

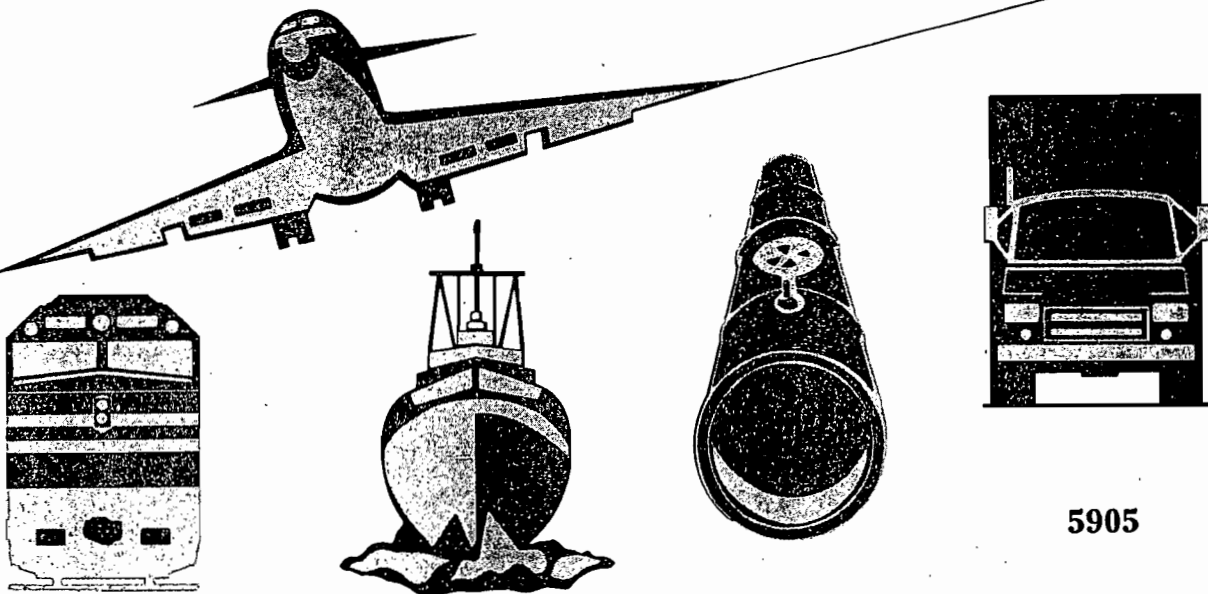
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NTSB/MAR-92/01/SUM

# **NATIONAL TRANSPORTATION SAFETY BOARD**

WASHINGTON, D.C. 20594

## **MARINE ACCIDENT/INCIDENT REPORT SUMMARY REPORT**

**COLLISION OF THE U.S. SAILING VESSEL  
AMERICAN PROMISE AND THE U.S. FREIGHT  
BARGE E-2, BEING PUSHED AHEAD OF THE  
U.S. TUG M/V SUN COAST, OFF COVE POINT,  
CHESAPEAKE BAY, APRIL 21, 1991**



5905

**Abstract:** This publication contains one summary report of an accident investigated by the National Transportation Safety Board off Cove Point, Chesapeake Bay, on April 21, 1991. The safety issues discussed in the report are the adequacy of collision avoidance actions, the adequacy of look-outs, the adequacy of radiotelephone communications, and the effectiveness of the sailing vessel's radar reflector.

The National Transportation Safety Board is an independent Federal agency dedicated to promoting aviation, railroad, highway, marine, pipeline, and hazardous materials safety. Established in 1967, the agency is mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable cause of accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The Safety Board makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

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Transportation  
Safety Board**

*Washington, D. C. 20594*

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## **MARINE ACCIDENT/INCIDENT SUMMARY**

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Accident Number:	DCA-91-MM-029
Vessels:	U.S. sailing vessel AMERICAN PROMISE and U.S. tug SUN COAST pushing freight barge E-2.
Type of Occurrence:	Collision
Location:	Chesapeake Bay, about 2 miles north of Cove Point, Maryland (latitude 38° 25.34'N, longitude 076° 22.84'W)
Date and Time:	April 21, 1991, 0205 local
Owners:	AMERICAN PROMISE: U.S. Naval Academy, Annapolis, Maryland SUN COAST: Robert Dann Company, Chesapeake City, Maryland Barge E-2: Baltimore Gas & Electric Company, Baltimore, Maryland
Persons on Board:	AMERICAN PROMISE: 12; SUN COAST: 5; Barge E-2: Unmanned
Injuries:	None
Damage:	AMERICAN PROMISE: Over \$800,000; SUNCOAST: None; Barge E-2: About \$10,000

About 0205<sup>1</sup> on April 21, 1991, in the Chesapeake Bay, off Cove Point, Maryland, the U.S. Naval Academy sailing vessel AMERICAN PROMISE and Barge E-2, which was being pushed ahead of the tug SUN COAST, collided. The sailing vessel had 12 crewmembers on board, the tug had 5 crewmembers, and the barge was unmanned. No serious injuries resulted from this accident. The sailing vessel sank, but was salvaged. The AMERICAN PROMISE sustained more than \$800,000 damage and the Barge E-2 sustained about \$10,000 damage. The SUN COAST was not damaged.

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<sup>1</sup>All times are local based on a 24-hour clock.

As a result of its investigation of this accident, the Safety Board identified four major safety issues:

- o Adequacy of collision avoidance actions.
- o Adequacy of look-outs.
- o Adequacy of radiotelephone communications.
- o Effectiveness of the sailing vessel's radar reflector.

Following a narrative of the accident, this summary report will discuss these issues.

## I. THE ACCIDENT

### Events Aboard the AMERICAN PROMISE

On April 20, 1991, the U.S. Naval Academy's AMERICAN PROMISE, a wood/figerglass-hulled 60-foot-long sailing vessel (see figures 1 and 2), was returning to the Naval Academy at Annapolis, Maryland, from an overnight training cruise to Point No Point on Chesapeake Bay. Three U.S. Navy officers and nine U.S. Naval Academy midshipmen manned the vessel. The Officer in Charge (OIC) and Assistant Officer in Charge (AOIC), both lieutenant commanders, were experienced and qualified to operate the AMERICAN PROMISE. A captain who was aboard as safety observer (SO) was undergoing qualification to operate the vessel.

About 1800 on April 20, the vessel had turned at Point No Point (9.5 nmi south of Cedar Point) and was tacking (maneuvering into the wind) eastward and westward across the bay as it sailed northward. Winds were from north-northeast at 20 knots, seas were about 4 feet high, and frequent rain squalls reduced visibility. Because of the weather, the vessel's mainsail was reefed<sup>2</sup> to about 80 percent and the genoa jib sail to about 85 percent. The transit from 1800 to 2400 was uneventful. The AOIC, who was in charge of the midwatch (0000 to 0400), relieved the OIC at 2330. The four midshipmen assisting the AOIC included a "watch captain,"<sup>3</sup> who also served as navigator; a helmsman; and two midshipmen, who were assigned to the port and starboard winches that controlled the genoa jib sheets (lines used to control the jib sail).

Shortly after 0140 on April 21, 1991, the AMERICAN PROMISE cleared the restricted area<sup>4</sup> near the western shore north of Cove Point, Maryland, on a starboard tack (wind on the starboard side). The watch captain recommended to the AOIC that the vessel be turned to head eastward on a port tack, and the AOIC attempted to do so.

The AOIC directed the midshipman tending the starboard jib sheet to pull in the sheet. The AOIC stated that when the midshipman pulled the line, "... it was the wrong sheet; it was the staysail sheet." The starboard genoa jib sheet had been

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<sup>2</sup>Reduction or shortening of the total sail area available.

<sup>3</sup>Designation of the midshipman overseeing the activities of other midshipmen on watch.

<sup>4</sup>A safety zone for liquified natural gas (LNG) vessel maneuvering.

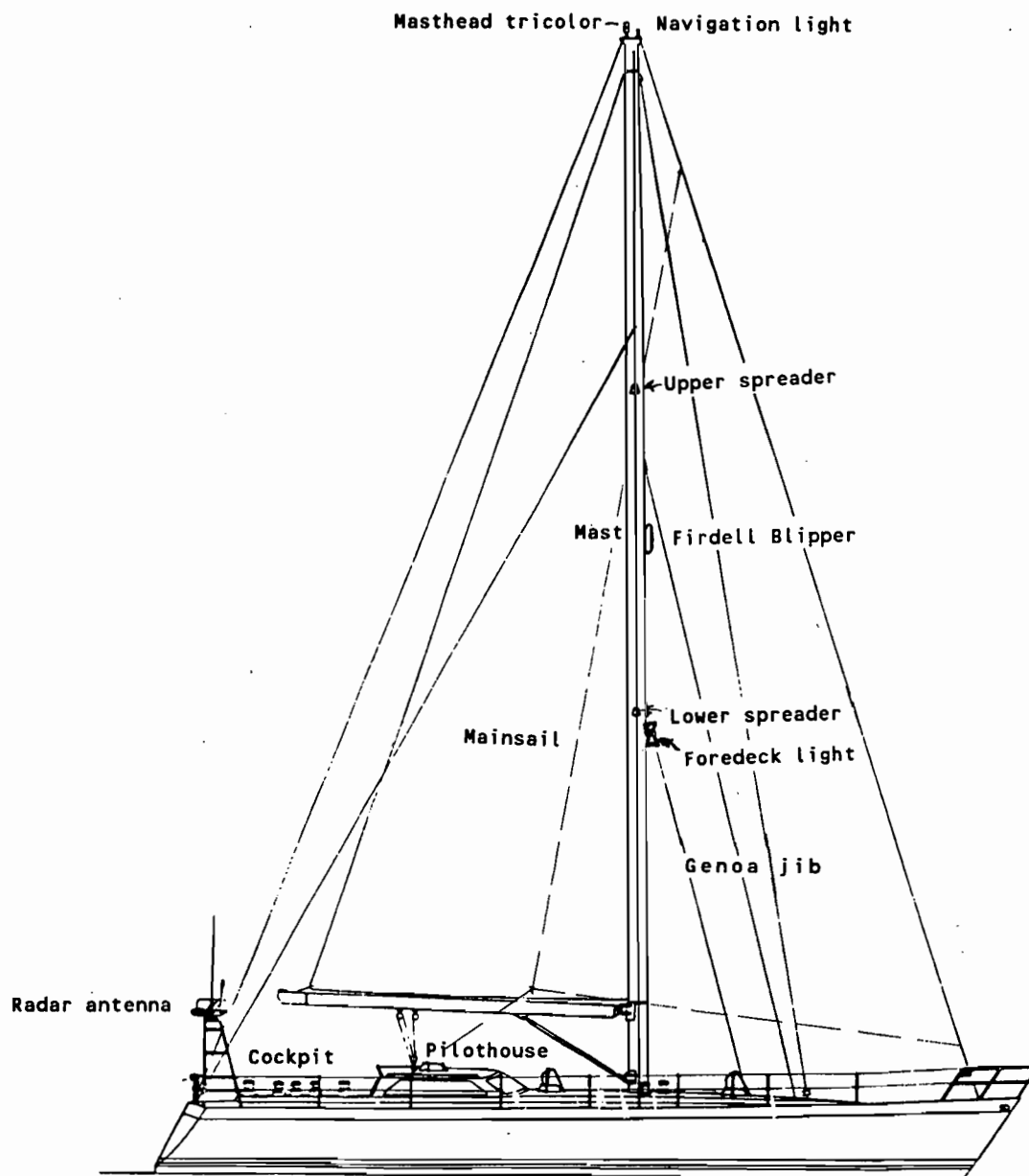


Figure 1.-- AMERICAN PROMISE profile.

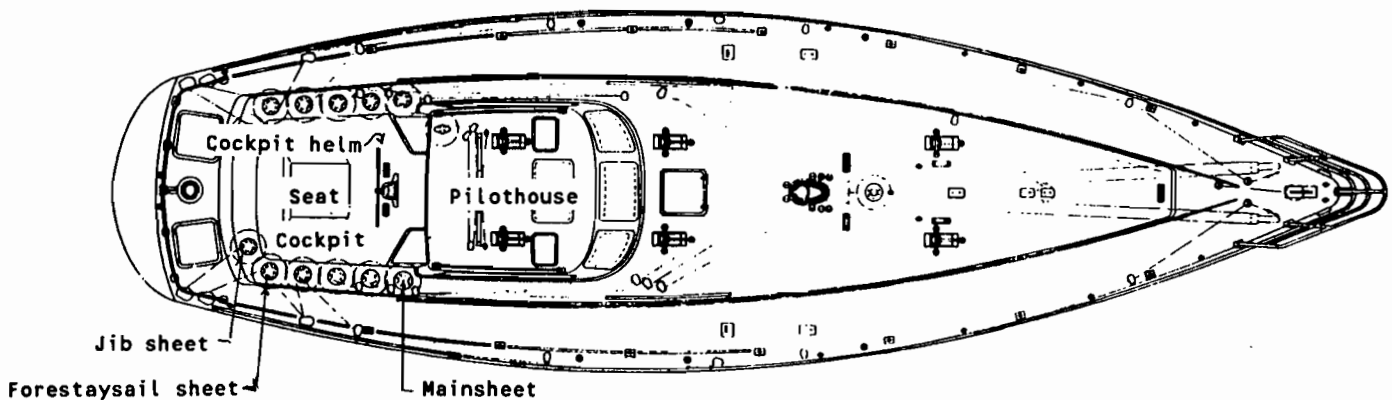


Figure 2.--AMERICAN PROMISE deck plan.

inadvertently released and had pulled away from the cockpit during the previous tack. The helmsman advised the AOIC that the jib sheets needed to be cleared.

The AOIC went forward on the starboard side to retrieve the starboard jib sheet and found it had been pulled across the deck to the port side. The AOIC stated that while trying to trim the genoa, the sail was fluttering and the loose starboard sheet wrapped itself several times around the port sheet between the genoa clew and port deck fairlead.<sup>5</sup> The AOIC tried to unwrap the sheets but could not readily do so. He estimated that unwrapping the lines might take 10 to 15 minutes, and therefore decided to "heave-to"<sup>6</sup> with the genoa jib backwinded<sup>7</sup> and the mainsail trimmed in close on the starboard side.

<sup>5</sup>A clew is the lower after corner of a triangular sail. A fairlead is a rigging fitting that serves to guide a line in a particular direction.

<sup>6</sup>Heave-to refers to setting a sailing vessel into the wind. Under this condition, a vessel's headway is reduced, stopped, or possibly reversed.

<sup>7</sup>Backwinding: Securing or holding the sail against the wind to obtain maximum pressure on the sail and thereby reduce its effectiveness to use the wind to move the vessel forward.

The AOIC stated that while heaving-to, he verified the vessel's position. He said that he twice checked for nearby vessels both visually and on radar. He said that he alternately saw the port and starboard side lights of a small vessel about 1.5 nmi to the south and concluded that it was a sailing vessel tacking across the bay. He estimated it would not reach the AMERICAN PROMISE in less than 40 minutes.

The AOIC said that between 0145 and 0150, he relieved the helmsman, hove-to to the AMERICAN PROMISE on a heading of 060°M (magnetic), and put the helm to left full rudder. He estimated that the wind was about 20 knots from 30 to 40 degrees off the port bow, that the vessel's headway was about 1.5 knots, and that the current was setting southward at 1 knot.

According to testimony, the AMERICAN PROMISE had assigned look-outs. The midshipman assigned to the starboard winch stated that it was standard operating procedure for everyone on watch to serve as a look-out. While the vessel was hove-to, the AOIC and the port winch midshipman went forward to clear the fouled sheets, leaving the watch captain to navigate and the helmsman and midshipman for the starboard winch to serve as look-outs from the cockpit. The AOIC testified that he and the two winch midshipmen served as look-outs and that no one was assigned as a radar watch.<sup>8</sup>

To provide light for working on deck, the foredeck light was turned on. Located on the mast about 30 feet above the waterline, the light was screened to shine downward so that it primarily illuminated the foredeck. The light also somewhat increased the visibility of the AMERICAN PROMISE to other vessels by partially illuminating the sails.

For increased detectability by radar, the sailing vessel was equipped with an 18- by 30-inch Firdell Blipper radar reflector<sup>9</sup> secured to the mast, about 45 feet above the waterline.

The AOIC and the midshipman had worked for 10 minutes to clear the sheets when the watch captain reported an approaching vessel (the SUN COAST tow). The watch captain testified that when she "spotted the red running [side] light and two white masthead lights of the tug," she realized there was a problem "because it was [on a] constant bearing." She and the other midshipmen in the cockpit used binoculars to observe the tow. The watch captain stated the tow was "pretty far off when we first saw it." The helmsman estimated the lights to be a mile away. The midshipman for the starboard winch said that he did not see the barge prior to collision.

The AOIC first saw the tug's port side light, towing lights, and "deck working lights," and the tug's port bow when it was bearing about 040° relative to the AMERICAN PROMISE and within 1,000 to 1,500 yards. He stated that he thought the tug was towing astern. The AOIC stated that he spent 10 to 15 more seconds trying to clear the sheets so the AMERICAN PROMISE could maneuver with sails but was unsuccessful.

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<sup>8</sup>The AMERICAN PROMISE was equipped with a Raytheon Model R-12 radar transceiver, located 7 feet above the stern deck.

<sup>9</sup>The Firdell Blipper radar reflector gives a radar echo through 360 degrees of azimuth and +/- 20 degrees of heel that increases the signal strength on a receiving vessel's radarscope.

The AOIC directed the watch captain to go below, awaken the other officers, and get them topside. When the watch captain returned to the pilothouse, she adjusted the VHF-FM radiotelephone from channel 82A to channel 12 because she "knew that was the net [frequency] that most of the tugs communicated on or monitored"<sup>10</sup> based on her past experience. She did not transmit any messages. She looked at the chart briefly to check "where we were." The watch captain also looked at the radar but did not detect the tow on the radarscope. She stated that with "rolling motion, the radar wasn't very reliable."

The SO stated that when he arrived topside about 0200, he talked briefly with the watch captain and looked at the magnetic steering compass, which showed a heading 060°M. The SO noticed the wind was from 030°M, off the port bow, and that the vessel was hove-to with the mainsail partially reefed and the boom slightly to starboard. He saw a barge about 1/4 nmi to starboard, bearing about to 080° relative; he stated it showed two "port running [side] lights . . . two vertical white lights and I'm not sure when I saw the yellow flashing light." He said he "didn't see any dangerous situation." He stated that about 20 or 30 seconds later the watch captain reported, "Sir, I see a green light." The SO said that he "saw the green light, too," and immediately went to the helm and tried to turn it left, only to find the rudder was already to full left. He then ordered the midshipman at the helm to go below and start the engine.

The OIC stated that the watch captain came below deck about 0145 and reported a problem with the sail and that an oncoming vessel had been sighted on the starboard side. He put on his foul weather gear and went to the pilothouse to check the radarscope. He said that he did not see anything unusual on the radarscope. He also looked at the chart to find the vessel's position.

In the meantime, AOIC had returned to the cockpit to try and turn the AMERICAN PROMISE to starboard because a turn to port into the wind was impossible with the vessel already hove-to. He testified that he started to release the mainsheet to turn the vessel to starboard but determined that changing course this late would result in a bow-on collision. He said that he saw "the towing lights, both side lights on the tug, and the dim yellow flashing light on the barge" which was being pushed ahead, but he did not see any side lights on the barge.

When the OIC went on deck, he saw the AMERICAN PROMISE was heading 060°M, and located "probably less than a mile from shoal water," right off Calvert Cliffs. He observed that the wind and sea were from 020°M; and the sailing vessel was making "probably a knot" and setting a "knot and a half maybe" with the current.

The OIC testified he was on deck only 1 or 2 minutes before he sighted the barge's bow and bow wave, about 20 to 25 yards away, just forward of the sailing vessel's bow. He stated that he shined a spotlight toward the barge and subsequently the tug illuminated the bow of the barge with its spotlight.

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<sup>10</sup>The Federal Communications Commission (FCC) has assigned Channel 12 for port operations (traffic advisories, including vessel traffic services [VTS] in some ports).

The AOIC testified that the aspect of the barge had changed as if it were in a port turn, and the rate of closure was "incredibly fast." The OIC also testified that the barge appeared to turn to its left. The AOIC stated that he reversed the engine, but it had no effect. Seconds later, the barge struck the AMERICAN PROMISE on the starboard side, directly amidship.

### Events Aboard the SUN COAST

The SUN COAST, an 85-foot-long, 1,800-HP, twin-screw diesel engine tug was bound from Newport News, Virginia, to Baltimore harbor, pushing the 350-foot-long Barge E-2, which was carrying about 7,000 tons of coal. The tug's bow was secured in the notched stern of the barge. (See figures 3 and 4.) The barge's drafts were 14' 4" forward and 15' 2" aft. The tug's 5-man crew comprised a master, relief master, two deckhands, and an engineer; the barge was unmanned.

The SUN COAST's underway watch comprised two persons: the tug operator (master or relief master) and one of the deckhands, standing 6-hour rotational watches. The relief master said that he was awakened on April 20 at 2330 to take the midnight watch (0000 to 0600). When he relieved the watch, the tow was off Cedar Point, 8 nmi south of Cove Point. (See figure 5.)

The relief master used the radar on the 6-mile-scale for navigation and the Loran<sup>11</sup> to determine course, speed, latitude, and longitude. The tug had a second radar, but it was turned off because electronic interference occurred when both radars were operating. The relief master stated that the radarscope showed sea return and rain clutter but that he picked up number 77 buoy "real good" while proceeding northward. With both engines at 3/4 speed, or 900 rpm, the Loran indicated the tow's speed was 4.5 knots. He estimated that at such speed, under the prevailing conditions, he could stop the tow dead in the water and commence moving astern within 1.4 nmi in less than 5 minutes.

At 0125, when Cove Point was abeam and about 1 nmi to port of the tow, the relief master altered course to 343 degrees [true], on a heading "up through buoy 78" (10.5 nmi north of Cove Point). He stated that he was "oversteering on autopilot . . . a good 10 degrees to compensate for leeway; the gyrocompass had no error. He observed the seas were "3 to 5 feet, breaking over the bow of the barge, mostly a swell rather than a chop." A "squall would come and go." The wind speed was 17 to 20 knots from NNE, with "pretty good gusts."

About 0145, while passing the Liquid Natural Gas (LNG) terminal above Cove Point, the relief master showed the deckhand the LNG offshore facilities imagery on the radarscope. After passing the LNG facilities, the relief master used a flashlight to check the clock, which showed 0200. The deckhand then left the pilothouse to make his routine engineroom check.

The relief master testified that after the deckhand left the pilothouse, he looked at the radarscope and saw a little flicker, "just a speck, which could have been a fishing boat," bearing 300 degrees relative, not more than "a quarter mile off." He said the second radar sweep did not pick up the contact on the radarscope.

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<sup>11</sup>An electronic aid to navigation system used for position fixing.

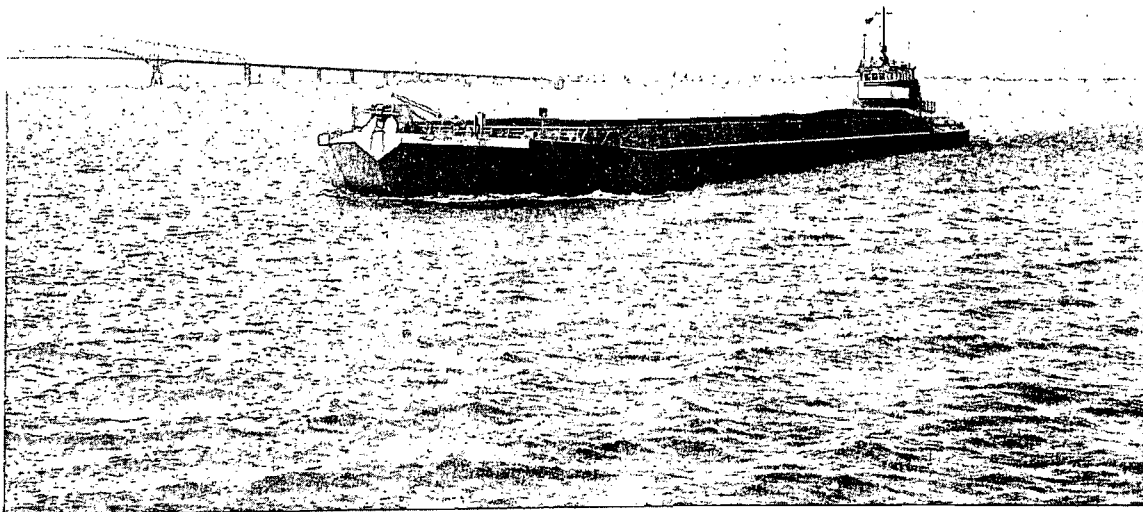


Figure 3.--Photograph of Barge E-2 being pushed by the tug GULF COAST.

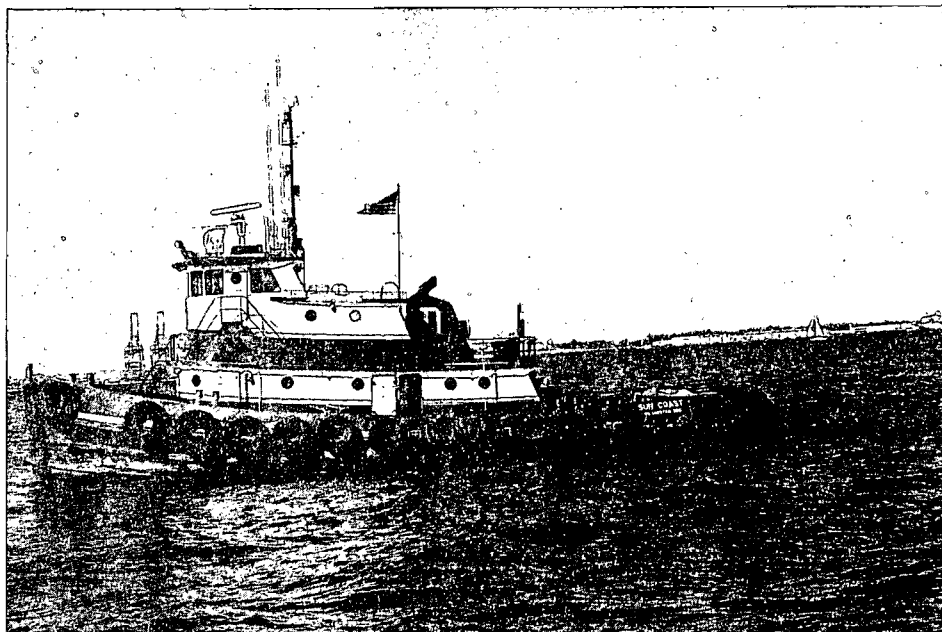


Figure 4.--Photograph of the SUN COAST.

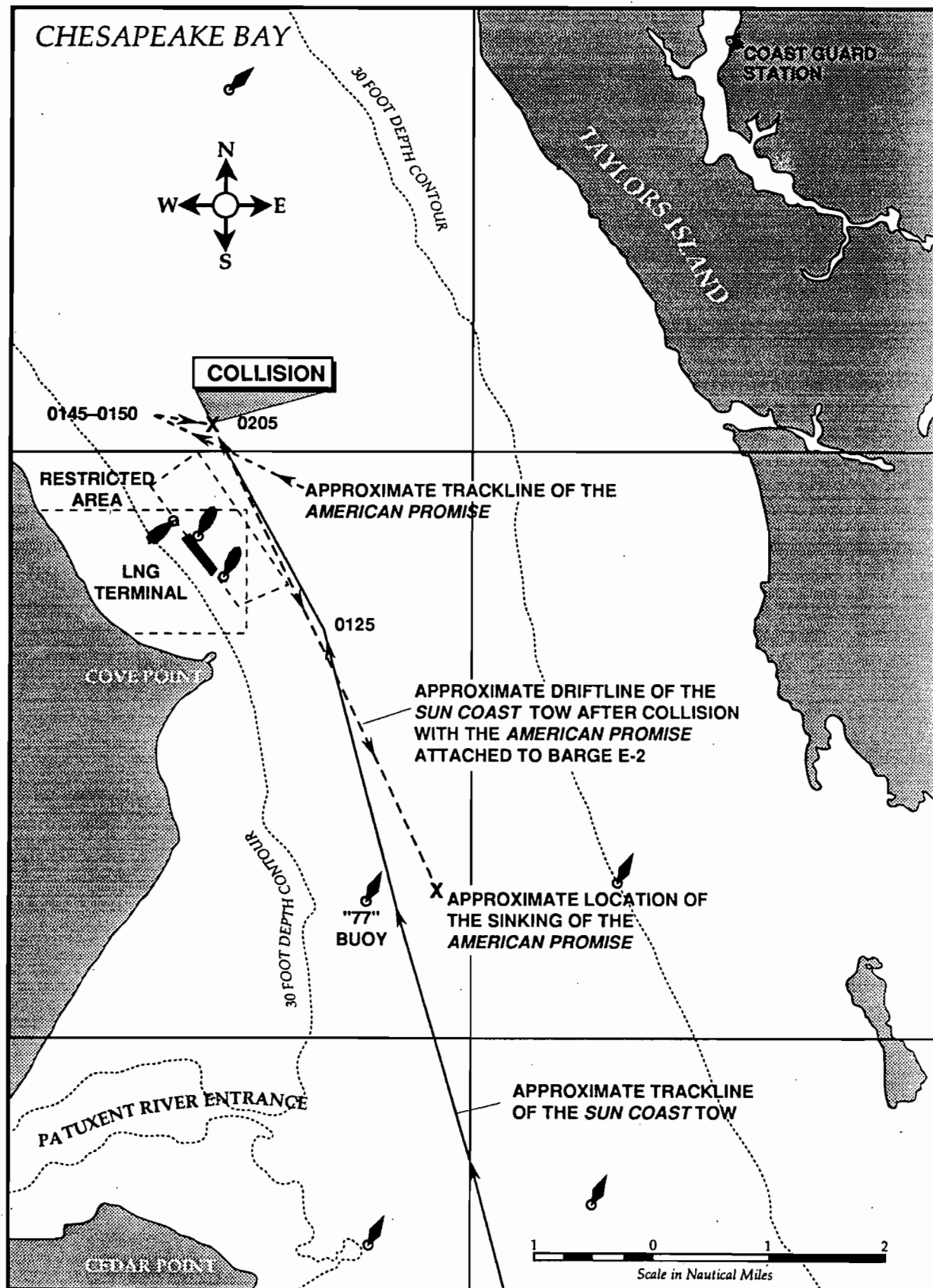


Figure 5.-- Location of the accident.

A subsequent sweep picked up a second flicker on the radarscope, bearing 320 degrees relative, "coming in fairly fast," and closer than a quarter mile. The relief master said that he then switched the radar to the 3-mile scale and "flipped off the filter for the range to see if it would pick it up better," but he still was unable to get accurate radar ranges of the contact.

Meanwhile, the relief master tried to call the vessel on radiotelephone VHF-FM channels 16 and 13.<sup>12</sup> He said that he "figured it was a sailboat" because "you're usually going to pick a sail up as just a flicker." He said he also thought it might be a fishing boat "because they are low to the water." The relief master said no one responded to the two or three radiotelephone calls that he made. He then started to turn the tug to the right and to sound the danger signal, five short, rapid blasts on the tug's whistle.<sup>13</sup> The AMERICAN PROMISE's crewmembers testified that they did not hear the whistle signals from the SUN COAST.

While turning the tow, the SUN COAST's relief master put the starboard engine and then the port engine in reverse (reverse maneuver usually takes 3 to 4 seconds). He stated that the Loran indicated the tug's speed "was down to 1.5 knots." He said that visibility was half a mile "in and out." He then saw a high green light, which indicated to him that the vessel ahead was a sailboat. The sailboat was "off the corner of the barge . . . about 10 degrees off the port bow" and that the bow of the barge was swinging to starboard. He further stated that the "sailing vessel made contact on the port side of the bow of the barge and then it just wrapped right around the barge."

The deckhand testified that he had checked the engineroom and was returning to the pilothouse after 0200 when he heard the engines idle down and go into full reverse and the tug's whistle sound five or six short blasts a couple of times. The deckhand stated that when he arrived in the pilothouse, the relief master told him that he had "seen a sailboat that was coming at us." The deckhand stated that he had turned on the spotlight and was shining it around when the sailboat came out of the rain and hit the tow. He then went below to awaken the master.

### Post Collision Events

When the AMERICAN PROMISE was struck, according to the OIC, the sailing vessel rebounded about 15 feet, knocking him and the other crewmembers off balance. The watch captain fell over the side and drifted away, supported by an inflated life vest, which was equipped with a strobe light.

Using VHF-FM channel 16, the SUN COAST's relief master radioed the Coast Guard Station at Annapolis to report the accident. The communications watchstander at the Coast Guard Station, Taylors Island, Maryland, testified that at 0206, he overheard and logged the SUN COAST radioing Annapolis and interrupted to respond. He also stated that earlier he had overheard the tug operator twice try to contact a sailboat 1 mile off Cove Point on VHF-FM 16 but had not heard a response.

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<sup>12</sup>The FCC has assigned Channel 16 for "distress, safety and calling (intership and ship-to-coast)," and channel 13 for "navigational (ship's) bridge to (ship's) bridge.

<sup>13</sup>The SUN COAST's whistle was triple trumpets mounted on the top of the pilothouse.

The SUN COAST's relief master reported to the Taylors Island Coast Guard station watchstander that the tow had "hit a sailing vessel off Cove Point." The watchstander sounded the station alarm to alert the standby boatcrew; at 0210, a 41-foot Coast Guard boat with a crew of five was dispatched to the accident site.

Meanwhile, the AOIC on the AMERICAN PROMISE, who was then listening to channel 16, overheard the SUN COAST's communication with Taylors Island Coast Guard station. Using channel 16, the AOIC first radioed the tug to request assistance and then the Coast Guard to report that it was the AMERICAN PROMISE that had been involved in the collision.

The AOIC and the Coast Guard communication watchstander then switched to VHF-FM 22A<sup>14</sup> and the AOIC provided additional information. Before radioing the Coast Guard, the AOIC had checked the water level in the bilges. Upon finding about 4 inches of water in the compartment below the cockpit, he started the bilge pump and closed the vessel's watertight doors except the one to the cockpit. In his communication with the Coast Guard, the AOIC reported that the AMERICAN PROMISE had no major flooding, 12 persons aboard, and at least one person unaccounted for.

Midshipmen who made subsequent checks of the bilges initially found the bilges dry; however, during a later check, they observed 6 to 8 inches of water in the bilge under the cockpit.

The collision broke the AMERICAN PROMISE's mast. About 30 feet of mast with attached rigging and sails fell across the barge's bow, holding the sailing vessel to the bow of the barge. The SUN COAST's engineer and a deckhand went forward on the barge and provided lines to secure the bow and stern of the AMERICAN PROMISE to the barge. The engineer testified that the AMERICAN PROMISE's engine was making a scraping sound; he advised the crew on the sailing vessel to secure the engine and they did.

The SUN COAST's engineer stated that the barge's forward mast holding the yellow light had been knocked over and the light's lens had been broken. He stated that the red and green side lights were still lighted when he checked them shortly after the collision. The engineer rigged a ladder so that the AMERICAN PROMISE's crew could transfer to the barge.

About 10 minutes after the collision, the SUN COAST's crew sighted the strobe light on the life vest of the sailing vessel's watch captain about a half-mile astern of the tug. Using a spotlight to keep her in sight, the relief master maneuvered the tow so that it would drift toward her. The crew hoisted the watch captain aboard over the tug's starboard side about 0250.

While the AMERICAN PROMISE's crew was aboard the SUN COAST tow, they and the tug's crew tried to detach the sailing vessel so it could be towed away from the barge. The variety of rigging fittings that had to be disassembled and the lack of suitable tools hampered their efforts. Additionally, the tangled rigging and pounding of the sailing vessel against the barge made dismantling the rigging difficult and dangerous.

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<sup>14</sup>Channel 22A is assigned by the FCC for "Coast Guard Liaison."

At 0320, the Taylors Island Coast Guard boat arrived alongside the SUN COAST. Two Coast Guard crewmembers boarded the tug to assess the situation and provide medical assistance to the midshipman who had been recovered from the water. The Coast Guard crewmember, who had been trained in emergency medical procedures, stated that he treated the midshipman for "moderate hypothermia" and arranged transportation to shore after her condition stabilized. The Coast Guard crew remained on scene to assist in the unsuccessful attempt to detach the AMERICAN PROMISE from the barge.

At 0645, the AMERICAN PROMISE had taken sufficient water through the hole in its hull to cause it to break loose from Barge E-2 and to sink in the 50-foot-deep water.

The AMERICAN PROMISE's crewmembers were transferred from the SUN COAST to other vessels and transported to the hospital at Naval Air Station, Patuxent, Maryland, where they were examined and released. The SUN COAST continued with its tow to Baltimore harbor. The AMERICAN PROMISE was subsequently salvaged by the USS PRESERVER and delivered to the Naval Academy on April 26, 1991.

A Safety Board investigator participated in a postaccident survey of the AMERICAN PROMISE during which he found that the vessel's hull had been crushed inward along the starboard quarter and holed from 30 inches upward above the waterline. The collision caused no underwater hull damage.

## II. SAFETY ISSUES

### Adequacy of Collision Avoidance Actions

The operators of the AMERICAN PROMISE and the SUN COAST with its tow were required to comply with the Inland Navigation Rules applicable to U.S. waters.<sup>15</sup> The SUN COAST's relief master testified that he surmised that the "flicker" on his radarscope was a sailboat, but also considered that it might be a fishing boat. Numerous fishing vessels and yachts operate out of the Patuxent River in the vicinity of Cove Point.

Before the collision, the AMERICAN PROMISE was hove-to and heading eastward across the bar, on a course that crossed that of the northbound tow. Although the AMERICAN PROMISE's image appeared on the SUN COAST's radarscope, the tug operator could not determine from the radar image whether the radar contact was a power-driven or sailing vessel. The Inland Rules stipulate different maneuvering actions for a power-driven vessel when it encounters another power-driven vessel than when it encounters a sailing vessel (see Inland Rules 15, 16, 17, and 18 in appendix).

When the SUN COAST's relief master could not differentiate the type of vessel being encountered, his avoidance actions were prescribed in Inland Rule 19, which stipulates the following:

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<sup>15</sup>Inland Navigation Rules, effective December 24, 1981.

A vessel which detects by radar alone the presence of another vessel shall determine if a close-quarters situation is developing or risk of collision exists. If so, she shall take avoiding action in ample time, provided that when such action consists of an alteration of course, so far as possible the following shall be avoided: (i) an alteration of course to port for a vessel forward of the beam, other than for a vessel being overtaken. . .

Further, Inland Rule 8 provides that "if necessary to avoid collision or allow more time to assess the situation, a vessel shall slacken speed or take all way off by stopping or reversing its propulsion."

According to the SUN COAST's relief master, he sounded a danger signal<sup>16</sup> (prescribed by Rule 34) and attempted to avoid collision by slowing the tow and altering course to starboard, and then reversed both engines. However, his actions were too late to prevent the collision.

The Safety Board concludes that when the SUN COAST's operator could not sight the AMERICAN PROMISE but surmised that it was a sailing vessel, could not establish radiotelephone communications with the vessel that radar indicated was close ahead, and could not determine from radar observations whether the vessels would clear each other in the pending close-quarters encounter, the navigation rules as well as prudent seamanship required that he immediately stop the tow and assess the maneuvering situation.

The risk of collision became evident to the midshipman watch captain aboard the AMERICAN PROMISE who visually observed the SUN COAST tow closing on a "constant bearing,"<sup>17</sup> and advised the AOIC of the approaching vessel. The AOIC saw the tug and believed that it was towing astern. He did not immediately stop untangling the jib sheets and assess the risk of collision with the approaching tow. The AOIC could have radioed the tow to alert the tug operator to the presence and hove-to condition of the AMERICAN PROMISE, but did not do so. Although the sailing vessel was hove-to, the AMERICAN PROMISE could have been turned to starboard to avoid crossing ahead of the tow.

Given the time of night and prevailing weather conditions, the AOIC should have considered that the approaching vessel might not have an alert watch or look-out posted or that the AMERICAN PROMISE might not be identified in the darkness as a sailing vessel. He should have taken action to enhance the visibility of the sailing vessel. Other than the navigation lights, the only illuminated light on the AMERICAN PROMISE was the foredeck light, which was screened to shine downward. Although the sailing vessel was equipped with a halogen floodlight, it was not used. Furthermore, the AOIC could have had the crew use the spotlight to light the sails, or could have them direct it to signal the approaching vessel (see appendix, Rule 36). However, the spotlight was not used until immediately before the collision.

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<sup>16</sup>At least five short and rapid blasts on the whistle.

<sup>17</sup>Risk of Collision.--Inland Rule 7 (d) (i) states that "such risk shall be deemed to exist if the compass bearing of an approaching vessel does not appreciably change; and (ii) such risk may sometimes exist even when an appreciable change is evident, particularly when approaching a very large vessel or a tow or when approaching a vessel at close range."

The Safety Board concludes that had the AOIC on the AMERICAN PROMISE correctly assessed the risk of collision and communicated by radio, the SUN COAST's operator could have been alerted in time to maneuver to avoid the sailing vessel. Further, the AMERICAN PROMISE still had the capability to alter course to starboard and avoid the tow.

### **Adequacy of Look-outs**

Inland Rule 5, "Look-out," states, "Every vessel shall at all times maintain a proper look-out by sight and hearing as well as by all available means appropriate in the prevailing circumstances and conditions so as to make a full appraisal of the situation and the risk of collision."

Under the conditions that prevailed before the collision, the SUN COAST's relief master could not effectively maintain a continuous visual look-out while performing navigational duties. Some of the images that he was picking up on his radarscope were poor. Visibility was half a mile "in and out." According to the deckhand, the pilothouse windows were closed, which could have obstructed sound signals from a nearby vessel. In addition, the pilothouse windows were not equipped with windshield wipers. The AMERICAN PROMISE's OIC, who was in the SUN COAST's pilothouse after the collision, stated that he noticed that the tug had no windshield wipers and that "You could not see out of the windows."

The relief master stated that he saw the light on the sailing vessel's mast only seconds before the collision. However, the watchstanders aboard the AMERICAN PROMISE testified that they saw the navigation lights of the tow when the SUN COAST was about a mile away. In the night and driving rain, windshield wipers to keep the tug's windows clean would have aided the operator's ability to see the navigation lights of the AMERICAN PROMISE sooner.

The Safety Board concludes that the lack of windshield wipers on the pilothouse windows contributed to the relief master's failure to see the navigation lights of the AMERICAN PROMISE until the collision was unavoidable.

In testimony taken after the accident, the SUN COAST deckhand on watch described his pilothouse duties as bringing coffee to the relief master, keeping the operator awake, turning on the heaters, and keeping the windows clean. He also stated that he checked the engines hourly. He stated that he did not know what was meant by "look-out." The relief master testified that he had not given look-out instructions to the deckhand.

Because the relief master could not maintain a continuous look-out, as a safety practice, he should have instructed the deckhand on watch regarding proper look-out procedures and had him serve as look-out. With the pilothouse of the tug located more than 350 feet behind the barge's bow, and the tow proceeding in squally weather with the pilothouse windows closed, maintaining a good visual look-out was paramount. If necessary, the operator should have posted a look-out outside the pilothouse or had him go forward on the barge to verify the radar contact.

The crewmembers on watch on the AMERICAN PROMISE sighted the SUN COAST tow as early as 0145, about 20 minutes before the collision. Had the SUN

COAST deckhand been trained and assigned as look-out, he might have been able to sight the sailing vessel before he left the pilothouse at 0200 to inspect the engineroom.

The Safety Board concludes that had the deckhand on the SUN COAST been trained and assigned as a look-out, the AMERICAN PROMISE might have been sighted earlier and the collision might have been avoided

### **Adequacy of Radiotelephone Communication Procedures**

The SUN COAST was required to be equipped with a radiotelephone and comply with the provisions of the "Vessel Bridge-to-Bridge Radiotelephone Act" (the Act). The Act required that the SUN COAST be able to communicate on radiotelephone channel 13 in most parts of the United States, including the Chesapeake Bay. The SUN COAST was also required to monitor channel 16, the frequency for distress, safety, and calling. The SUN COAST had two VHF radios aboard and complied. However, when the SUN COAST's relief master tried to contact the vessel detected on his radarscope using VHF-FM radiotelephone 16 and 13, he was unsuccessful.

Aboard the AMERICAN PROMISE, the watch captain had adjusted the radiotelephone to channel 12 in the mistaken belief from her past experience that the approaching tug would be monitoring that channel. The AMERICAN PROMISE, which had the radio equipment to monitor VHF-FM channels 16 and 13, was operating in compliance with all the Naval Academy's communication instructions during the training exercise.

The communication instructions for the AMERICAN PROMISE required that the vessel guard radiotelephone channel 82A<sup>18</sup> as the primary frequency at all times during the overnight sailing trip, and 4145.0 KHz as the secondary frequency. The AOIC testified that the radiotelephone had a scanning capability, but he did not know how the scanning feature functioned and did not use it during the trip.

The U.S. Navy communications doctrine<sup>19</sup> specifies that "A continuous guard will be maintained on 156.65 MHz (VHF-FM channel 13) on vessels subject to the Act while operating inside the boundary lines of the United States." However, the AMERICAN PROMISE was not of a size or type included under the Act.<sup>20</sup> The doctrine further states, "There is presently no requirement for U.S. Navy vessels to guard VHF radiotelephone (R/T) channels in international waters."<sup>21</sup> However, a continuous guard on channel 16 (156.80 MHz) is highly recommended for establishing communications."

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<sup>18</sup>Channel 82A, as assigned by the FCC, is intended for "U.S. Government Only."

<sup>19</sup>Basic Operational Communication Doctrine (U), NWP 4(Rev.B).

<sup>20</sup>No Federal regulation currently requires a sailing vessel the size of the AMERICAN PROMISE to be equipped with a radiotelephone. The FCC requires any nongovernment vessel having a voluntary radiotelephone station to keep a watch on VHF-FM radiotelephone channel 16 at all times that the station is in operation.

<sup>21</sup>Title 47, Section 352 exempts vessels owned and operated by the U.S. Government from radio equipment and operator requirements.

According to the U.S. Naval Academy Sailing Master, the academy communications curriculum for the Command and Seamanship Training Squadron (CSTS) includes the use of VHF radiotelephones, use of channels 12, 13, 16, 22, and 82A, and procedures to be used for intership communications.

Although U.S. Navy communications doctrine highly recommends that channel 16 be used to establish communications in international waters, the policy does not require that channel 16 be monitored in either international or domestic waters. Had the AMERICAN PROMISE monitored channel 16, or had the watch captain adjusted the radiotelephone to channel 16 rather than 12, communications could have been established with the SUN COAST, either directly or with assistance from the Coast Guard. The Safety Board concludes that had the AMERICAN PROMISE's crew monitored and used VHF-FM channel 16, they could have established timely communications with the SUN COAST's operator and exchanged information necessary to avoid the collision.

Prior Recommendations.--As a result of its investigation of the collision between the USS RICHARD L. PAGE and the fishing vessel CHICKADEE,<sup>22</sup> on June 1, 1988, the Safety Board issued the following Safety Recommendation to the U.S. Navy:

M-88-37

Require that U.S. Navy vessels monitor VHF/FM radio channel 16 in international waters.

On September 20, 1988, the U.S. Navy responded that the Safety Board's findings and recommendations "have been forwarded to the commanding officer, Surface Warfare Officers School for review." As a result, the Safety Board classified Safety Recommendation M-88-37 as "Open--Awaiting Response."

On October 27, 1989, the Safety Board asked the U.S. Navy to provide information concerning what action had been taken or was being considered in regard to Safety Recommendation M-88-37. On February 13, 1990, the U.S. Navy responded that it "suggests, but does not require, that ships operating in international waters monitor VHF-FM radio channel 16. Under normal practice, this would be done in circumstances similar to those in this incident." On June 18, 1990, the Safety Board replied to the U.S. Navy:

The Safety Board continues to believe that monitoring VHF/FM channel 16 in international waters should be a requirement and, therefore, classifies Safety Recommendation M-88-37 as Closed--Unacceptable Action.

As a result of its investigation of the collision between the AMERICAN PROMISE and Barge E-2, the Safety Board concludes that in addition to a need for U.S. Navy vessels to monitor VHF-FM channel 16 in international waters, vessels operated by

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<sup>22</sup>Marine Accident Report--"Collision between the USS RICHARD L. PAGE and the U.S. Fishing Vessel CHICKADEE in the Atlantic Ocean on April 21, 1987"(NTSB/MAR-88/04).

the U.S. Navy in inland waters also need to monitor channel 16 if they have VHF-FM radiotelephone equipment.

### **Effectiveness Of The Sailing Vessel's Radar Reflector**

Small wooden boats, such as the AMERICAN PROMISE, are poor radar reflectors; they give off weak, fluctuating radar echoes that can be easily lost in sea clutter on a radarscope.<sup>23</sup> The sailing vessel was equipped with a Firdell Blipper radar reflector, which should have enhanced its radar echo. As the vessels closed prior to the collision, the AMERICAN PROMISE's orientation to the SUN COAST was such that the sailing vessel's hull should have presented a good broadside radar-reflective surface. However, the relief master's description of the radarscope images that he observed indicated that the radar reflection from the AMERICAN PROMISE was poor.

In an independent study performed in the United Kingdom by the Admiralty Surface Weapons Establishment (Civil Marine Division), testers found that the Firdell Blipper did not return the same radar signal strength through 360 degrees. Tests indicated that the Firdell Blipper's signal was stronger in the 180- to 360-degree sector than in the 0- to 180-degree sector.<sup>24</sup> Based on testimony describing the radar screen image, the Safety Board concludes that the Firdell Blipper on the AMERICAN PROMISE did not provide adequate reflectivity, or it may not have been effective in the sector where the SUN COAST was located.

### **III CONCLUSIONS**

1. When the SUN COAST's operator could not sight the AMERICAN PROMISE but surmised that it was a sailing vessel, could not establish radio communications with the vessel that radar indicated was close ahead, and could not determine from radar observations whether the vessels would clear each other in the pending encounter, the navigation rules as well as prudent seamanship required that he immediately stop the tow and assess the maneuvering situation.
2. Had the Assistant Officer In Charge on the AMERICAN PROMISE correctly assessed the risk of collision and used VHF-FM channel 16, the SUN COAST's operator could have been alerted in time to maneuver the tow and avoid the sailing vessel.
3. Although the AMERICAN PROMISE was hove-to, it still had the capability to alter course to starboard and avoid the tow.
4. Had the AMERICAN PROMISE's crew used the halogen floodlight to illuminate the sailing vessel, or directed the spot light toward the tow earlier, or both, the SUN COAST's operator could have been alerted in time to maneuver to avoid the sailing vessel.

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<sup>23</sup>Radar Instruction Handbook, U.S. Department of Commerce, Maritime Administration, 1974.

<sup>24</sup>Practical Sailor, Volume 14, Number 4, February 15, 1988.

5. Had the SUN COAST's deckhand been trained and assigned as a look-out, the AMERICAN PROMISE might have been sighted earlier and the collision might have been avoided.
6. Lack of windshield wipers on the tug's pilothouse windows contributed to failure of the SUN COAST's relief master to see the AMERICAN PROMISE's navigation lights until the collision was unavoidable.
7. The radar reflector on the AMERICAN PROMISE did not provide adequate reflectivity, or it may not have been effective in the sector where the SUN COAST was located.

#### IV PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of the collision of the sailing vessel AMERICAN PROMISE and the freight Barge E-2, which was being pushed ahead of the tug SUN COAST, was the failure by the SUN COAST's operator to stop the tow when he did not sight the vessel that his radar indicated was crossing ahead, and the failure of the Assistant Officer in Charge of the AMERICAN PROMISE to signal the SUN COAST via radiotelephone or by shining lights on the sails. Contributing to the accident was the inadequacy of the look-out on the SUN COAST, the lack of a U.S. Navy requirement for the AMERICAN PROMISE to monitor VHF-FM radiotelephone channel 16, the failure of the AMERICAN PROMISE's Assistant Officer In Charge to have turned his vessel to avoid collision, and a possibly ineffective radar reflector on the AMERICAN PROMISE.

#### V RECOMMENDATIONS

As a result of its investigation, the National Transportation Safety Board made the following recommendations:

--to the Secretary of the Navy:

Require that naval vessels having VHF-FM radiotelephone equipment on board monitor VHF-FM channel 16 while underway. (Class II, Priority Action) (M-92-58)

--to the U.S. Naval Academy:

Require that naval academy vessels having VHF-FM radiotelephone equipment on board monitor VHF-FM channel 16 while underway. (Class II, Priority Action) (M-92-59)

Require that officers assigned to naval academy vessels promptly use the VHF-FM radiotelephone for making passing agreements when encountering other vessels. (Class II, Priority Action) (M-92-60)

Conduct tests to evaluate the adequacy of the radar reflectors being used aboard naval academy vessels and replace them if they are found to be inadequate. (Class II, Priority Action) (M-92-61)

--to the Robert Dann Company:

Institute a training program for crewmembers aboard your vessels that instructs them in the duties, techniques, and responsibilities of a look-out and require that operators in charge of the navigation watch on your vessels assign a crewmember as a look-out. (Class II, Priority Action) (M-92-62)

Install windshield wipers or other suitable means of keeping pilothouse windows clear of precipitation on the SUN COAST and other company-owned tugs to improve the visibility for vessel operators and look-outs. (Class II, Priority Action) (M-92-63)

--to the American Waterway Operators:

Publicize this accident to your members and emphasize the need to have windshield wipers or other suitable means of keeping pilothouse windows clear of precipitation to improve visibility for vessel operators and look-outs. (Class II, Priority Action) (M-92-64)

**BY THE NATIONAL TRANSPORTATION SAFETY BOARD**

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November 19, 1992

**APPENDIX**  
**EXCERPTS FROM INLAND NAVIGATION RULES**

**—INLAND—**  
***Steering and Sailing Rules***

**RULE 15**

***Crossing Situation***

(a) When two power-driven vessels are crossing so as to involve risk of collision, the vessel which has the other on her starboard side shall keep out of the way and shall, if the circumstances of the case admit, avoid crossing ahead of the other vessel.

**RULE 16**

***Action by Give-way Vessel***

Every vessel which is directed to keep out of the way of another vessel shall, so far as possible, take early and substantial action to keep well clear.

**RULE 17**

***Action by Stand-on Vessel***

(a)(i) Where one of two vessels is to keep out of the way, the other shall keep her course and speed.

(ii) The latter vessel may, however, take action to avoid collision by her maneuver alone, as soon as it becomes apparent to her that the vessel required to keep out of the way is not taking appropriate action in compliance with these Rules.

(b) When, from any cause, the vessel required to keep her course and speed finds herself so close that collision cannot be avoided by the action of the give-way vessel alone, she shall take such action as will best aid to avoid collision.

(c) A power-driven vessel which takes action in a crossing situation in accordance with subparagraph (a)(ii) of this Rule to avoid collision with another power-driven vessel shall, if the circumstances of the case admit, not alter course to port for a vessel on her own port side.

(d) This Rule does not relieve the give-way vessel of her obligation to keep out of the way.

**RULE 18**

***Responsibilities Between Vessels***

Except where Rules 9, 10, and 13 otherwise require:

(a) A power-driven vessel underway shall keep out of the way of:

- (i) a vessel not under command;
- (ii) a vessel restricted in her ability to maneuver;
- (iii) a vessel engaged in fishing; and
- (iv) a sailing vessel.

**—INLAND—**  
***Sound and Light Signals***

**RULE 34**

***Maneuvering and Warning Signals***

(a) When power-driven vessels are in sight of one another and meeting or crossing at a distance within half a mile of each other, each vessel underway, when maneuvering as authorized or required by these Rules:

(ii) upon hearing the one or two blast signal of the other shall, if in agreement, sound the same whistle signal and take the steps necessary to effect a safe passing. If, however, from any cause, the vessel doubts the safety of the proposed maneuver, she shall sound the danger signal specified in paragraph (d) of this Rule and each vessel shall take appropriate precautionary action until a safe passing agreement is made.

(d) When vessels in sight of one another are approaching each other and from any cause either vessel fails to understand the intentions or actions of the other, or is in doubt whether sufficient action is being taken by the other to avoid collision, the vessel in doubt shall immediately indicate such doubt by giving at least five short and rapid blasts on the whistle. This signal may be supplemented by a light signal of at least five short and rapid flashes.

**RULE 36**

***Signals to Attract Attention***

If necessary to attract the attention of another vessel, any vessel may make light or sound signals that cannot be mistaken for any signal authorized elsewhere in these Rules, or may direct the beam of her searchlight in the direction of the danger, in such a way as not to embarrass any vessel.