

NOAA ENC US4AK5PM displayed the rock as an asterisk (see figure 8). When investigators selected the asterisk marking the rock on the same version of the same ECS, the ENC stated, "underwater rock / awash rock," "shoaler than range of depth of the surrounding depth area." The range of depth for the surrounding area was shown on the chart as 60–300 feet.

After the grounding, the captain initially reported to the Coast Guard that the rock was uncharted, however after reviewing the ENC, the captain noticed that the rock was charted and re-submitted a corrected report 5 days later. He stated that "it was marked with an asterisk sign, and I didn't see it."

1.3.3.4 Coast Pilot

The *United States Coast Pilot* 9 (Alaska) noted a rock in the area where the ATB grounded stating, "Kizhuyak Point: A rock, which uncovers about 4 feet, is 400 yards north from this point. Shoal water extends 300 yards north of the rock."

The captain had a copy of *United States Coast Pilot 9* for the area on board; however, he did not reference it when plotting the route.

2 Analysis

As the ATB *Cingluku/Jungjuk* approached the entrance to Shakmanof Cove, the ATB's barge ran aground on a charted submerged rock.

The forward visibility of the crew in the wheelhouse and on the bow as the ATB approached the cove was partially obstructed by the *Jungjuk*'s bow ramp. Additionally, since the water level at the time of the grounding was still 2.2 feet above MLLW, the rock would have been submerged and would not have been detectable by radar or a visual lookout.

Although the rock was charted on the ENC, the captain did not notice the asterisk marking the rock's location. Because ENCs are customizable based on vessel characteristics and user settings, investigators were unable to determine precisely how the information was presented to the captain when he was planning the ATB's route. However, when investigators viewed the area on an equivalent ECS, the asterisk marking the rock was displayed alongside soundings of similar size and color, so it is possible that the captain mistook the asterisk for a depth sounding or other chart information when plotting and reviewing the route. The vessel had a copy of the *United States Coast Pilot* for the area, which called out the rock's location, on board. However, the captain did not reference it and relied on the ENC when planning and reviewing the route. Using other available resources, such as the *Coast Pilot*, would have helped the captain in identifying the rock when planning and reviewing the route.

Additionally, the captain of the *Cingluku* told investigators that he was not aware that certain grounding avoidance features of the ECS were disabled on the day of the grounding—including the isolated danger symbol feature, which, when enabled, displayed an isolated danger symbol over the rock, regardless of the entered safety contour depth or vessel draft. The crew stated that they did not use the contour depth features on the ECS and likely did not enter the ATB's draft into the ECS, and thus did not receive obstacle alerts or warnings when plotting and loading the route. The operating company did not offer any training to the ATB crew on the use of the ECS software used on their vessels and only offered tutorials on an as-needed basis. There were also no procedures in the company's SMS to ensure that preconditions—such as setting the contour depths or entering the vessel's draft—were enabled for use of the ECS's grounding avoidance features. Therefore, the crew did not use the ECS functions that could have helped them identify the rock's location, nor did the company ensure they used or understood these functions.

3 Conclusions

3.1 Probable Cause

The National Transportation Safety Board determines that the probable cause of the grounding of the articulated tug and barge *Cingluku*/*Jungjuk* was the captain not identifying a rock that was indicated on the displayed electronic navigation chart when planning the vessel's route into Shakmanof Cove. Contributing was the captain not using all available navigational resources, including the *Coast Pilot* and the grounding avoidance features of the electronic chart system, when planning the route.

3.2 Lessons Learned

Training on Electronic Chart Systems

Owners and operators should ensure their crews are sufficiently trained in the use of their electronic chart system (ECS) and understand how to use the different functionalities of the ECS. An ECS can provide a wealth of navigation information to mariners and can display the same feature(s) differently depending on user settings and entered vessel characteristics, such as draft and contour depth settings. Raster navigational charts, displayed on the ECS, do not have this capability.

An ECS offers advanced features that can help users increase their vessel's safety and crew situational awareness of potential safety hazards. In some cases, incorrect, or non-use of these features may even reduce situational awareness to certain hazards, such as submerged rocks.

While categorically different than an Electronic Chart Display and Information System (ECDIS), ECSs operate similarly and implement many of the same features as International Maritime Organization-compliant ECDIS equipment. ECDIS training is a mandatory course for most credentialed mariners on oceangoing vessels; however, there is no such requirement for the operation of an ECS. For more information about ENC and chart symbols, mariners should refer to U.S. Chart No. 1: Symbols, Abbreviations and Terms used on Paper and Electronic Navigational Charts.

Vessel Particulars

Vessel	*Cingluku*	*Jungjuk*
Type	Towing/Barge (Towing vessel)	Towing/Barge (Freight barge)
Owner/Operator	Brice Marine (Commercial)	Brice Marine (Commercial)
Flag	United States	United States
Port of registry	Fairbanks, Alaska	Fairbanks, Alaska
Year built	2022	2022
Official number (US)	1323087	1323084
IMO number	N/A	N/A
Classification society	American Bureau of Shipping	American Bureau of Shipping
Length (overall)	78.8 ft (24.0 m)	185.0 ft (56.4 m)
Breadth (max.)	32 ft (9.8 m)	55.0 ft (16.8 m)
Draft (casualty)	5.5 ft (1.7 m)	6.0 ft (1.8 m)
Tonnage	145 GRT	844 GRT
Engine power; manufacturer	3 x 600 hp (447 kW); Caterpillar C-18 diesel engines	N/A

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

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