



UNITED STATES COAST GUARD

**REPORT OF THE INVESTIGATION
INTO THE
CLYDE S. VAN ENFKEVORT (O.N. 1232691) AND
ERIE TRADER (O.N. 1238380) ANCHOR STRIKE
WHICH DAMAGED SUBSURFACE TRANSMISSION
CABLES AND PIPELINES IN THE STRAITS OF
MACKINAC MICHIGAN ON 01 APRIL 2018**



U.S. Department of
Homeland Security

United States
Coast Guard



Commandant
United States Coast Guard

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16732
OCT 08 2019

SUBSURFACE PROPERTY DAMAGE INVOLVING THE ARTICULATED TUG CLYDE S. VANENKEVORT AND BARGE ERIE TRADER ON APRIL 1, 2018

ACTION BY THE COMMANDANT

The record and the report of the investigation convened for the subject casualty have been reviewed. The record and the report, including the findings of fact, analysis, conclusions, and recommendations are approved subject to the following comments. This marine casualty investigation is closed.

ACTION ON RECOMMENDATIONS

Recommendation 1: Currently, no regulations exist in 46 Subchapter I that require an alarm that notifies the bridge when an anchor had been deployed. Lakers and ATBs in the Coast Guard District 9 area of responsibility with a similar configuration (where the anchoring system is not visible from the deck or the bridge) present a potential latent unsafe condition allowing for the accidental deployment on of an anchor without the crew being aware. Furthermore, this could also present a latent unsafe condition for Subchapter I vessels with a similar configuration nationwide. The U.S. Coast Guard should consider establishing regulations in 46 subchapter I to address this condition.

It should be noted that since this incident Van Enkevort Tug and Barge Inc. has taken action to install a signaling system on the ERIE TRADER that alerts the bridge whenever an anchor had been deployed.

Action: I partially concur with the intent of this recommendation. Updated federal regulations for towing vessels, implemented after the incident occurred, include several new provisions for towing vessels inspected under 46 Code of Regulations (CFR) Subchapter M to prevent such occurrences. The added option for companies to use a Towing Safety Management System (TSMS) would provide additional oversight to the mechanical safety items that are already required to prevent anchor failures of this nature. The Coast Guard will monitor anchor related incidents under Subchapter M requirements and this recommendation will be considered for any future regulatory initiatives related to towing vessel anchor systems.

A handwritten signature in blue ink, appearing to read "D. C. Barata".

D. C. BARATA
Captain, U.S. Coast Guard
Director of Inspections and Compliance

dp
16732
01 May 2019

FIRST ENDORSEMENT on SECTOR Sault Sainte Marie Memo 16732 of 22 Mar 2019

A.M. Beach
From: A.M. BEACH, CAPT
CGD NINE (dp)

To: COMDT (CG-INV)

Subj: ENDORSEMENT OF SAFETY RECOMMENDATIONS REGARDING THE CLYDE S. VAN ENKEVORT (O.N. 1232691) AND ERIE TRADER (O.N. 1238380) ANCHOR STRIKE WHICH DAMAGED SUBSURFACE TRANSMISSION CABLES AND PIPELINES IN THE STRAITS OF MACKINAC ISLAND

1. Forwarded, approved. I concur with the Investigating Officer's findings of fact, conclusions and findings of concern.
2. Safety Recommendation:
 - a. Recommendation #1: Currently, no regulations exist in 46 Subchapter I that require an alarm that notifies the bridge when an anchor had been deployed. Lakers and ATBs in the Coast Guard District 9 area of responsibility with a similar configuration (where the anchoring system is not visible from the deck or the bridge) present a potential latent unsafe condition allowing for the accidental deployment on of an anchor without the crew being aware. Furthermore, this could also present a latent unsafe condition for Subchapter I vessels with a similar configuration nationwide. The U.S. Coast Guard should consider establishing regulations in 46 subchapter I to address this condition.

Note: Since this incident, Van Enkevort Tug and Barge Inc. has taken action to install a signaling system on the ERIE TRADER that alerts the bridge whenever an anchor has been deployed.

3. Administrative Recommendations:

- a. I concur with all administrative recommendations and recommend this casualty investigation be closed.

4. My point of contact is Lieutenant [REDACTED].

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Enclosures: (1) Memorandum from Sector Sault Sainte Marie Memo 16732 of 22 Mar 2019 with Enclosures

Copy: COMDT (CG-CVC-3)
CG LANTAREA
CG SECTOR Sault Sainte Marie

U.S. Department of
Homeland Security

United States
Coast Guard




Commander
United States Coast Guard
Sector Sault Sainte Marie

337 Water Street
Sault Sainte Marie, MI 49783
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16732
22 Mar 2019

MEMORANDUM

From:  P. S. Nelson, CAPT
CG SECTOR Sault Sainte Marie (s)

To: COMDT (CG-INV)

Thru: CG DISTRICT NINE (dp)

Subj: ACTION BY OFFICER IN CHARGE, MARINE INSPECTION ON ANCHOR STRIKE
INVESTIGATION IN THE STRAITS OF MACKINAC MICHIGAN ON 01 APR 2018
MISLE ACTIVITY # 6384285.

Ref: (a) Marine Safety Manual Vol. V, Investigations and Enforcement, CIM 16000.10A

1. In accordance with reference (a) the Report of Investigation titled CLYDE S. VAN ENKEVORT (O.N. 1232691) and ERIE TRADER (O.N. 1238380) Anchor Strike Which Damaged Subsurface Transmission Cables and Pipelines In the Straits of Mackinac Michigan on 01 April 2018 has been completed.
2. I concur with all findings of concern, safety recommendations, and administrative recommendations for this investigation. While crewmember complacency certainly constituted a major factor in this casualty, it appears a robust safety management system and attentive "safety culture" within the company could have prevented this incident.
3. I'd like to extend my sincere appreciation to the Investigations NCOE and the District Nine Prevention staff who supported Sector Sault Sainte Marie during this investigation.

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Copy: CG INCOE



16732
11 January 2019

**CLYDE S. VAN ENKEVORT (O.N. 1232691) and ERIE TRADER (O.N. 1238380) Anchor
Strike Which Damaged Subsurface Transmission Cables and Pipelines
In the Straits of Mackinac Michigan on 01 April 2018**

INVESTIGATING OFFICER'S REPORT

Executive Summary

On 1 April 2018, the articulated tug and barge (ATB) CLYDE S. VAN ENKEVORT and ERIE TRADER were transiting in the Straits of Mackinac, MI. The vessel departed Duluth, MN on 30 March 2018 en route to Indiana Harbor, IN with cargo.

On 1 April 2018, between the approximate times of 1730-1735 local, Enbridge Inc.'s dual pipelines and American Transmission Company (ATC) submarine electric transmission cables in the Straits of Mackinac were struck and damaged.

At approximately 1730 Enbridge Inc. received a signal on their pipeline threat detection system that monitors the dual pipelines. These lines are commonly known as the Line 5 Pipeline. Enbridge Inc. pipelines sustained multiple dents and gouges, however remained structurally sound and intact. Damage estimate costs are currently ongoing.

At approximately 1732 ATC received a signal at their Systems Operations Center in Pewaukee, WI indicating that two protective relays connected to transmission cable circuits in the Straits of Mackinac had tripped offline. Three out of six ATC submarine electric transmission cables were damaged causing the release of approximately 800 gallons of a dielectric mineral oil solution into the Straits of Mackinac. ATC incurred an estimated \$4.3 million in damages for environmental response activities alone. Total damage estimates are ongoing, but are anticipated to be in the tens of millions of dollars.

Utilizing publically available Automated Identification System (AIS) ship-tracking data, Enbridge Inc. determined that the CLYDE S. VAN ENKEVORT had passed over the pipeline area during the time that Enbridge Inc.'s pipeline threat detection system had received a signal. Enbridge Inc. notified the U.S. Coast Guard of this data while working in coordination with the Incident Command System (ICS) Unified Command established on 3 April 2018 in St Ignace, MI to respond to the pollution caused by this incident.

Coast Guard Investigators used historical AIS data to determine that the towing vessel UNDAUNTED was the only other vessel in the vicinity of the pipeline at the time of incident. On 7 April 2018 Coast Guard Investigators boarded UNDAUNTED in Alpena, MI and ruled out any involvement by this vessel.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

Coast Guard Investigators attended the CLYDE S. VANENKEVORT and ERIE TRADER on 6 April 2018 in Sault Sainte Marie, MI. Investigators initially observed that the barge ERIE TRADER was missing the flukes on its starboard anchor. Upon further investigation, Coast Guard Investigators determined that the ERIE TRADER had unintentionally deployed its starboard anchor somewhere between Detour Passage, MI and the Straits of Mackinac. The crew had not discovered the deployed anchor until preparing to arrive into Indiana Harbor on 3 April 2018. Approximately 350 feet of anchor chain had deployed by the time the ATB arrived in Indiana Harbor.

Given the significant weather and ice conditions just south of Detour Passage in Lake Huron on 1 April 2018, it is most likely that the anchor chain initially began to deploy soon after coming through the Detour Passage and into Lake Huron. Before the anchor made initial contact with the dual pipelines, it had dropped to a depth of more than 200 feet and was dragging on the lake bed.

As a result of this investigation the Coast Guard determined that the initiating event for this casualty was the unintentional deployment of the starboard anchor by the ERIE TRADER. Subsequent events include the anchor dragging on the lake bed, the anchor striking the pipelines, and the anchor striking and damaging the transmission cables.

Causal factors that led to this marine casualty include: (1) Improper installation of the starboard windlass brake bands on the ERIE TRADER. (2) Communications failures between crew and ship's officers. (3) Communications failures between ship's officers and the ABS Surveyor regarding the ERIE TRADER's starboard anchor brake band replacement. (4) Weather and ice conditions in the Straits of Mackinac on 1 April 2018. (5) Crew member complacency. (6) Crew members lack of familiarity with company policy and procedures.

Section 1 – Preliminary Statement

This marine casualty investigation into the starboard anchor of the ERIE TRADER striking and damaging sub-surface cables and pipelines in the Straits of Mackinac on 1 April 2018, along with the submission of this report were conducted in accordance with Title 46, Code of Federal Regulations, Part 4, and under the authority of Title 46, United States Code, Chapter 63.

- 1.1. LCDR ██████████ was the initial lead-investigating officer, but departed Sector Sault Sainte Marie in June of 2018. LT ██████████ completed this investigation and drafted this Report of Investigation. Additionally, Mr. ██████████ from the National Transportation Safety Board (NTSB) assisted with this investigation.
- 1.2. Designated as parties-in-interest include: American Transmission Corporation, Enbridge Inc., Van Enkevort Tug & Barge Inc.
- 1.3. All times listed in this report are in Eastern Daylight Time using a 24-hour format (HHMM). The Incident Investigation Activity number for this investigation is 6384285.

Section 2 – Vessels Involved in the Incident



Figure 2-1 The barge ERIE TRADER on the South Pier St Marys River MI on 6 April 2018.

Vessel Name:	ERIE TRADER
Vessel Identification Number:	O.N. 1238380
Flag:	United States
Vessel Class/Type/Sub-Type	Bulk Cargo Barge. ABS Classed
Build Year:	2012
Gross Tons:	16552
Capacity:	38,516 tons
Length:	740'
Draft:	27'
Beam/Width	78'

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018



Figure 2-2 The towing vessel CLYDE S. VANENKEVORT and ERIE TRADER,(formerly the LAKES CONTENDER). Unknown time and location.

Vessel Name:	CLYDE S. VAN ENKEVORT
Vessel Identification Number:	O.N. 1232691
Flag:	United States
Vessel Class/Type/Sub-Type	Towing Vessel
Build Year:	2012
Gross Tons:	1250
Length:	129'
Draft:	21'
Beam:	50'
Main/Primary Propulsion:	Diesel, 10,876 HP

Personnel Data:

CLYDE S. VANENKEVORT Involved Crewmembers	Role
██████████	Master
██████████	Chief Engineer
██████████	1st Mate
██████████	2 nd Mate
██████████	Able Seaman/ Bow Watchman
██████████	Able Seaman/ Bow Watchman
██████████	Conveyorman

Section 3 – Record of Deceased, Missing, and Injured

There were no injuries, fatalities, or missing persons as a result of the occurrence of the subject marine casualty.

Section 4 – Findings of Fact

- 4.1 The CLYDE S. VAN ENKEVORT is a U.S. flagged commercial towing vessel owned and operated by Van Enkevort Tug & Barge of Escanaba, Michigan. Currently the vessel is U.S. Coast Guard inspected under 46 CFR Subchapter M. However, this vessel was not subject to inspection by the U.S. Coast Guard at the time of incident on 1 April 2018. 46 Code of Federal Regulations (CFR) Subchapter M had not come into effect until 20 July 2018. The tug is powered by twin diesel engines driving two controllable pitch propellers.
- 4.2 The ERIE TRADER is a U.S. flagged unmanned self-unloading freight barge owned and operated by Van Enkevort Tug & Barge of Escanaba, Michigan. The ERIE TRADER is classified by the American Bureau of Shipping (ABS) and inspected by the U.S. Coast Guard. It had a current and valid U.S. Coast Guard Certificate of Inspection (COI) at the time of the incident.
- 4.3 As per the American Bureau of Shipping (ABS) Rules for Building a Classing Steel Barges the ERIE TRADER is required only one anchor. According to Master [REDACTED] the crew did not utilize the starboard anchor for routine operations. It was primarily used as a back up to the port anchor.
- 4.4 The ERIE TRADER is configured with the windlass, anchoring system, and associated tackle in an enclosed space on the bow main deck just above the forepeak. This space houses the windlass systems, associated controls, and tackle for both the port and starboard anchors. The windlass system (model: 2W26231-16-00) and associated parts were manufactured by Coastal Marine Equipment Inc. These systems are not visible while standing on the main deck of the barge, nor are they visible from the bridge of the CLYDE S. VAN ENKEVORT. There are no alarms or signals on the bridge or otherwise that verify the status of the anchors. The windlass space is approximately 845 feet from the bridge (see figure 4-1).
- 4.5 The windlass systems on ERIE TRADER cannot be remotely operated. This means that in order to drop an anchor the windlass system had to be powered up and controlled locally. These systems cannot be controlled from the tug. The windlass brake assembly is comprised of a manual hand crank/wheel and an upper and lower brake band that when tightened secure the windlass and anchor chain in place by means of friction (see figure 4-2 and 4-4).

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

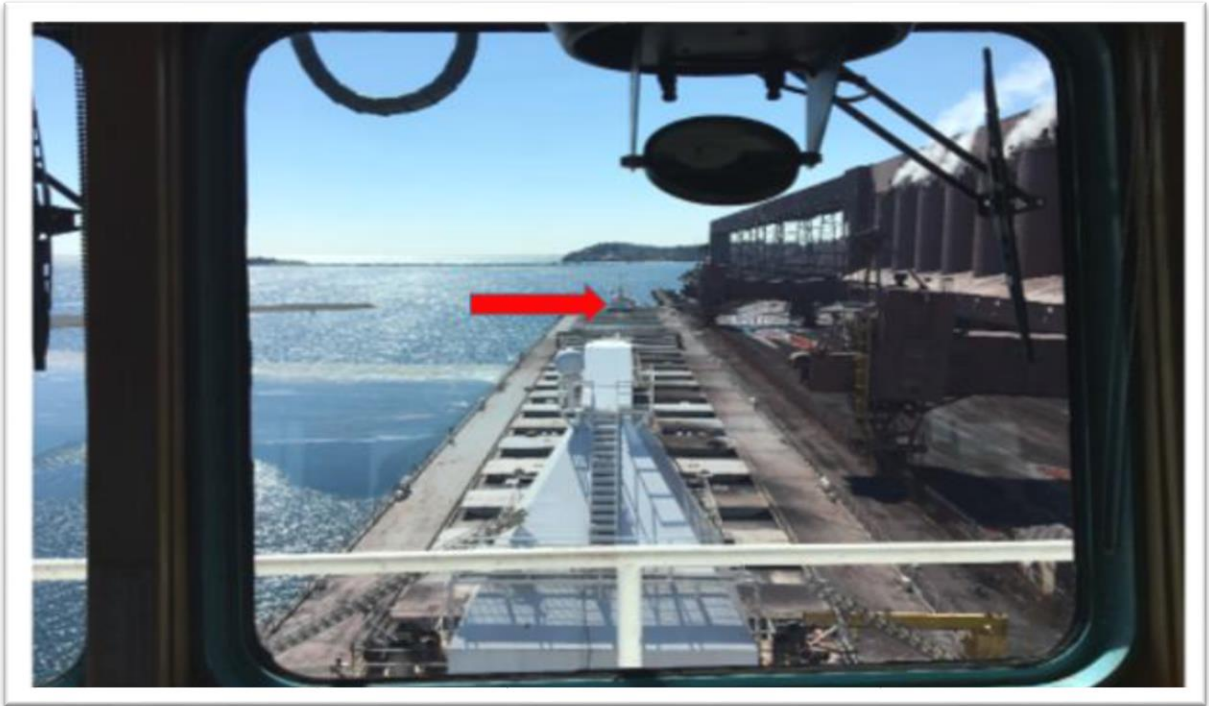


Figure 4-1 View from the bridge of the CLYDE S. VANENKEVORT to the main deck of the ERIE TRADER. The red arrow indicates the location of the windlass room.

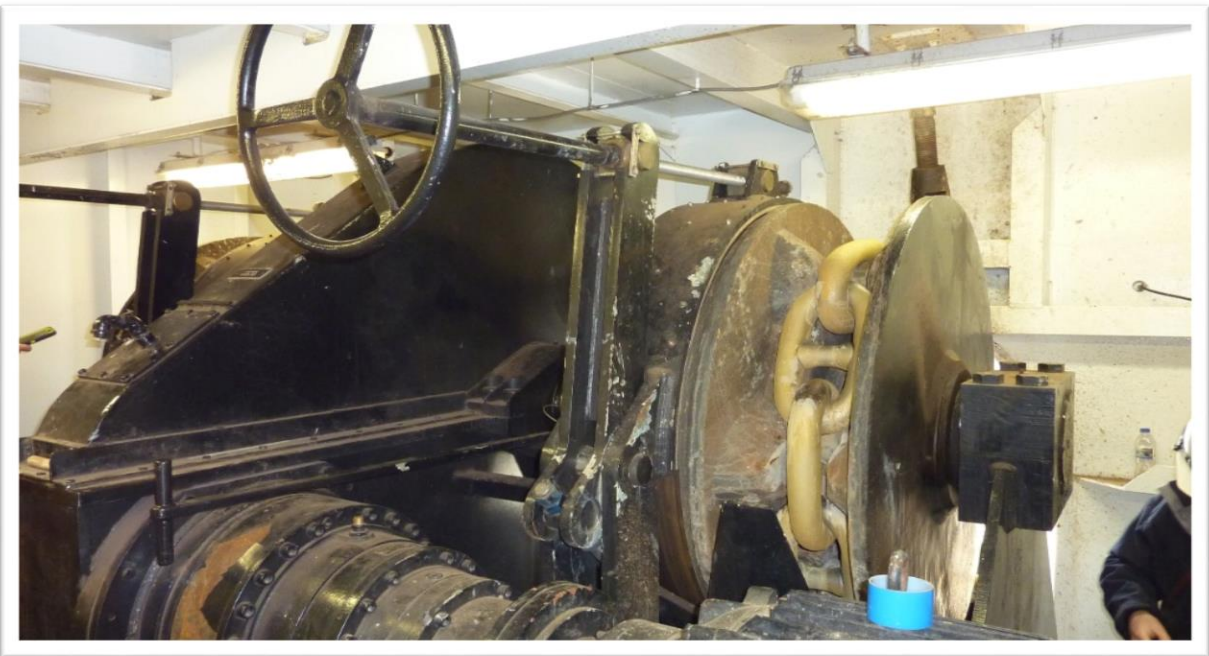


Figure 4-2 Inside the windlass room on ERIE TRADER. starboard anchor chain, windlass, brake assembly, and brake hand wheel are shown.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

- 4.6 The ERIE TRADER and the CLYDE S. VAN ENKEVORT together comprise an articulated tug and barge (ATB). ATBs consist of a barge and a tug that is positioned in a notch in the stern of the barge, which enables the tug to propel and maneuver the barge. Unlike an ITB (Integrated Tug/Barge), the ATB has an articulated or "hinged" connection system between the tug and barge. This proprietary coupler connection system is called a Hydraconn. This allows movement in one axis, or plane, of fore and aft pitch.
- 4.7 Master ██████████ stated during interviews with the U.S. Coast Guard, that it was standard industry practice to clear¹ one or both the port and starboard anchors while transiting in a restricted waterway. The Master stated that it was standard practice for the ERIE TRADER to utilize only the port anchor while transiting in regulated navigation areas² and/or restricted waterways.
- 4.8 As per Van Enkevort Tug and Barge policy, a Bow Watch was implemented on the ERIE TRADER while the vessel was transiting through restricted waterways. Duties of the Bow Watch consist of standing lookout for vessel traffic, calling out distances when passing by buoys, and clearing and securing the anchors. While the anchor is in a cleared status, the Bow Watch would release the windlass brake assembly to deploy the anchor. Alternatively, when the vessel departs a restricted waterway, the watch officer on the bridge of the CLYDE S. VANENKEVORT instructs the Bow Watch on ERIE TRADER to secure³ the anchors.
- 4.9 The barge ERIE TRADER is fitted with two stockless B-type anchors which weighed 12,000 pounds and are connected to a 2^{5/8} inch size chain. The brake holding capacity by design is 341,100 pounds. Each anchor chain is 6 shots (1 shot = 90 feet). The anchor was designed to have three mechanisms to protect against unintended release: the paw, the claw, and the brake (see figure 4-4). The claw and paw⁴ devices cannot be accessed from inside the windlass room. There is a separate space forward of the windlass room called the hawespipe locker that is accessed by a small hatch. In order to view the claw and paw the hawespipe locker hatch must be opened (see figure 4-3).

¹ The term "clearing the anchor" means making the anchor ready for rapid deployment in the case of an emergency. To clear the anchor, two of the three mechanisms used to secure the anchor (claw and paw) are removed, and the windlass (gear) disengaged. The anchor is then held fast solely by the brake assembly. (see figure 4-3)

² Federal regulations governing Regulated Navigation Areas (RNA) are outlined in 33 CFR Part 165. RNAs are water areas within a defined boundary for which regulations for vessels navigating within the area have been established.

³ To (secure) the anchor means to affix the claw and paw onto the anchor chain, and engage the windlass gear. The claw and paw are fail-safes that prevent deployment of the anchor. With the paw and the claw engaged, the anchor is considered completely secure. With the anchor properly seated and secured, the full weight of the anchor and chain should rest on the claw.

⁴ The paw or (chain stopper) is fail-safe mechanism used to secure the anchor and chain while the anchor is stowed.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

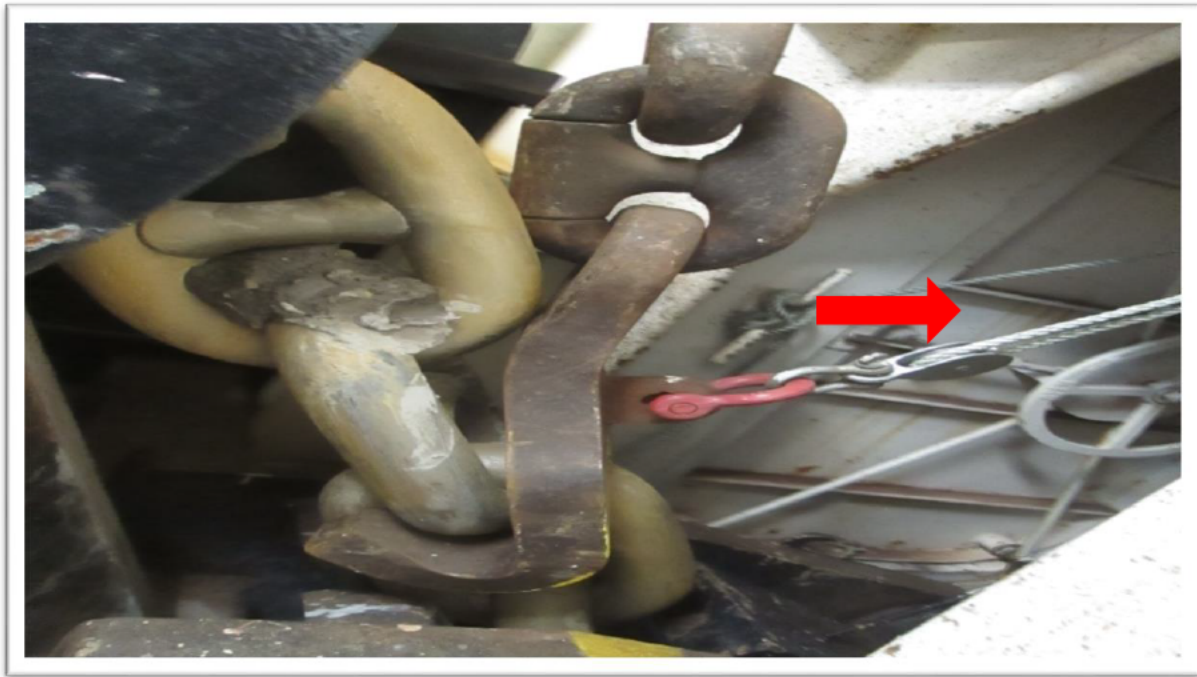


Figure 4-3 Inside view of the starboard hawespipe locker hatch. Red arrow indicates the hatch that provides access to the claw and paw. This image displays the hatch in the closed position.



Figure 4-4 The starboard claw and paw on the ERIE TRADER. In this image both devices are un-engaged. The claw (indicated by blue arrow) is tied off to the cleat on the bulkhead. The paw (indicated by red arrow) is pulled back and into an upright position.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

- 4.10 When secured and seated properly, the port and starboard anchors on ERIE TRADER are designed to ride flush with or slightly inset in the pocket¹ of the hull.
- 4.11 In October of 2017, the crew noticed that the ERIE TRADER's starboard anchor windlass brake band was cracked and in need of repair. They also noted that the starboard anchor was not fully seated in the pocket and was hanging out of pocket by approximately 1-2 feet (see figure 4-6). The discrepancy was reported to ships officers and the starboard anchor was placed out of service and not used for the remainder of the shipping season.
- 4.12 Master ██████████ and 2nd Mate ██████████ stated that during the 2017 shipping season there was a discrepancy with the controllable pitch propeller system on the CLYDE S. VAN ENKEVORT. The engines were not taking on a full load due to the controllable pitch propellers being slightly out of alignment. Normal speed with both engines at full power was approximately 15 miles per hour (mph). With the propellers out of alignment, the vessel was several miles per hour slower (approximately 12-13 mph) at full power. During the 2018 winter lay-up period this discrepancy was repaired.
- 4.13 11 January 2018- The CLYDE S. VAN ENKEVORT and ERIE TRADER went into winter lay-up² at Frazier Shipyards in Superior, Wisconsin. Mr. ██████████ was the Port Engineer for Van Enkevort Tug and Barge Inc. Mr. ██████████ stated to the Coast Guard that as the Van Enkevort Port Engineer, he was responsible for supervising all worklist items and the repairs made on the ATB while in it was in the shipyard.
- 4.14 11 March 2018- While the vessel was in winter lay-up at Frazier shipyard, CLYDE S. VAN ENKEVORT Chief Engineer ██████████ replaced the damaged starboard windlass brake band with a new brake band from the manufacturer Coastal Marine Equipment Inc (CMEI). While completing this replacement the Chief Engineer utilized a maintenance manual from CMEI. The manual contained diagrams of the system, however the manual did not contain specific instructions for the replacement of the brake band and associated parts. There was no technical oversight of the replacement by the Port Engineer. Furthermore, there was no assistance requested or provided by the manufacturer.
- 4.15 12 March 2018- The Officer in Charge, Marine Inspections (OCMI) Marine Safety Unit Duluth performed an annual Certificate of Inspection (COI) inspection. LT ██████████ ██████████ was the U.S. Coast Guard's lead Marine Inspector. The crew for the barge ERIE TRADER informed her that the starboard anchor windlass brake band had just been replaced. LT ██████████ visually inspected the replacement and did not observe any notable discrepancies. An operational test of the system was not performed.

¹ A pocket or hawsepipe is a recess in the bow of a ship used for storing an anchor.

² Winter lay-up is a term used on the Great Lakes to describe the period, during the slower winter season, when vessels are taken out of commercial service. During winter lay-up vessels are generally taken to a shipyard where various aspects of maintenance and repair are conducted.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

- 4.16 18 March 2018- American Bureau of Shipping (ABS) surveyor, Mr. [REDACTED] attended the ERIE TRADER and inspected all repairs made during the winter lay-up period. He was not informed of and was not aware of the starboard windlass brake band replacement. As part of a standard survey, he inspected and conducted a functional test of the starboard windlass and anchoring system. Mr. [REDACTED] found the inspection and test of the system to be satisfactory. The ABS test of the starboard anchor included the following procedure: the starboard anchor was held on the brake only, then the brake was opened up. After the anchor chain payed out more the brake was re-applied. As the brake stopped the anchor and held, the test concluded. This test was conducted in a controlled environment while the vessel was moored pier side. All ground tackle (i.e. claw, turnbuckle, Paw, chain, anchor) was inspected by ABS and found to be in satisfactory working order. While a functional test of the anchor was conducted, the anchor never touched the water. During Coast Guard and NTSB interviews, Mr. [REDACTED] stated that it was a normal practice as re-seating a wet anchor in the anchor pocket may allow the anchor to freeze to the hull, thus rendering it inoperable in an emergency. The test conducted by Mr. [REDACTED] was considered a modified test.
- 4.17 18 March 2018- [REDACTED] and [REDACTED] were both employed as Able Bodied Seaman (AB) working onboard the CLYDE S. VAN ENKEVORT. They were also assigned as the only two crew members to stand Bow Watch onboard the barge ERIE TRADER. As Bow Watch their duties included securing and releasing the anchors and standing lookout while the ATB transits in restricted waters. They maintained communication with the bridge via handheld VHF radio. They each stood rotating 6-hour shifts as Bow Watch only while the ATB was transiting in restricted waterways or when requested to by ships officers.
- 4.18 March 2018- After completing the shipyard lay-up period, the ATB moved from the lay berth to the cargo loading dock within the Port of Duluth, MN. At an undetermined time in March 2018 and prior to departure from Duluth at the beginning of the 2018 shipping season, Able Seaman (AB) [REDACTED] peered over the starboard bow of ERIE TRADER. He noticed that the starboard anchor on ERIE TRADER was protruding from the hawsepipe pocket by approximately 1-2 feet.
- 4.19 The arrangement of claw on the ERIE TRADER is set up so that when the claw is not engaged on the anchor chain it must be manually tied off to a cleat welded onto the bulkhead. If the claw is not tied onto the cleat, it will freely fall back onto the anchor chain (see figure 4-5).

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018



Figure 4-5 In this image the starboard claw is engaged on the anchor chain. When the not engaged, it is lifted up by pulley and tied to a cleat on the bulkhead.

- 4.20 March 2018- After discovering the protruding anchor, Mr. [REDACTED] notified Mr. [REDACTED] of the discrepancy. They were both aware that the brake band had just been renewed, and assumed that the brake system must still have the same issue since before the winter lay-up. Both men came to an agreement that they would not touch the starboard system and would leave it secured. They agreed to use only the port anchor. Mr. [REDACTED] and Mr. [REDACTED] did not inform the bridge or the ship's officers of this agreement, nor did they notify any ship's officers about the starboard anchor discrepancy.
- 4.21 20 March 2018- The ATB sails from Duluth, MN to Detroit, MI and then back to Duluth without incident.
- 4.22 30 March 2018 at 1100- The CLYDE S. VANENKEVORT and the barge ERIE TRADER departed Duluth en route to Indiana Harbor, IN. The starboard anchor is protruding from the hawespipe by approximately 1-2 feet. Ice could be seen forming on the starboard anchor (see figure 4-6).

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018



Figure 4-6 The ERIE TRADER departing Duluth MN on 30 March 2018. The Starboard anchor is seen covered in ice and hanging out of the anchor pocket. (Image taken from video by J. Herrick on youtube.com)

- 4.23 31 March 2018 approximately 1737- the CLYDE S. VANENKEVORT and ERIE TRADER passed Gros Cap near the western entrance to the St. Marys River to head down bound. Mr. [REDACTED] assumed the bow watch while entering the St. Marys River (a Regulated Navigation Area). Mr. [REDACTED] received the order from the bridge to clear the anchors. He cleared the port anchor before arrival into the St. Marys River. He did not clear or check on the starboard anchor.
- 4.24 31 March 2018 at approximately 2052- After passing through the Sault Locks in Sault Sainte Marie, MI, the vessel moors for the night alongside the South East Pier of the Sault Locks. The St. Marys River was closed by the U.S. Coast Guard between the Sault Sainte Marie Locks and Lake Huron due to significant ice conditions.
- 4.25 1 April 2018 0600- Mr. [REDACTED] assumed the Bow Watch while in the St. Marys River. Mr. [REDACTED] stated to Coast Guard Investigators that he did not check or clear the starboard anchor.
- 4.26 1 April 2018- Great Lakes Surface Environmental Analysis performed by the National Ocean and Atmospheric Administration (NOAA) documents median ice concentration in the St. Marys River to have been approximately 70-90%.

Report of Investigation: CLYDE S. VANENKEVORT and ERIE TRADER Anchor Strike Incident in the Straits of Mackinac Occurring on 1 April 2018

- 4.27 1 April 2018 at approximately 0945- the CLYDE S. VANENKEVORT and ERIE TRADER get underway and head down the St. Mary's River approximately 5 miles behind the ice breaking Coast Guard vessel USCGC MACKINAW. When the MACKINAW reached the northern side of Neebish Island, it transited down the east side of the island, which is the designated channel for up bound traffic on the St. Marys River. The CLYDE S. VANENKEVORT transits to the down bound channel along the west side of the island known as the Rock Cut. The USCGC MACKINAW had traveled through the Rock Cut the previous day and a path was cut into the ice, however significant ice conditions still existed.
- 4.28 1 April 2018 at approximately 1000- Coast Guard Sector Sault Sainte Marie Vessel Traffic Service (VTS) cameras captured video of the starboard anchor protruding from the hawsepipe of the ERIE TRADER at Mission Point and Rock Cut, west of Neebish Island in the St. Marys River. Despite the significant ice conditions, the ATB experienced no abnormal maneuverability issues during this transit. Water depth was approximately 28 feet (see figure 4-7).



Figure 4-7 The ERIE TRADER in the St Marys River at Rock Cut west of Neebish Island on 1 April 2018. Image captured by Coast Guard VTS cameras depicts significant ice conditions. Red Arrow points to ice on the starboard anchor hanging below the anchor pocket.

- 4.29 1 April 2018 1200- Mr. [REDACTED] relieves Mr. [REDACTED] as Bow Watchman on the ERIE TRADER.
- 4.30 1 April 2018 at approximately 1445- The CLYDE S. VANENKEVORT and ERIE TRADER depart the Detour Channel into Lake Huron and steered a course for the Straits of Mackinac. Upon departing Detour Channel, the Bow Watch, Mr. [REDACTED] was given the

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order to secure anchors by [REDACTED] the 2nd Mate on watch. Mr. [REDACTED] confirmed to the 2nd Mate that anchors were secured but did not actually verify the starboard anchor to be secured.

- 4.31 1 April 2018 1450- 2nd Mate [REDACTED] stated that the ATB was traveling west at approximately 12.4 miles per hour on a course for Round Island Passage. The ATB was facing headwinds of approximately 45 mph and seas conditions of 6-8 feet.
- 4.32 1 April 2018 1455- The officer on bridge watch and at the helm of CLYDE S. VAN ENKEVORT 2nd Mate Mr. [REDACTED] noticed that the ATB's speed was approximately 12.3-12.4 miles per hour (mph) at full power. Normal speed at full power in calmer conditions would be approximately 15 mph. Mr. [REDACTED] had been a Mate on the vessel during the previous shipping season and reasoned that the slower speed was due to multiple factors. These factors included a perceived discrepancy in the alignment of the controllable pitch propeller (CPP) system, sea and weather conditions, and the fully loaded condition of the ERIE TRADER.
- 4.33 1 April 2018 1708- The ATB passed through Round Island Passage without any experiencing any maneuverability issues.
- 4.34 1 April 2018 1728- The CLYDE S. VANENKEVORT and ERIE TRADER passed under the Mackinac Bridge.
- 4.35 1 April 2018 1730- Enbridge Inc. received a signal from their pipeline threat scan system¹ used to monitor their sub-surface dual pipelines in the Straits of Mackinac. Enbridge Inc.'s pipelines are on the seabed east of the ATC Cables. Enbridge Inc. utilized publicly available Automated Identification System (AIS) vessel tracking data to identify the CLYDE S. VAN ENKEVORT as being located near the pipeline at the time the threat signal was received.
- 4.36 1 April 2018 1732- American Transmission Corporation (ATC) received a signal at their Systems Operations Center indicating that two protective relays connected to transmission cable circuits in the Straits of Mackinac had tripped offline less than a minute apart. American Transmission Company owns six underwater subsurface transmission cables that rest on the seabed in the Straits of Mackinac. These cables actively provide power to the upper peninsula of Michigan. The cables run between McGulpin Point, on the Lower Peninsula, to Pointe La Barbe, on the Upper Peninsula. The cables are spaced approximately 200 feet apart at depths of over 200 feet (see figures 4-8 and 4-9).

¹ Enbridge Inc's pipeline threat scan system allows the company to monitor the pipelines for any irregularities through use of acoustic signaling data.

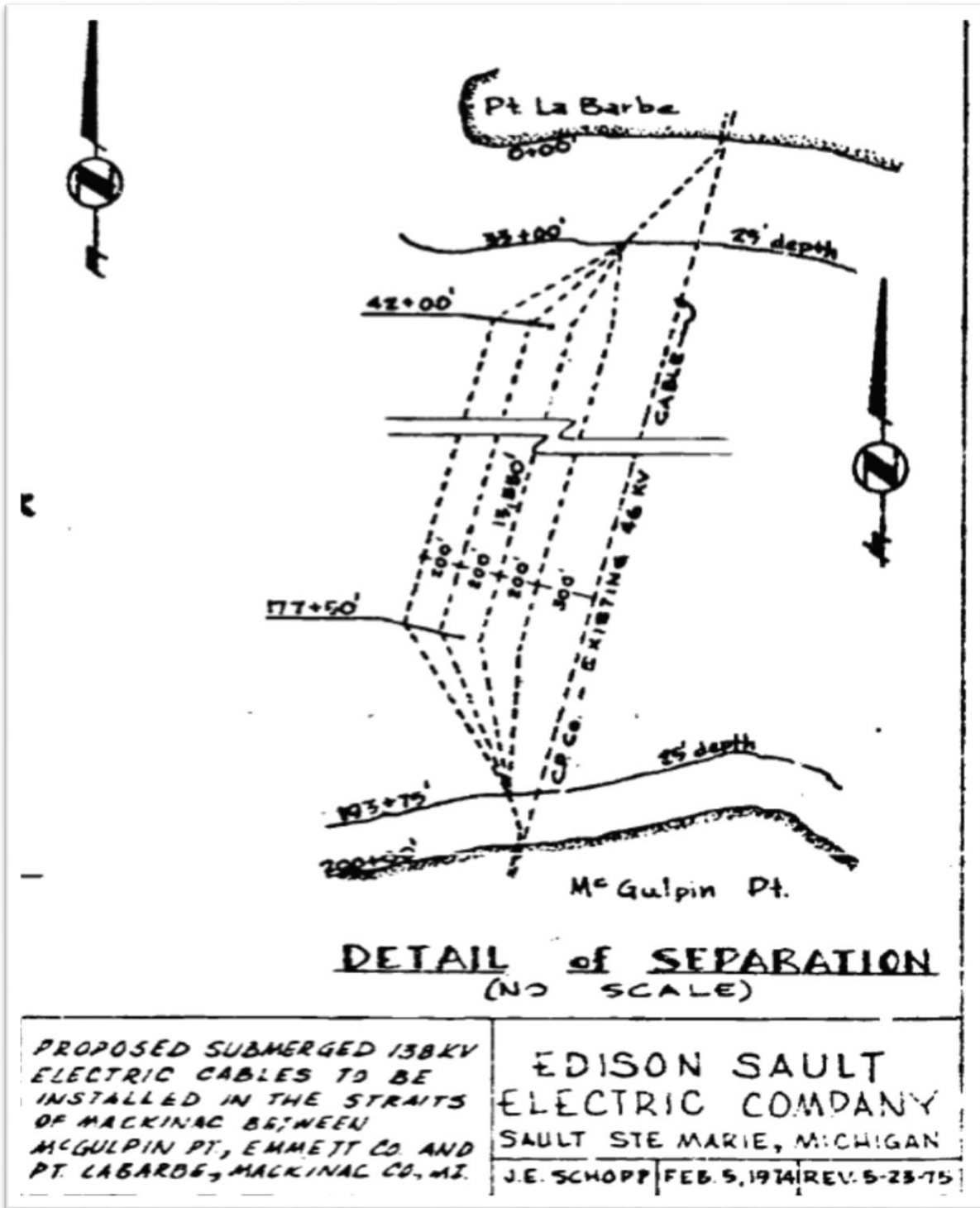


Figure 4-8 Diagram for the layout of ATC submerged cables west of the Mackinac Bridge. Image provided by U.S. Army Corps of Engineers. Cables originally owned by Edison Sault Electric Company..

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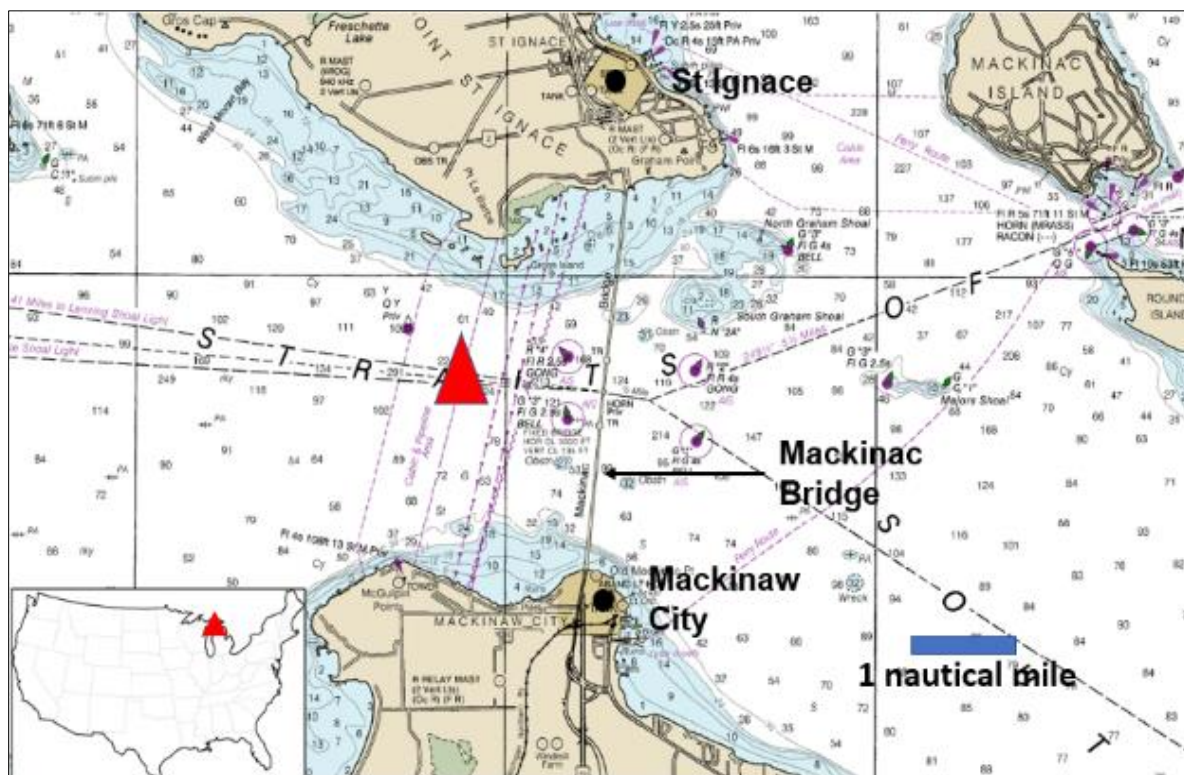


Figure 4- 9 Straits of Mackinac. Red area signifies the approximate location of the incident site (NOAA Chart 14881)

- 4.37 2 April 2018- ATC determined that several of their subsurface transmission cables were damaged and leaking dielectric fluid into the Straits of Mackinac. ATC notified the National Response Center and the U.S. Coast Guard. ATC estimates that a potential 800 gallons of cable fluid had leaked into the Straits of Mackinac. Coast Guard pollution responders were dispatched to the incident location.

- 4.38 3 April 0020- While making preparations to enter Indiana Harbor, Mr. ██████ made his way to the bow of the ERIE TRADER to assume the Bow Watch. While walking to the bow he heard a noise that sounds to him like the vessel hitting ice. Upon realizing that there was no ice in the Indiana Harbor area, he investigated the noise. He peered over the starboard bow of the ERIE TRADER and discovered that the anchor was deployed. Mr. ██████ immediately notified bridge of the situation via hand held radio. Mr. ██████ the 2nd Mate, who was at the helm, took all pitch off the propellers and brought the vessel to a halt (see figure 4-10).

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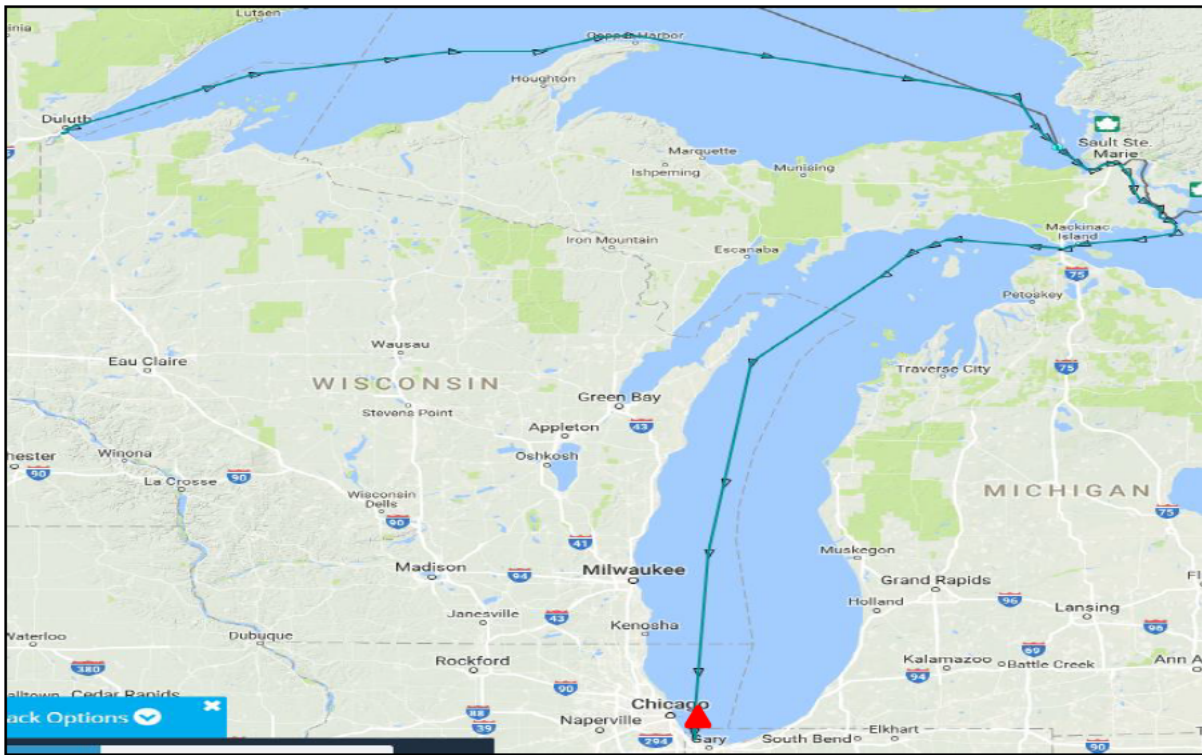


Figure 4-10 CLYDE S. VANENKEVORT AIS track line from Duluth, MN to Indiana Harbor, IN. AIS track line from 30 March 2018 through 3 April 2018. Image by Port and Waterways Safety System PAWSS. Red area signifies approximate location where the anchor was discovered to be deployed.

- 4.39 3 April 0022- Mr. ██████ opened the starboard hawespipe locker hatch that provided access to the paw and the claw and observed that both devices were disengaged from the anchor chain. The claw was disengaged and was manually tied off to a cleat on the bulkhead securing it up and away from the chain. Mr. ██████ powered up the starboard windlass and brought up the anchor. Approximately 4 shots, or 360 feet of anchor chain were recovered. When the anchor stock came into sight, Mr. ██████ discovered that the anchor flukes were missing and reported this to the bridge (see figure 4-11).
- 4.40 3 April 0100- The vessel proceeded into Indiana Harbor. Shortly after, the master notified the company of the problem. The Master was unable to determine when or how the anchor deployed.
- 4.41 6 April 2018- As part of the Coast Guard's preliminary investigation, Investigating Officer (IO) LCDR ██████ boarded the ERIE TRADER and CLYDE S. VANENKEVORT at the South East Pier of the Sault Lock in Sault Sainte Marie, MI. Upon arriving to the vessel, the he immediately observed that the flukes of the starboard anchor on ERIE TRADER were missing.

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Figure 4-11 ERIE TRADER missing flukes on starboard anchor 6 April 2018 at South East Pier St. Marys River

- 4.42 7 April 2018 Coast Guard Investigators board the towing vessel UNDAUNTED in Alpena Michigan. Investigators rule out any involvement by the vessel.
- 4.43 Post casualty drug testing was not conducted in accordance with 46 CFR Subparts 4.06 and 16.240. Alcohol testing was not conducted in accordance with 46 CFR Subparts 4.06 and 16.240, and company policy. These tests were not conducted because it was not discernably evident that the ERIE TRADER and CLYDE S. VAN ENKEVORT were involved in a marine casualty until more than 5 days after the initial incident.
- 4.44 22 April 2018- ATC contracted Durocher Marine and T&T Subsea to use an underwater remotely operated vehicle (ROV) to inspect its subsurface cables. ROV visual imagery confirmed damage to 3 of the 6 submarine cables. Two cables were severed completely and the third was damaged but determined to be salvageable (see figure 4-12).

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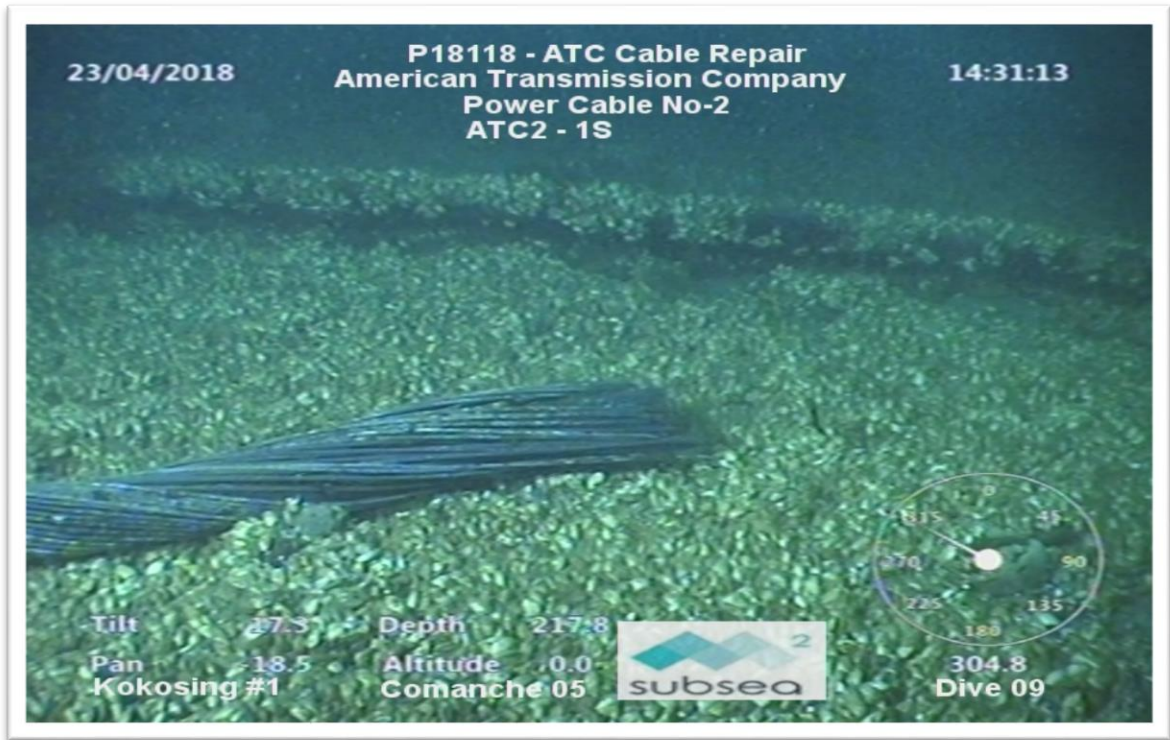


Figure 4-12- Severed ATC transmission cable No-2. ROV imagery provided by ATC.

- 4.45 23 April 2018- Enbridge Inc. contracts with Ballard Marine to employ an ROV to inspect their dual pipelines in the Straits of Mackinac. The dual pipelines remained intact and structurally sound, however multiple dents and gouges were discovered. The ROV obtained visual imagery that displays two discernable drag marks in the sea bed just before the Enbridge west pipeline (see figures 4-13, 4-14, 4-15).

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Figure 4-13 Drag marks in the seabed just before the Line 5 Pipeline. The marks depicted were not measured. ROV Image provided by Enbridge Inc.



Figure 4-14 Dent and impact marks west pipeline. ROV imagery provided by Enbridge Inc.



Figure 4-15 Gouges in Enbridge's west pipeline. ROV imagery provided by Enbridge Inc.

Section 5 – Analysis and Opinions

- 5.1 ***Improper installation of the brake bands on the ERIE TRADER's starboard windlass system*** - The starboard windlass brake assembly on ERIE TRADER was comprised of an upper and lower brake band. The Chief Engineer and several other crew members were tasked with installation of the new bands on the system manufactured by Coastal Marine Equipment Inc.(CMEI). The Van Enkevort Port Engineer Mr. [REDACTED] did not provide proper installation instructions and oversight. Mr. [REDACTED] stated to investigators that he considered the brake band replacement to be an experienced based task. Mr. [REDACTED] did not oversee the installation, nor did he inspect the replacement of the starboard windlass brake band. He determined that he would rely on the ABS surveyor to determine if the brake band was installed correctly.

The CMEI anchor parts and installation manual states the following (page 30 section 8) - *"maintenance and replacement work must be carried out by expert maintenance technicians trained in the observance of the applicable laws on health and safety at work and the special ambient problems attendant on the installation"*.

On 7 May 2018 the starboard anchor windlass, brake and assembly were examined by the U.S. Coast Guard and National Transportation Safety Board (NTSB) and other involved parties in interest. All parties gathered at the CSX dock in Oregon, OH. A CMEI technician was on hand to disassemble to brake.

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The brake band is hand wheel operated. It engages with a clockwise rotation and releases with a counterclockwise rotation. It is designed to control the freewheel payout of the windlass while not set in gear. The brake is not designed to control the windlass under power. Engaging the brake while the windlass is under power could potentially cause the brake to fail.

Upon initial inspection and before disassembly, there was a noticeable gap between the starboard windlass brake drum and the liner at both the top and forward of the top brake band and liner. At the widest gap at the top, there was a 0.8 cm (0.314 inches) gap which was measured with a caliper. When installed correctly there is no gap when the brake is engaged. The brake band was comprised of an upper and lower half (see figure 5-1).



Figure 5-1 Left: Post accident photo of the upper brake band liner for the starboard anchor with the brake engaged. The red arrows highlight the noticeable gap at the top between the drum and liner.

*Right: Photo of the starboard anchor upper brake band liner with the brake closed after installation of new liner and adjustment by technician. *Notice that there is no gap between the brake band liner and the drum.*

- 5.1.1 Noticeable friction spots were discovered on the upper band portion near the top of the liner and at the aft end of the liner near the edge. Nothing unusual or significant was found on the bottom portion of the brake liner. It was also noted that on the brake band liner inner surface housing paint was burned away in line with the friction markings on the upper brake band itself (see figure 5-2).

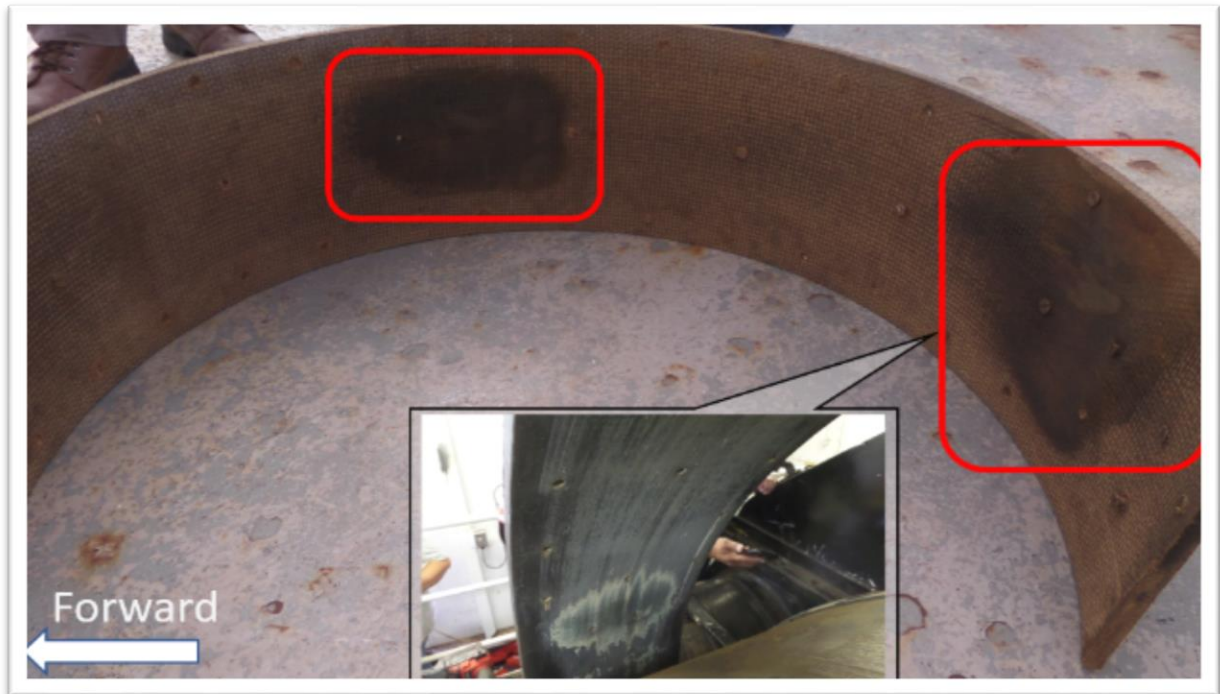


Figure 5-2 The upper brake band liner for the starboard anchor. Highlighted in red are the friction spots on the liner. The inset shows the paint worn from the heat accumulation through the liner aft section of the upper band.

- 5.1.2 During an inspection of the starboard windlass and brake it was confirmed by the CMEI technician that when fitted and torqued properly the brake bar should be in a completely vertical position. The inspection found that with the brake fully engaged there was about 5.2 degrees off vertical (angle to aft bulkhead) on the starboard brake bar. Rub markings in the paint were found on the starboard brake bar. These markings indicated that at one time, there was a 10 degree off vertical deflection of the top bar when the brake was engaged. This degree of vertical deflection indicates that the brake nut was torqued past manufacturer specifications (see figure 5-3). This caused the upper brake band to not be fully seated in contact with the upper portion of the wildcat. This dramatically reduced the capacity of the brake alone to hold the full weight of the anchor and chain.

It was also noted during U.S Coast Guard post casualty interviews that both Mr. [REDACTED] and Mr. [REDACTED] found that the hand wheel was much more difficult to turn when engaging the starboard windlass brake. This was most likely caused by the over torquing of the brake band nut. When engaging the brake via hand wheel, the upper band was being warped slightly upward. This added tension caused the hand wheel to become difficult to turn in order to fully engage the brake.

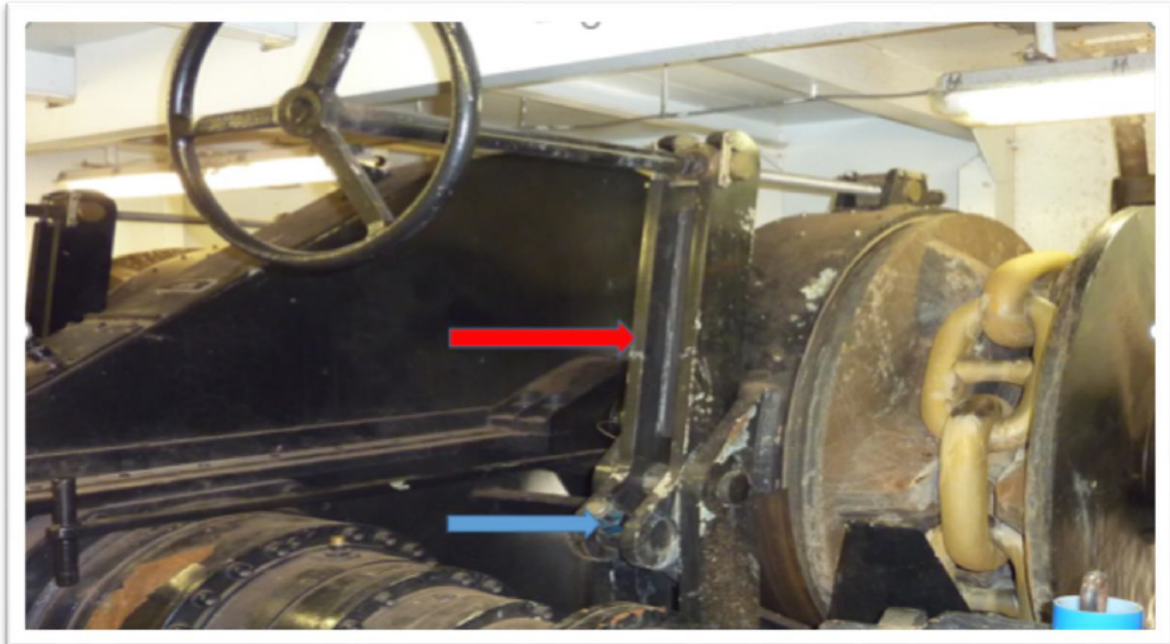


Figure 5-3 ERIE TRADER- brake vertical bar, brake band nut, brake band hand wheel. Red arrow indicates the vertical bar. Blue arrow indicates the brake band nut.

- 5.2 ***Communications failures between crew and ships officers, and ships officers and the ABS Surveyor regarding the starboard anchor-*** The ships officers and Master of the CLYDE S. VANENKEVORT were never notified and were not aware that the starboard anchor was out of the anchor pocket. Master [REDACTED] informed investigators that this issue should have been reported directly to him and that he considered the starboard anchor to be essential equipment. He assumed that when the anchors were ordered to be cleared that both port and starboard anchors were being cleared, not just the port.

Mr. [REDACTED] discovered that the starboard anchor was sticking out about a foot from the hull pocket sometime in March of 2018. He discussed this with Mr. [REDACTED]. Both Mr. [REDACTED] and Mr. [REDACTED] knew that the brake band had recently been renewed while in lay-up, but assumed that the brake must still be slipping as it had prior to the 2017 winter lay-up. Both ABs came to an agreement that they would no longer touch the starboard system and would only clear and secure the port anchor. They reasoned that since they were the only two crew members operating the anchors that this would not be a problem.

During Coast Guard and NTSB interviews, Mr. [REDACTED] did not remember reporting that the starboard anchoring system discrepancy to the mates or master of the CLYDE S. VANENKEVORT. He did however claim to remember reporting the finding to the Conveyorman/Barge Engineer [REDACTED].¹ Mr. [REDACTED] claims to have told Mr.

¹ Traditionally, Mr. [REDACTED] position would be described as a Conveyorman on most Great Lakes Laker vessels. On this vessel, however, his title is Barge Engineer, but he is not an official Engineer nor does he have any Qualified Member of Engine Department officer endorsements. Mr. [REDACTED] was a deckhand whose job it was to keep the cargo self-unloading system working and to operate it during discharge operations.

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██████ that the starboard system was broken again. Mr. ██████ expressed that he was never informed of this by Mr. ██████ or anyone else. It is not possible to determine with certainty if Mr. ██████ was actually ever informed about the discrepancy. Nevertheless, he was not considered a ships officer and was the wrong person to take the report.

- 5.2.1 At an unknown location after departure from Duluth on 20 March 2018 and before the ATB reached Detour passage on 1 April 2018 the claw and Paw were removed from the starboard anchor. The anchor remained in a cleared status riding solely on the brake while entering the Straits of Mackinac on 1 April 2018. It is likely that the anchor was cleared out of routine habit by either Mr. ██████ or Mr. ██████ before or shortly after the vessel entered the St. Marys River. Neither Mr. ██████ nor Mr. ██████ claim to know who cleared the starboard anchor. However, during post casualty interviews Mr. ██████ confessed to not checking the starboard anchor to verify it was secure upon being given the order by the 2nd Mate Mr. ██████ while departing from the Detour Passage.
- 5.2.2 The U.S. Coast Guard and the ABS both inspected the starboard anchor system in March 2018, the U.S. Coast Guard on 12 March 2018 and ABS on 18 March 2018. A functional test of the system was carried out by ABS whereas the U.S. Coast Guard conducted only a visual inspection. Both the visual test and the functional test considered the system to be operating satisfactorily. The crew informed the U.S. Coast Guard about the replacement of the brake band, however failed to notify ABS of the replacement. The failure of ships officers to inform the ABS inspector about the brake band replacement is a failure of communication.
- 5.3. ***Weather and ice conditions in the Straits of Mackinac on 1 April 2018***- Ice conditions in the St. Marys River and the resulting impact vibrations to the hull of the ERIE TRADER contributed to the anchor gradually deploying from the improperly installed starboard brake. These vibrations combined with the weight of the ice on the starboard anchor as it hung out of the pocket of the hawsepipe, were causal factors in the inadvertent deployment of the anchor.

The St. Marys River was closed on 31 March 2018 due to significant ice conditions. Mr. ██████ was standing Bow Watch on the ERIE TRADER during this time and described the noise caused by ice hitting the bow of ERIE TRADER. He stated that “It sounded like thousands of freight trains hitting the hull.”

Video footage of ERIE TRADER was captured from a VTS camera as the ATB came thorough Rock Cut west of Neebish Island in the St. Marys River on 1 April 2018. This video shows the significant ice conditions the ATB was subjected to while transiting the St Marys River. It also shows the starboard anchor hanging out of the pocket just below the hawsepipe with the weight of ice that had formed on it (see figure 4-7).

The vibrations of the ice impacting with the hull of ERIE TRADER caused the anchor chain to begin to vibrate loose. It is likely that the anchor started to slip further as the vessel entered into Lake Huron and into the Straits where headwinds upwards of 45 mph and seas

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of 6-8ft caused the ATB to pitch and roll. These weather conditions and their effect on the ATB were attested to by both the Master and 2nd Mate during post casualty interviews.

- 5.3.1 It should be noted that the ATB did come through Round Island Pass without any apparent effect on speed or maneuverability or any noticeable shifting of the barge. Round Island Pass is approximately 30 feet deep. The ATB had slowed its speed to approximately 8 mph while coming through the pass. It is highly likely that if the anchor had been dragging on the bottom through Round Island Pass that there would have been a noticeable shift in the maneuverability of the ATB. Because no such shift occurred, it is most likely that the anchor started to pay out more rapidly after the ATB departed Round Island Pass. It is also possible that the anchor may have slightly touched the bottom while coming through Round Island Pass and was dragged just enough to have the anchor chain start paying out more rapidly in the deeper waters before the first pipeline approximately 5.5 nautical miles away. Once the chain had paid out to a certain undermined depth, the weight of the chain and anchor on the improperly installed brake would have grown exponentially, and the chain would have begun to deploy more rapidly when the flukes made contact with the lake bed.
- 5.3.2 Before arriving in Indiana Harbor, IN on 3 April 2018 the ERIE TRADER had deployed approximately 360 feet of anchor chain from the Straits of Mackinac and across the entire span of Lake Michigan. During this transit the flukes on the starboard anchor were ripped from the anchor stock and were never located. It is likely that the flukes broke free from the anchor stock after coming into contact with the 3rd transmission cable. When the last cable was snagged it may have generated enough force to rip the flukes away from the stock. Shortly after striking the third cable, the ATB departed the Straits of Mackinaw and reached the deeper waters of Lake Michigan where the stock and chain would likely not touch the bottom and would have been drifting through the water underneath the ATB throughout most of the transit. Without the flukes dragging and catching on the bottom, the windlass brake was able to hold the chain from being deployed any further. This may explain why all 500 plus feet of chain did not pay out.
- 5.4 **Crew complacency** –2nd Mate, Mr. [REDACTED] had been employed on the CLYDE S. VAN ENKEVORT for the shipping season from March through December 2017. He was driving the ATB as it passed through Detour Passage on 1 April 2018. Shortly after coming through Detour Passage on 1 April 2018 at approximately 1455, he noticed that the tugs speed at full power was approximately 2-3 mph slower at full speed than normal. During the previous shipping season in 2017 the CLYDE S. VANENKEVORT had an issue with the controllable pitch propeller system that caused the vessel's normal speed at full power to be diminished by approximately 2-3 mph. Mr. [REDACTED] knew that this problem was repaired while the vessel was in winter lay-up, but assumed that the same issue must have returned. He also assumed the slower speed was due to a substantial 30 mph headwind and 6-8 foot seas.

It is a possibility that the speed discrepancy was not due to a CPP issue or the weather, but because the starboard anchor had been deployed and was dragging through the water or on the lake bed. The assumption of the CPP discrepancy may have prevented further

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investigation into the issue by the 2nd Mate. If all options had been investigated instead of assumed the crew may have discovered that the starboard anchor had been deployed before the incident occurred.

- 5.4.1 The wheelhouse of the CLYDE S. VANENKEVORT is located atop a tower on the tug with the engine exhaust directly behind the wheelhouse. The anchors are not visible from the wheelhouse and any noise associated with a deployed starboard anchor may have been drowned out by the exhaust noise.
- 5.4.2 AB, Mr. █████ assumed that the starboard anchor was secure and did not carry out his duty to verify a secure anchor upon departure from Detour Passage. When given the order to secure the anchors, Mr. █████ confirmed to the 2nd Mate that the anchors had been secured via hand held radio from the ERIE TRADER.
- 5.4.3 Neither Bow Watch AB claimed to remember clearing the starboard anchor. When the starboard anchor was initially discovered deployed by Mr. █████ on 3 April 2018, he discovered that the claw and paw had both been disengaged. He observed the claw had been tied off manually to the bulkhead and the paw had been disengaged. The starboard anchor had not been checked since 30 March when the vessel was in Duluth, MN. It would have been impossible for these devices to become disengaged on their own. At an unknown time, somewhere between departing Duluth, MN on 30 March 2018 and departing Detour Passage, MI on 1 April 2018 someone manually disengaged the claw and paw from the starboard anchor chain. It is most likely that the anchor was cleared as a force of habit by either Mr. █████ or Mr. █████ shortly before the ATB arrived to Sault Sainte Marie, MI, or while in the St. Marys River moored on the south pier after having just come through the Soo Locks on 31 March 2018.
- 5.5 ***Crew not familiar with CLYDE S. VANENKEVORT policy and procedures***- The CLYDE S. VANENKEVORT was in the process of implementing company policy to align with new U.S. Coast Guard regulations applicable to towing vessels in 46 CFR Subchapter M. However, the new regulations would not come into effect until 20 July 2018. Given the new regulations and the new safety management systems (SMS)¹, the captain and crew of the vessel were still in the process of implementing and learning the system and had not fully implemented it. Both Mr. █████ and Mr. █████ were unaware of the company procedures for reporting non-conformities and/or deficiencies.

The first paragraph in Section 10 of the Company Procedures Manual states the following *10.2- All Company personnel/employees are responsible for identifying and reporting to their immediate Department Head any non-conformity, hazardous situations, or accidents or near misses that they may witness or be involved in.*

- 5.5.1 There was no evidence of company procedures and processes related to anchor operations, checklists, planned and unplanned maintenance, and reporting of equipment deficiencies,

¹ 33 CFR 96.120 defines Safety Management System as “a structured and documented system enabling company and vessel personnel to effectively implement safety and environmental protection policies.”

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corrective actions, lock out tag out procedures, or other safety measures to place defective equipment out of service. Furthermore, there was no evidence of any lock out/tag out, signage, or corrective action plan to appropriately resolve the issue and ensure the starboard anchor would not be cleared or used until properly repaired.

Section 6 - Conclusions:

6.1. *Cause of the Casualty:*

Causal factors that led to this marine casualty include: (1) Improper installation of the starboard windlass brake bands on the ERIE TRADER. (2) Communications failures between crew and ship's officers. (3) Communications failures between ship's officers and the ABS Surveyor regarding the ERIE TRADER's starboard anchor brake band replacement. (4) Weather and ice conditions in the Straits of Mackinac on 1 April 2018. (5) Crew member complacency. (6) Crew members lack of familiarity with company policy and procedures.

6.2 *Violations by credentialed mariners:*

6.2.1 The actions described in paragraph 4.30 represent an act of misconduct by the Able Seaman [REDACTED] as Bow Watch on the ERIE TRADER under Title 46, United States Code, Subtitle II, Part E. and was determined to have contributed to the cause of this casualty.

6.2.2 The actions described in paragraph 4.20 and 4.25 of this report represent an act of negligence by Able Seaman [REDACTED] as Bow Watch on ERIE TRADER under Title 46, United States Code, Subtitle II, Part E Subchapter 7703 and 46 CFR Subpart 5.29.

6.3 *Violations by Members of the U.S. Coast Guard:*

There is no evidence that there was an act of misconduct, incompetence, negligence, unskillfulness, or willful violation of law committed on behalf of any Coast Guard personnel that contributed to the cause of the casualty.

6.4 *Violations of Criminal Law:*

There is no evidence of violations of criminal law by any personnel discovered during the course of the investigation into this casualty.

6.5 *Need for New or Amended Laws/Regulations:*

As a result of this incident, the U.S. Coast Guard has established a Regulated Navigation Area (RNA) in the Straits of Mackinac. On 31 October 2018 this RNA came into effect. This RNA prohibits vessels from anchoring within one nautical mile of any charted submerged cable and/or pipeline areas.

Section 7 - Recommendations:

7.1 Findings of Concern:

- 7.1.1 The Van Enkevort Tug and Barge company policy was lacking in various areas to include anchoring operations, planned and unplanned maintenance, reporting of equipment deficiencies, corrective actions, procedures to document and place defective equipment out of service, procedures for reporting maintenance and repairs to their classification society ABS. It is recommended that Van Enkevort Tug and Barge take action to incorporate and implement these procedures into their current SMS.
- 7.1.2 Lack of proper communication between the crew and the ships officers was a causal factor in this incident. It is recommended that Van Enkevort Tug and Barge provide training to all crew members on the proper procedures for the reporting and documentation of broken and inoperable equipment.
- 7.1.3 During the winter lay-up of 2018 Van Enkevort Tug and Barge hired a Port Engineer to oversee all repairs and maintenance being conducted. The repairs made to the starboard windlass brake were never verified or inspected by the Port Engineer nor were they made known to the ABS Surveyor. Furthermore, proper instructions were not provided to the crew for replacement of the windlass brake. It is recommended that Van Enkevort Tug and Barge implement policy and procedure regarding Port Engineer oversight of repairs made while in lay-up status. This company policy should address proper communications with ABS and the U.S. Coast Guard.

8.1 Safety Recommendations

- 8.1.1 Currently, no regulations exist in 46 Subchapter I that require an alarm that notifies the bridge when an anchor had been deployed. Lakers and ATBs in the Coast Guard District 9 area of responsibility with a similar configuration (where the anchoring system is not visible from the deck or the bridge) present a potential latent unsafe condition allowing for the accidental deployment on of an anchor without the crew being aware. Furthermore, this could also present a latent unsafe condition for Subchapter I vessels with a similar configuration nationwide. The U.S. Coast Guard should consider establishing regulations in 46 subchapter I to address this condition.

Note: Since this incident, Van Enkevort Tug and Barge Inc. has taken action to install a signaling system on the ERIE TRADER that alerts the bridge whenever an anchor has been deployed.

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9.1 *Administrative Recommendations:*

- 9.1.1 It is recommended that Van Enkevort Tug and Barge incorporate and implement procedures into their SMS regarding anchoring operations, checklists, planned and unplanned maintenance, and reporting of equipment deficiencies, corrective actions, lock out tag out procedures, or other safety measures to document and place defective equipment out of service.
- 9.1.2 It is recommended that U.S. Coast Guard, Sector Sault Sainte Marie initiate Suspension and Revocation proceedings against the Able Seaman [REDACTED] for misconduct in accordance with Title 46, United States Code, Subtitle II, Part E Subchapter 7703. As per section 4.30 of this report, Mr. [REDACTED] confirmed to the 2nd Mate that the anchors were secure but failed to actually verify that they were.
- 9.1.3 It is recommended that the U.S Coast Guard issue a Letter of Warning to Able Seaman [REDACTED] for negligence in accordance with Title 46, United States Code, Subtitle II, Part E Subchapter 7703 and 46 CFR Subpart 5.29 for reasons listed in section 4.20 and 4.25 of this report.
- 9.1.4 It is recommended that this investigation be closed.

[REDACTED]
[REDACTED]
Investigating Officer
U.S. Coast Guard