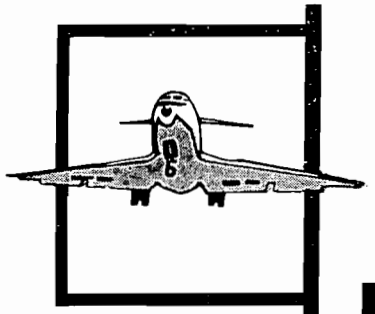

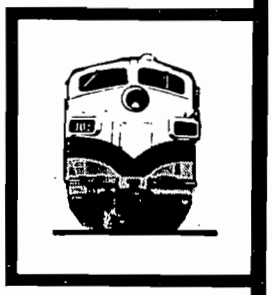

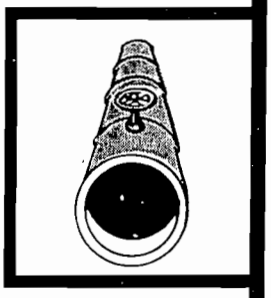

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

FISHING VESSEL M/V LOBSTA-1
CAPSIZING AND SINKING
IN THE ATLANTIC OCEAN
POINT JUDITH, RHODE ISLAND
SEPTEMBER 23, 1978

NTSB-MAR-80-6

UNITED STATES GOVERNMENT

TECHNICAL REPORT DOCUMENTATION PAGE

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15. Supplementary Notes

16. Abstract

About 0100 e.d.t., on September 23, 1978, the fishing vessel M/V LOBSTA-I capsized in the Atlantic Ocean about 47 nmi south-southeast of Point Judith, Rhode Island, while en route to its lobster fishing area. The capsized vessel was sighted about 12 hours after the accident by a tankship. Subsequently, a Coast Guard helicopter sighted the capsized vessel but it sank before a Coast Guard cutter could reach it. The Coast Guard conducted an extensive search in the area but found no survivors. The LOBSTA-I was later located resting upright on the bottom at a 234-ft water depth, and photographs, showing damage to the vessel's hull plating were taken by a shipboard controlled, underwater vehicle. All five crewmen are missing and presumed dead.

The Safety Board considered many factors during the investigation, including vessel stability, operating practices, weather forecasting, and the possibility of collision.

The National Transportation Safety Board is unable to determine the probable cause of the capsizing of the LOBSTA-I. Vessel damage indicates a collision with another vessel as a possible cause of the capsizing; however, the evidence is not sufficient to establish that such a collision occurred. Another possible, but less likely, cause is the loss of stability due to internal flooding. The lack of distress notification may have contributed to the loss of life.

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NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C. 20594

MARINE ACCIDENT REPORT

Adopted: April 16, 1980

FISHING VESSEL M/V LOBSTA-I CAPSIZING AND SINKING IN ATLANTIC OCEAN POINT JUDITH, RHODE ISLAND SEPTEMBER 23, 1978

INTRODUCTION

This accident was investigated jointly by the National Transportation Safety Board and the U.S. Coast Guard. A Coast Guard formal investigation was convened in Providence, Rhode Island, on October 12, 1978. A Safety Board representative participated in all phases of the investigation. This report is based on the factual information developed by this investigation. The Safety Board has considered all facts pertinent to the Safety Board's statutory responsibility to determine the cause or probable cause of the accident and to make recommendations.

The Safety Board's recommendations are made independently of any recommendations proposed by the Coast Guard. To insure public knowledge of all Safety Board recommendations and responses by the Coast Guard, all such recommendations and responses are published in the Federal Register.

SYNOPSIS

About 0100 e.d.t., 1/ on September 23, 1978, the fishing vessel M/V LOBSTA-I capsized in the Atlantic Ocean about 47 nmi south-southeast of Point Judith, Rhode Island, while en route to its lobster fishing area. The capsized vessel was sighted about 12 hours after the accident by a tankship. Subsequently, a Coast Guard helicopter sighted the capsized vessel but it sank before a Coast Guard cutter could reach it. The Coast Guard conducted an extensive search in the area but found no survivors. The LOBSTA-I was later located resting upright on the bottom at a 234-ft water depth, and photographs, showing damage to the vessel's hull plating, were taken by a shipboard controlled, underwater vehicle. All five crewmen are missing and presumed dead.

1/ All times herein are eastern daylight based on the 24-hour clock.

The Safety Board considered many factors during the investigation, including vessel stability, operating practices, weather forecasting, and the possibility of collision.

The National Transportation Safety Board is unable to determine the probable cause of the capsizing of the LOBSTA-I. Vessel damage indicates a collision with another vessel as a possible cause of the capsizing; however, the evidence is not sufficient to establish that such a collision occurred. Another possible, but less likely, cause is the loss of stability due to internal flooding. The lack of distress notification may have contributed to the loss of life.

INVESTIGATION

The Accident

Sometime between 1815 and 2100, on Friday, September 22, 1978, the LOBSTA-I, a commercial lobster fishing vessel, departed its berth at the Handrigan Seafood dock, Galilee, Rhode Island, for offshore fishing about 95 nmi away. (See figure 1.) Normally, the vessel would set a course of 160° to 170° magnetic for the 11 1/2 to 12 hour trip and would depart in the evening so that the crew could be rested when they reached the area.

About 1300, on September 23, 1978, the Greek tankship ANGELA-F, which had departed East Providence about 0700, sighted an object 4 nmi away, approached it within 150 yds, and determined that it was a capsized boat. Using binoculars, crewmembers scanned the surrounding waters for survivors but saw none.

The ANGELA-F's master tried unsuccessfully for about 10 minutes to contact the Coast Guard on channel 16 VHF. He then started to transmit a message in Morse Code over 500 kHz cw but delayed the message until the silent period (1315 to 1318) was over. Following the silent period, the volume of communications over 500 kHz was so heavy that the ANGELA-F was not able to communicate with the Coast Guard until about 1335. The following message was then transmitted to the Coast Guard radio station in Portsmouth, Virginia:

> "TTT 2/ GREEK TANKER ANGELA-F REPORT THAT ON COURSE FROM PROVIDENCE/RI TO ST. CROIX MEETING DANGEROUS UPP-SETTING WRECK FROM BOAT PAINTED KEEL BLACK AND WHITE 10 FEET ABOUT ABOVE THE WATER AT POSITION APR 40-30N 71-15W. MASTER"

The Coast Guard had difficulty in receiving the message because of interference from other transmissions, and portions of the message had to be repeated. The Coast Guard radio operator acknowldeged the message at 1404, advised the Rescue Coordination Center (RCC) in the Third Coast Guard District

2/ "TTT" indicates that the message concerns safety of navigation or contains important meteorological warnings.

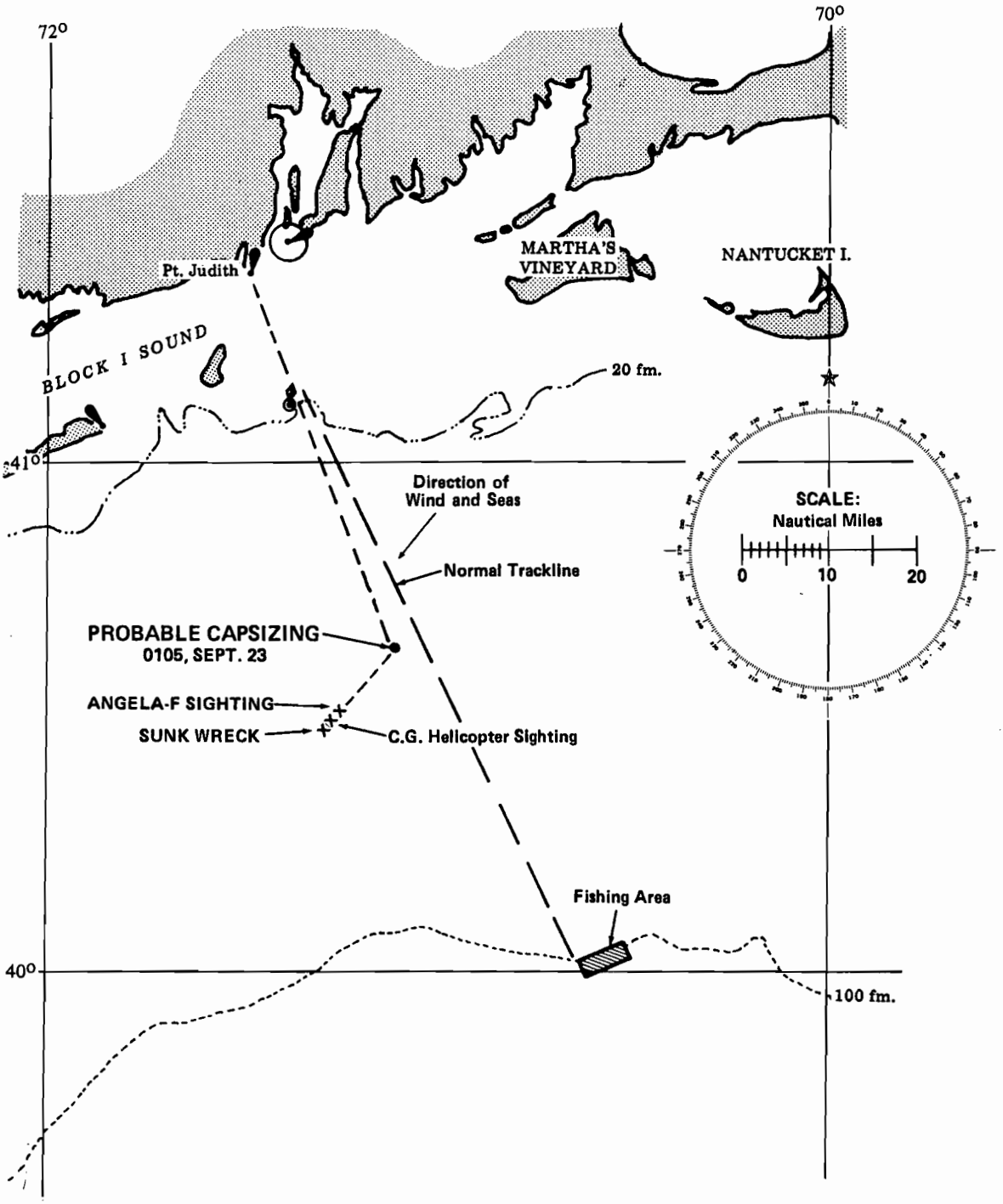

Figure 1. Area of LOBSTA-I operation and capsizing.

about the wreck report, and then requested further information from the ANGELA-F regarding "any name or numbers on ship you sighted." At 1410, the ANGELA-F responded that sea conditions prevented it from seeing any identifying marks. The Coast Guard radio operator acknowledged and then asked the ANGELA-F to wait. Subsequent efforts to communicate with the ANGELA-F were unsuccessful and were terminated at 1435.

Following the last communication with the ANGELA-F at 1410, the chronological search and rescue (SAR) log for this case indicates the following actions were taken: At 1418, the RCC duty officer called the National Guard air station in the Third Coast Guard District but was advised that they did not have an available helicopter. At 1425, he requested that the Coast Guard POINT WELLS be prepared to get underway. At 1427, he telephoned his commanding officer who was not home. At 1450, the commanding officer returned the call and was briefed, about the case. He asked the duty officer to have the POINT WELLS get underway and then to check to see if the Coast Guard air station at Brooklyn had available aircraft and, if not, to request an HH-3F helicopter from the First Coast Guard District. Air Station Brooklyn advised it would have to fly two HH-52A helicopters for a mission as far offshore as the reported wreck. 3/ At 1459, the RCC duty officer briefed the duty personnel at the First Coast Guard District Operations Center and requested an HH-3F helicopter. At 1535, Coast Guard helicopter CG-1479 departed Coast Guard Air Station Cape Cod. The POINT WELLS got underway from Montauk Point, Long Island, at about 1600.

At 1616, the helicopter pilot located the reported wreck at 40° 29.2' N, 71° 16.5' W. He reported the name of the wreck as the LOBSTA-I, said that it looked like a raft about 20 ft long, took pictures, and searched an area within 5 nmi of the hull for survivors. (See figure 2.) Because the fuel was running low, the helicopter pilot departed the area at about 1705 after tying a datum marker buoy (DMB) and a strobe light to a line streaming from the LOBSTA-I's hull. At about 2030, the POINT WELLS arrived in the area of the capsized hull but did not locate it. On scene, the POINT WELLS reported the wind at 15 to 18 kns east-northeast, seas at 4 to 6 ft east-southeast, and visibility at 8 to 10 nmi.

At 1715 on September 23, the Coast Guard's Rescue Coordination Center in Boston contacted the owner of the fishing vessel LOBSTA-I and was told that the LOBSTA-I had departed Point Judith at 1930, September 22. Further debriefing of the helicopter pilot at 0124 on September 24 indicated that the wreck could have been as large as 75 ft long and 18 ft beam and that the stern was about 10 to 15 ft below the surface. The Coast Guard then concluded that the wreck was the fishing vessel LOBSTA-I.

Since the POINT WELLS was unable to locate the LOBSTA-I or the DMB, the Coast Guard assumed that the vessel had sunk and developed a search plan with primary emphasis on searching for survivors who might have abandoned the LOBSTA-I when it capsized. The probable location of capsizing was taken as a position where the reciprocal drift path of the capsized hull intersected the

3/ The Coast Guard's policy, based on experience with its HH-52A helicopters, is that the HH-52A helicopter must have an escort when flying missions over 25 nmi offshore.

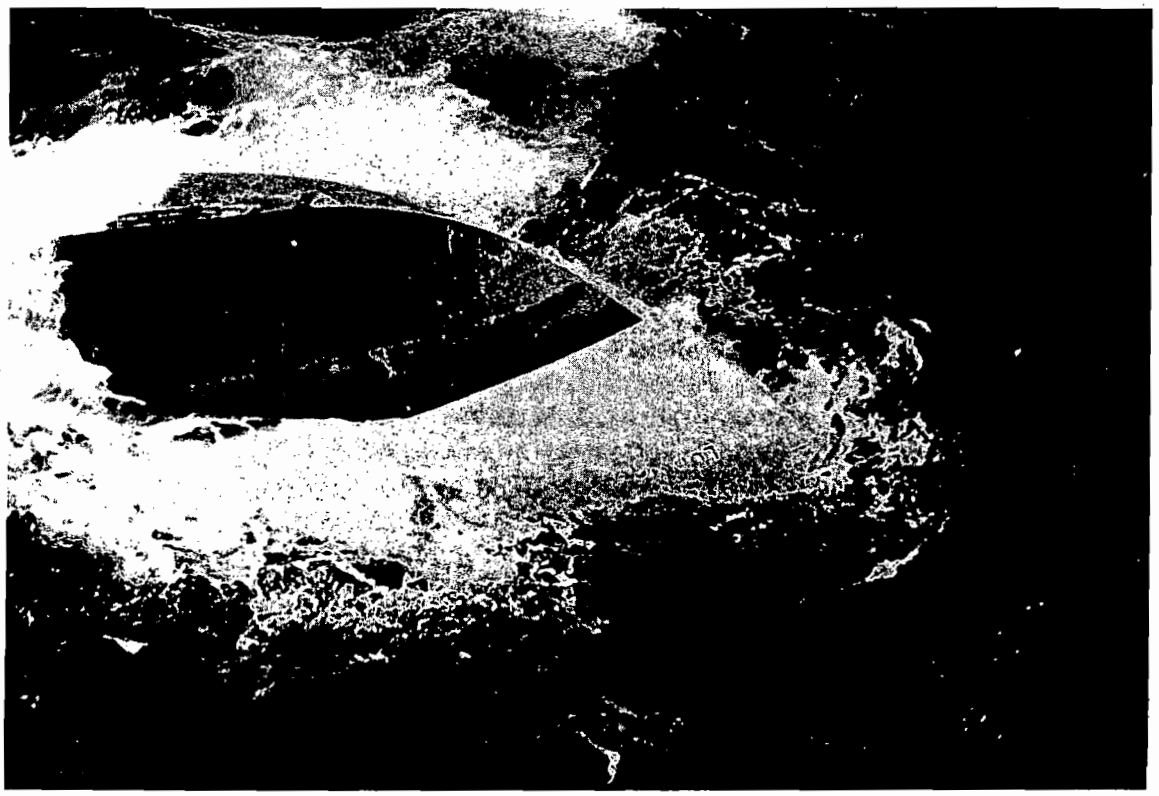

Figure 2. Photograph of capsized LOBSTA-I taken from Coast Guard helicopter about 15 1/2 hours after capsize.

expected route of the vessel to its fishing ground. The drift of the hull, which was determined from the sightings of the ANGELA-F and CG-1479, was 230° T at 0.533 kn. Later, the Coast Guard determined that the drift of a DMB was 223° T at 0.677 kn. The probable capsizing location used for search planning was initially established at 40°39.0' N, 71°03' W.

By 0700 on September 24, Coast Guard aircraft and cutters had searched 279 square mi around the LOBSTA-I's last known position. A search pattern of 40 by 20 nmi oriented parallel to the direction of computed drift was established. The primary search vehicle was an HH3F helicopter. On September 25, two C-130 fixed wing aircraft and the POINT WELLS searched a 1,800 square mile area.

The search was terminated on September 27 because the Coast Guard believed survivors would have been found due to the well established location of the LOBSTA-I and the excellent search conditions. Sixteen Coast Guard and U.S. Navy aircraft and surface units had searched 11,000 square miles over 200 hours with an overall probability of detection (POD) greater than 0.9 (1.0 equals the maximum probability). No survivors or debris from the LOBSTA-I were located.

As part of its investigation following the search and rescue, the Coast Guard sent an investigator to St. Croix to interview crewmembers of the ANGELA-F who had seen the capsized LOBSTA-I. Crewmembers described a capsized vessel with a black keel and a white hull, with about 25 to 45 ft of the hull protruding about 10 ft above the water surface. Floating aft was a 1- to 2-in line measuring about 30 to 40 ft in length. The vessel's name could not be seen. Crewmembers had seen what appeared to be through-hull fittings but had not seen any flotsam.

Injuries to Persons

All five crewmembers are missing and presumed dead.

Damage to Vessel

The statements by crewmembers of the ANGELA-F and a study of the photographs taken from the Coast Guard helicopter indicate that the forward one-third of the LOBSTA-I's bottom was relatively clean and did not show any sign of damage. The LOBSTA-I had an estimated value of $150,000.

Crew Information

The crew consisted of the master and four crewmembers, all of whom were experienced fishermen. None of the crewmembers held a Coast Guard license, nor were they required to. This was the master's first voyage on the LOBSTA-I; however, he had operated other lobster fishing boats for over 3 years, and other fishermen who knew him professionally considered him a competent master. Three crewmembers had worked previously for the master on the lobster fishing vessel SNUG HARBOR, and the other crewmember had worked previously on the LOBSTA-I. (See appendix A.)

The master had spent an average of 10 hours each day during the week before sailing supervising the loading of provisions and familiarizing himself with the vessel. He had spent about 1 1/2 hours with a former master and about 3 hours with a former engineer discussing and familiarizing himself with machinery, equipment, and operations of the LOBSTA-I; procedures for pumping bilges; operation of the water circulation system for the lobster tanks and procedures to use it as a bilge pump; operation of communication equipment; the need to check the shaft alley drain and oil pressure for the generator diesel engine at each change of watch; and the practice of removing fuel oil from either the port or starboard tank for the propulsion engine and returning excess fuel oil to the opposite tank to keep the vessel trimmed as bait was used. Because of a previous flooding incident, the master was also informed that the fish hold was drained into the shaft alley. During this time, the former master and engineer observed that the hold and lobster tanks were dry and that the gaskets on the hatch covers were in good condition. Both men believed that the master had familiarized himself adequately with the vessel's operation and that the vessel was seaworthy when they visited it. Additionally, the LOBSTA-I's owner heard the high water bilge alarm when the master had tested it manually.

According to fishermen who had worked previously for the master, his practice was to divide the watch periods on the helm equally among the crew with

only one crewman standing watch at a time and the master normally standing the first watch. Based on this testimony, the watch periods aboard the LOBSTA-I should have been about 2 hours. The master had standing orders that the person on watch was to check the engineroom bilge and the main generator engine oil pressure once during the watch and at the change of the watch.

Vessel Information

The LOBSTA-I, a combination stern trawler and lobster boat, was built by Bender Welding and Machine Co., Inc., Mobile, Alabama, in 1972 (Bender Hull No. 311) to be used for lobster fishing by the owners, David Handrigan Seafood Inc., and Lobsta Inc., both of Point Judith, Rhode Island. The vessel was constructed of 5/16-in thickness, grade A-36 steel with 24-in frame spacing. It was 105 gross tons, 68.7 ft long, 22 ft wide, and 11.1 ft deep. The vessel's maximum speed was 8 to 9 kns. (See figure 3.)

The navigation bridge, crew quarters, and galley were in the pilothouse which was located in the forward part of the vessel. Access to the galley and crew quarters was through a watertight door with dogs on the portside at main deck level. A nonwatertight wooden door provided access to the navigation bridge and a nonwatertight wooden door inside the pilothouse provided access to the engineroom. (See figure 4.) Both doors were located at main deck level and had raised sills.

Because the forward lobster tank was not used, its overflow discharges were capped, and its spray system was disconnected. The after lobster tank had a 6,000 gallon capacity, and it was normally pumped full of seawater just before the LOBSTA-I arrived at the fishing area. Hull openings in each side of this tank were connected to elbow fittings and vertical pipe sections so that water would overflow when its level was within 1-ft of the top. Incidental flooding of this tank, 1 to 4 ft of water, varying with sea conditions, had occurred during previous 4-day trips.

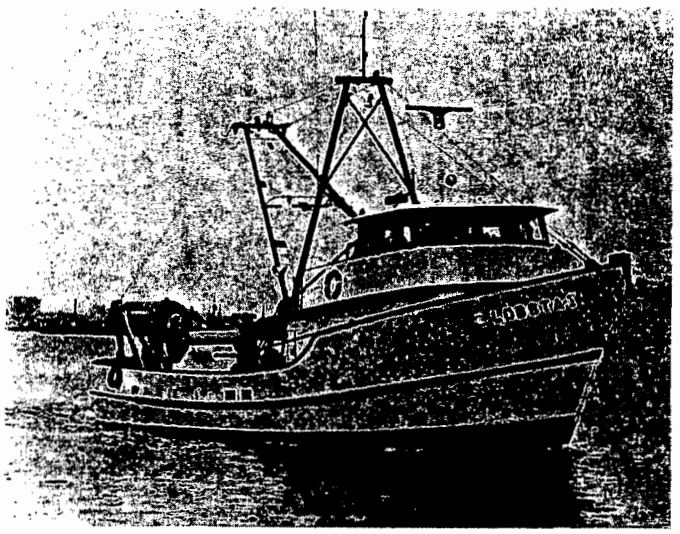

Figure 3. LOBSTA-I.

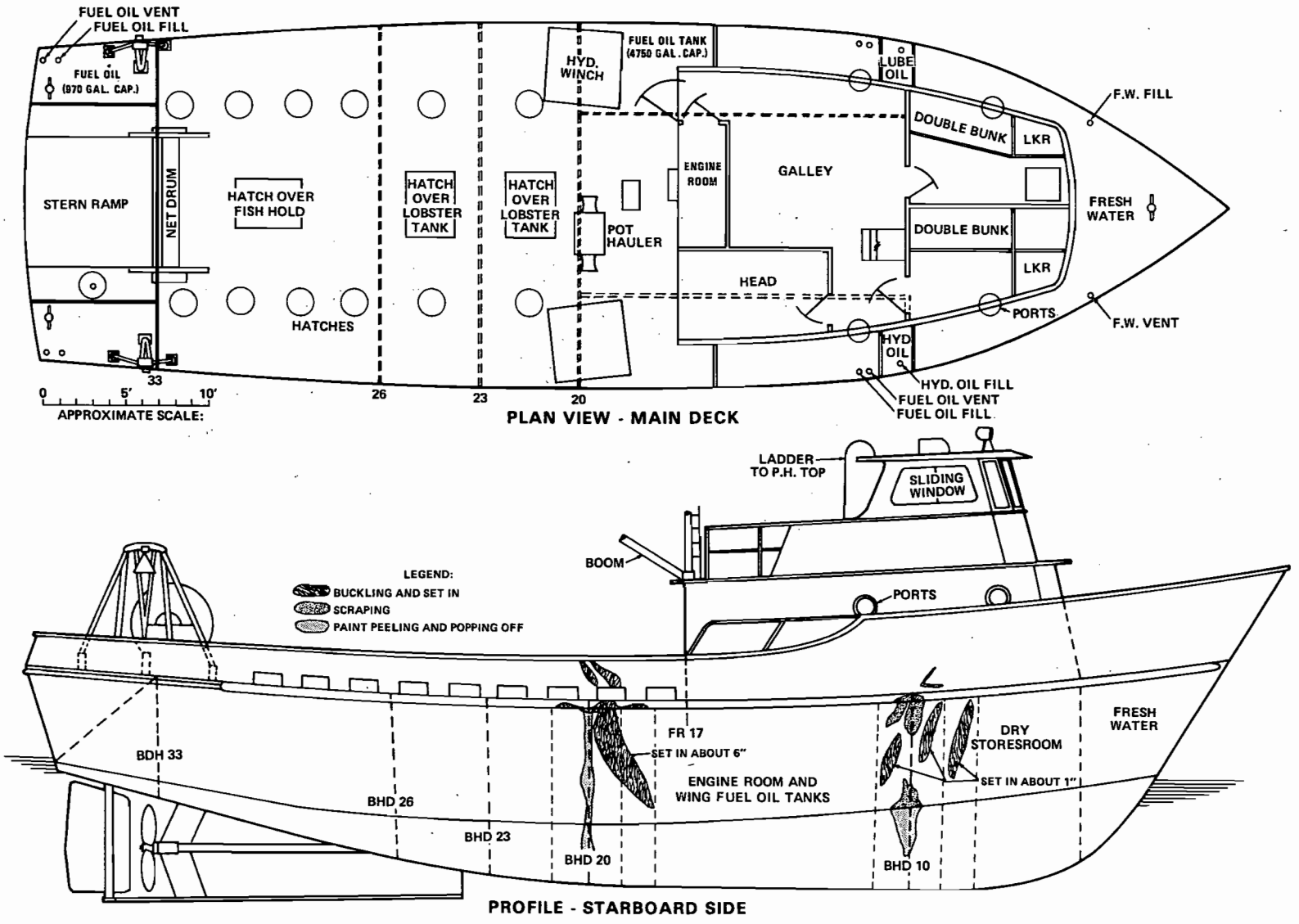

Figure 4. Trawler-LOBSTA-I.
Arrangement and Location of Damage

The fish hold was not used and was kept free of debris. An inspection plate located forward in the fish hold bottom was removed to permit water to drain from the hold, through the shaft alley, through a 1 1/2- to 2-in valve, and into the engineroom bilge.

The forward lobster tank had a 3- by 4-ft hinged hatch on a coaming about 5 in high which could not be bolted shut. The remaining hatches and deck plates on the main deck were flush, gasketed and could be bolted shut. Testimony indicated that very little seawater would come on deck when quartering or following seas were less than 8 ft high.

The bulwarks aft of the pilothouse were 30-in high, and there were nine 10- by 21-in freeing ports on each side. The transom was fitted with a 12-ft wide opening and stern ramp to facilitate hauling nets. Lobster pots, located just aft of the pilothouse, were handled by a combination pot hauler and winch with hydraulic control.

The LOBSTA-I was powered by a 12V-71N Detroit Diesel (2-cycle) engine which consumed 19.4 gph of fuel and 1125 cfm of air from the engineroom space when operating at its rated horsepower. When the vessel was underway, electrical power was supplied by a 20-kw generator which was driven by a Lister diesel engine.

Bilge water could be discharged through one of two bilge pumps which were belt-driven from a power takeoff on the main engine and were engaged by a hand-actuated clutch. A manifold with well marked valves permitted the pumps to take suction from the dry stores compartment, engineroom, each lobster tank, ice hold, lazarette, and seachest, and to discharge overboard or through the deck washdown hose. A seawater circulation system could completely fill or discharge the after lobster tank in about 15 minutes and also could be aligned to discharge water from the engineroom bilge. A float switch was installed to activate an alarm in the pilothouse when the bilge water was about 18-in deep.

Communication and navigation equipment in the pilothouse included an automatic pilot, a VHF/FM radiotelephone, a citizens band radiotelephone, a single sideband (SSB) marine radiotelephone, a LORAN-C receiver, and two depth recorders. The automatic pilot was not operating. If primary electric power was lost, the radiotelephones could be powered by two batteries on the navigation bridge which were maintained ready by a constant trickle charge.

Lifesaving equipment consisted of six lifejackets which were stowed in the pilothouse and a Seamaster six-person inflatable liferaft in a cannister which was stowed portside aft of the bridge. The liferaft contained distress flares and was secured by a hydrostatic release. The liferaft was removed and serviced on January 30, 1978, but the hydrostatic release was not removed because it was attached by a welded ring.

Fishing vessels, such as the LOBSTA-I, are classified as uninspected vessels and must meet the minimal safety requirements in 46 CFR, Subchapter C, for lifesaving and fire protection equipment. The liferaft installation was not

required. The Coast Guard does not have statutory authority to set requirements for the design, construction, or periodic inspection of fishing vessels.

The LOBSTA-I departed Point Judith with about 1,900 gallons of fresh water in its forepeak tank, about 3,000 gallons of fuel oil evenly divided between the tanks along the engineroom, and a mixture of seawater and fuel oil in the aft fuel tanks; the aft fuel tanks were not used because of fuel contamination problems. Eight 55-gallon drums of bait and ice were stowed on the main deck, starboard quarter aft; three or four drums were stowed on the main deck portside near the pilothouse. Each drum weighed about 350 lbs. Ten to 15 lobster pots, each weighing about 40 lbs, were stowed aft on the pilothouse deck. Six hundred fathoms of polypropylene sweep line were stowed in a wooden box which was secured by a chain to the starboard rail and net drum frame. Testimony indicated that additional line was stowed or secured so that it would not be washed overboard.

Waterway Information

The LOBSTA-I normally headed on a course generally south-southeast from Point Judith, Rhode Island, to its fishing area along the charted 100 fathom depth contour. The probable location of the capsizing was about 47 nmi south-southeast of Point Judith. Depth in the vicinity of capsizing and sinking ranged from 37 to 40 fathoms. According to the Pilot Chart of the North Atlantic Ocean, prevailing surface water currents were 0.5 to 0.6 kn toward the southwest. The surface water temperature in the vicinity of the accident was reported to be about 60° F. Magnetic variation along the expected trackline was about 15° W.

Commercial vessels and fishing vessels regularly transit the general vicinity where the LOBSTA-I capsized.

Meteorological Information

Persons familiar with the master's practices testified that he normally listened to the scheduled marine weather forecast broadcasted by the Boston Marine Operator at 1820 over radio station WOU before getting underway. The master also told the owner that he would get underway if the 1820 forecast on September 22 was good. This forecast could be received over channel 2 (2366Hz) of the LOBSTA-I's SSB radiotelephone.

On Friday, September 22, the Boston Marine Operator broadcast the following forecast:

> MARINE FORECAST FOR THE OFFSHORE WATERS EAST OF NEW ENGLAND NORTH OF 41° LATITUDE AND WEST OF 60° LONGITUDE. HIGH PRESSURE OVER THE CENTRAL GREAT LAKES REGION WILL MOVE TO NORTHERN NEW ENGLAND TONIGHT AND OVER THE FORECAST WATERS SATURDAY. NORTHEAST WINDS 15 TO 20 KNOTS DIMINISHING TO 15 KNOTS OR LESS BY LATE TONIGHT. LIGHT AND VARIABLE WINDS SATURDAY AND SATURDAY NIGHT. SHOWERS ENDING SOUTH PORTIONS THIS EVENING FOLLOWED BY

SLOW CLEARING. VISIBILITY LOWERING TO 2 TO 4 MILES IN SHOWERS. SEAS 2 TO 4 FEET. . . .

. . . WEST CENTRAL NORTH ATLANTIC OFFSHORE FORECAST BETWEEN 32N AND 41N AND WEST OF 65W. A COLD FRONT FROM NEAR 30N 75W TO 41N 65W AT 1400 SEPTEMBER 22 MOVING SOUTHEAST TO AN EAST-WEST POSITION ALONG 36N BY 2000 SEPTEMBER 23. LARGE HIGH BUILDING NORTH OF FRONT.

NORTH OF FRONT . . . . NORTHEAST WIND 10 TO 20 KNOTS TONIGHT BECOMING EAST 15 TO 25 KNOTS SATURDAY AND SATURDAY NIGHT. WAVES 3 TO 6 FEET TONIGHT AND 4 TO 8 FEET SATURDAY. OCCASIONAL RAIN IN VICINITY OF AND WITHIN 300 MILES OF THE FRONT. VISIBILITY BELOW 3 MILES AT TIMES.

Surface weather observations made at Block Island, Rhode Island, for the period 0000 to 0300 on September 23 recorded winds at 12 to 14 kns from 030° T and the air temperature at 55° F. The Coast Guard Station at Montauk, New York, during the same period, recorded winds at 12 to 17 kns east-northeast to northeast, cloudy skies, rain, and the temperature between 52° and 55° F. Observations made by ships and environmental data buoys (EDB) in the area indicated winds were 18 to 25 kns generally from the northeast and seas were 3 to 6 ft from the northeast. Observations made by ships in the area were not transmitted and, therefore, were not available to NWS forecasters. Observations of the EDBs and Nantucket Lightship were transmitted. (See appendix B.)

Weather radar pictures from Chatham, Massachusetts, showed a region of very strong echoes, which would indicate thunderstorm activity, about 2330 on September 22 and moderate echoes about 0030 and 0130 on September 23 in the vicinity of the LOBSTA-I capsizing.

The prevailing winds, which would generate the seas in the vicinity of the accident, were determined from the surface pressure patterns of the NWS surface analysis. Prevailing winds would have been from the northeast at 21 kns with gusts to 28 kns. These winds were estimated to have had a northeasterly fetch of 100 nmi from the accident site and to have begun at 1200 on September 22.

Wreckage

After U.S. Navy P-3 aircraft identified several magnetic anomaly contacts in the vicinity of the Coast Guard helicopter sighting, Coast Guard personnel using side scan sonar were able to identify one of the contacts tentatively as the LOBSTA-I. The Coast Guard marked the site with a lighted buoy and arranged for the Navy Supervisor of Salvage to provide its SEA DRONE 4/ system for an underwater photographic survey of the sonar target.

4/ The SEA DRONE is an unmanned underwater vehicle equipped with closed-circuit television (CCTV), 70 mm camera, and search sonar. It is maneuvered by electric motor-driven, ducted propellers, and it is controlled via a cable with electrical conductors from a control module aboard ship. The control module is operated by a technician who monitors sonar contacts and CCTV images.

On November 14 and 15, 1978, the SEA DRONE, which was being controlled aboard the Coast Guard cutter SASSAFRAS, positively identified the LOBSTA-I resting nearly upright on a heading of 060° M on the bottom in 234 ft of water at 40°28.5' N, 71°17.2' W. The area was fairly flat, soft silt, no visible rocks, and completely devoid of any objects, except the LOBSTA-I and the anchor clump from the marker buoy, for a distance of 3,000 feet. The SEA DRONE recorded the CCTV images on magnetic tape and took about 350 70 mm photographs all around the LOBSTA-I but was not able to view the vessel fully from above because of its rigging and entangled lines, limited controllability, and water currents.

Examination of the photographs and CCTV tapes revealed recent damage to the vessel hull plating, above and below the waterline on both sides of the vessel.

- The shell plating was buckled between frames 8 and 11 on the starboard side, and paint was missing at the bulkhead at frame 10. Deflections were estimated at about 1 in. (See figure 5.)

- The 6-in half pipe sheer guard was buckled near frame 20 on the starboard side. The entire panel of plating between frames 17 and 20 was set in about 6 in. Paint peeling vertically along the bulkhead at frame 20 could be clearly seen from the deck edge to the bottom. The bulwark plate above the freeing port near frame 20 was buckled outboard to the side. The deflection of the bulkhead and deck was estimated at 3 in. The deformation of the 6-in sheer guard was about 4 in. (See figure 6.)

- On the portside, the bulwark plate above the second freeing port, just forward of the bulkhead at frame 20, was deflected slightly outward, and there was vertical peeling of paint along that bulkhead.

- The sheer guard bulwark plate near frame 33 portside was deformed. The sheer guard and hull plate at the after corner of the last (ninth) freeing port were fractured. The port stern transom plate was set in heavily above and below the waterline. The transom plate deflections, which are short, dished-in regions, and extend only between the framing members and the scantlings, appeared generally intact.

Because the camera angles to the hull varied, it was not always possible to estimate the amount that the side shell was deflected inward. Figure 4 indicates the approximate location of damage to the starboard side.

The photographs showed the propeller hub partially buried in the sea bottom and a section of 3/4-in polypropylene line coiled around the propeller. The line was frayed and parted. The rudder was intact and positioned approximately amidships; the skeg was not visible, and the siltly bottom was slightly depressed in this area.

Survival Aspects

The LOBSTA-I did not carry survival suits to protect persons against cold water immersion if they were required to abandon ship. Survival time for unprotected persons immersed in 60° F water would be about 6 hours. Without personal flotation devices (PFD), persons who become unconscious would drown

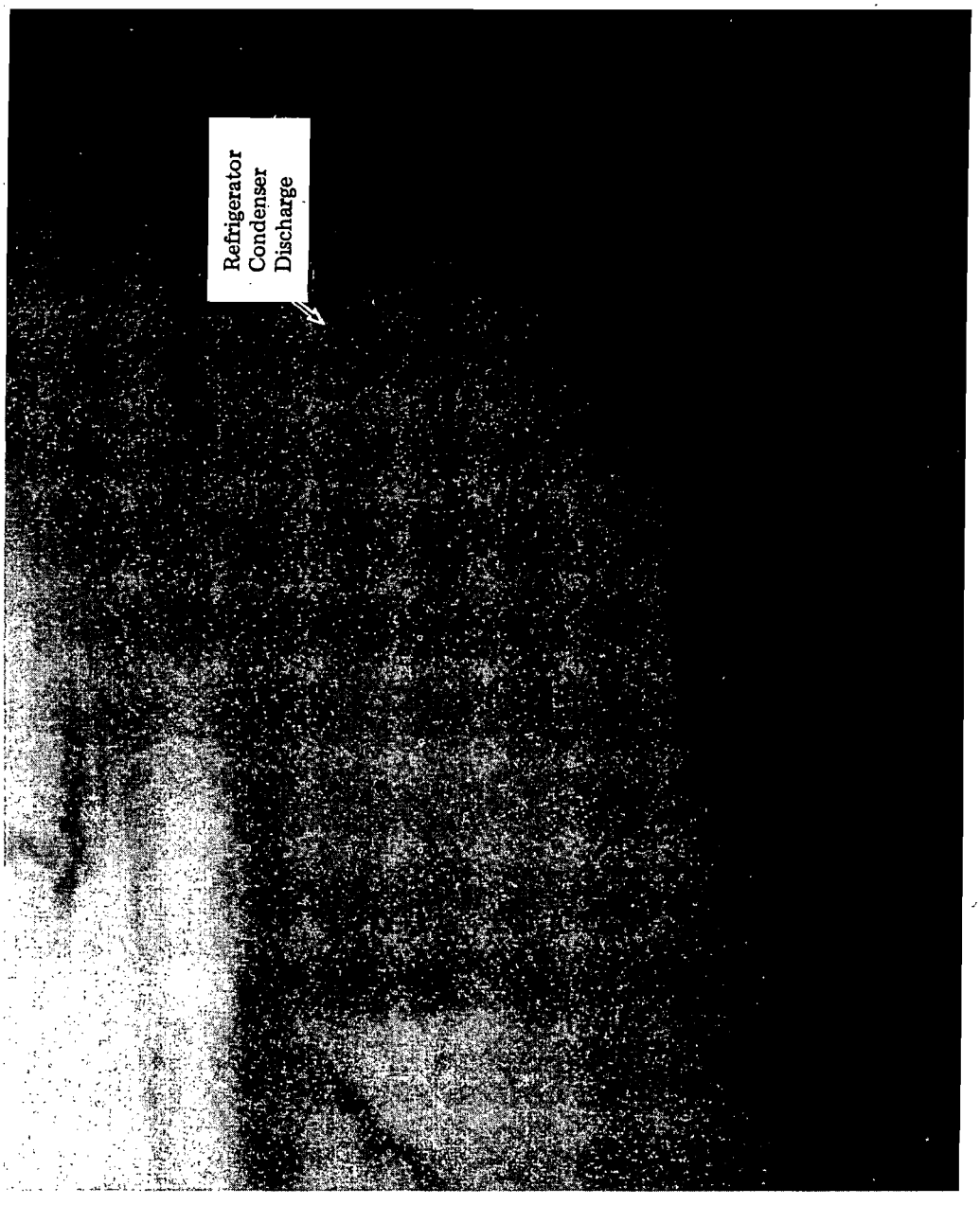

Figure 5. Distortion near frame 10 on starboard side.

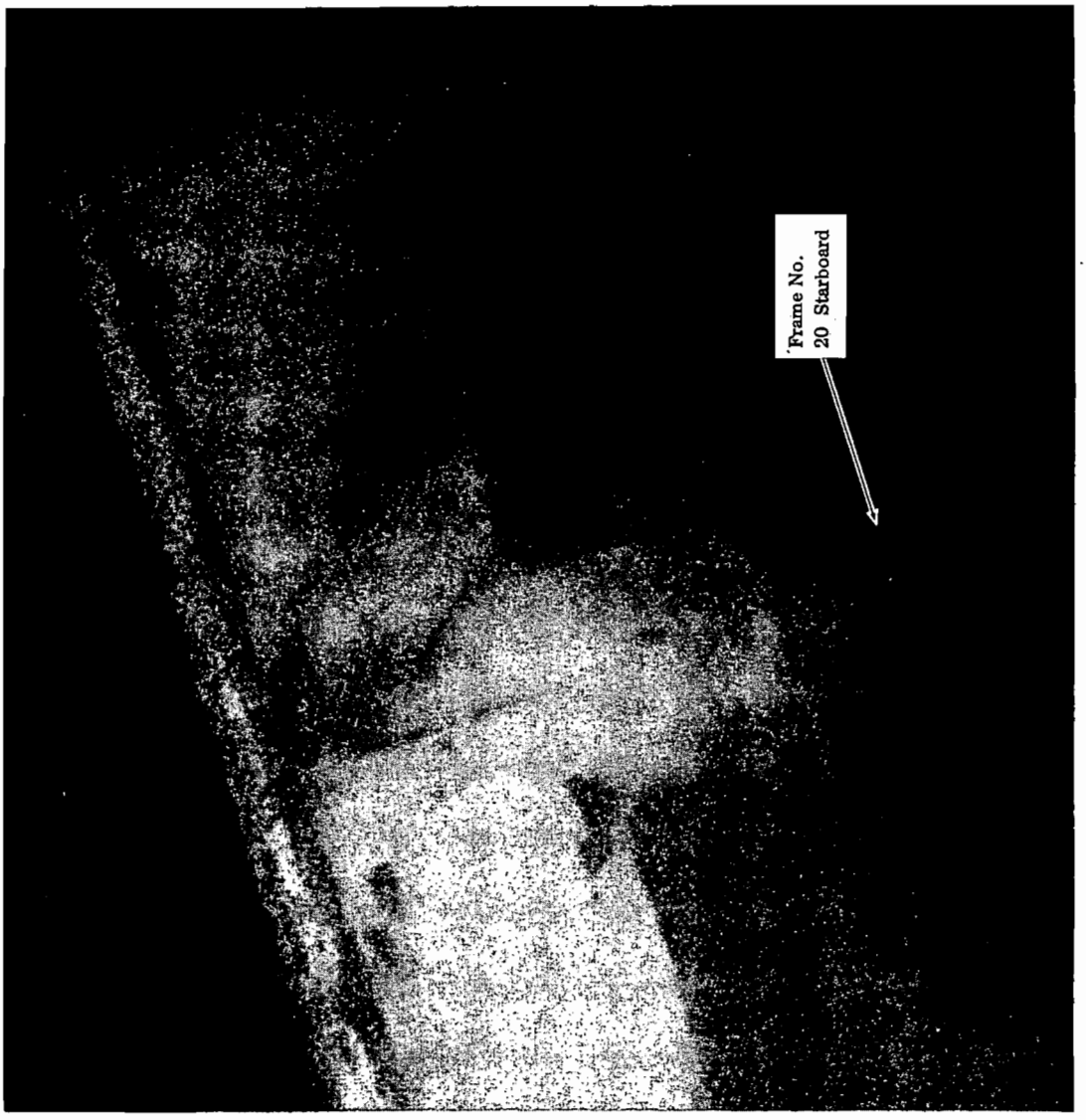

Figure 6. Distortions near frame 20 on starboard side.

even sooner. Also, the probability of locating a person or persons floating in the water with PFDs is much less than that for a liferaft.

Automatic release of the liferaft required the hydrostatic release to be submerged in 5 to 15 ft of water, with a reasonably unobstructed path to the water surface. The Safety Board could not determined whether the liferaft had released.

Tests and Research

Vessel Stability - Stability is the ability of a vessel to return to an upright position after it has been inclined by external forces which develop an upsetting moment. The moment returning the vessel to the upright position is the righting moment. As a vessel is inclined, its stability depends upon the difference between the upsetting moment and the vessel's righting moment. The righting moment is the product of the distance between the lines of force for the vessel's center of gravity and its center of buoyancy (the righting arm), and the buoyant force of the vessel. If the righting moment is greater than the upsetting moment, the vessel will return to the upright position. However, if the upsetting moment is greater than the righting moment, the vessel will capsize.

Calculations were performed by the Coast Guard and Safety Board to determine the LOBSTA-I's righting moment curves for the following conditions:

(1) The operating condition which existed on September 23, 1978, in still water;

(2) Partial flooding of the after lobster tank and fish hold;

(3) The LOBSTA-I momentarily poised on 5- and 8-ft waves; and

(4) The combined effect of partial flooding as in (2) above and being poised on an 8-ft wave.

The results of these calculations are shown in figure 7. The curves do not consider the additional righting moment developed when the pilothouse begins to immerse. The LOBSTA-I had a maximum righting moment of 165 ft-tons at an angle of heel of about 32° for the operating condition which existed on September 22, 1978. The effect of the fuel transfer for 7 hours of operation, as well as normal free surfaces, are included in this curve which shows that the vessel probably had a list of about 3°.

The effect on stability of downflooding through the overboard discharge of the after lobster tank and possible leakage through the deck hatches of the fish hold were calculated for 45 in of water in the lobster tank and 18 in of water in the fish hold. The maximum righting moment would have been reduced to 130 ft-tons primarily because of water in the lobster tank.

With the LOBSTA-I poised on the crest of an 8-ft high, 70-ft long wave, its maximum righting moment would have been reduced to 90 ft-tons; the curve for the vessel being poised on a 5-ft wave was also shown since this was in the range of reported sea conditions. The 8-ft wave approximates the steepest nonbreaking wave with a length equal to the vessel's length. Finally, the combined effect of the

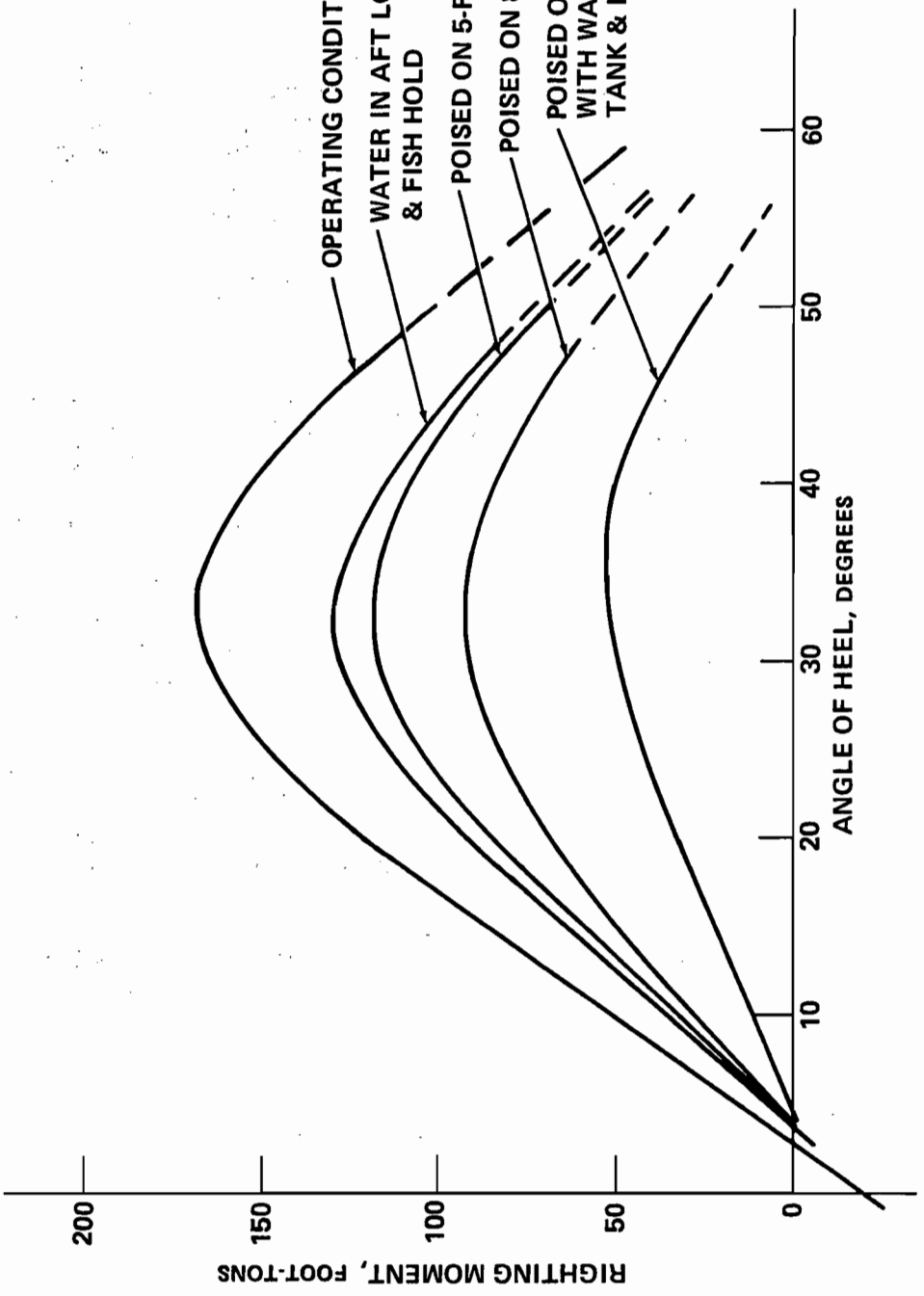

Figure 7. LOBSTA-I statical stability curves.

water in the lobster tank and fish hold and poising the vessel on an 8-ft wave would have reduced the maximum righting moment to 53 ft-tons.

USCG Weather Criteria and Torremolinos Convention Criteria - Calculations were also performed to determine whether the LOBSTA-I met the U.S. Coast Guard Weather Criteria for ocean service and the Torremolinos International Convention Criteria for the Safety of Fishing Vessels, 1977. (See appendixes C and D.)

Photographic Examination and Collision Analysis - The Safety Board arranged to have the Naval Intelligence Command examine the photographs of hull damage and determine the extent of damage to the LOBSTA-I's hull. Additionally, the Safety Board contracted Hydronautics, Inc., of Laurel, Maryland, to examine the photographs and to evaluate whether a collision could have caused the damage and capsizing. Hydronautics, Inc., stated in the major conclusions of their report that: (1) "It is difficult to explain some of the observed damage by causes other than a collision," and (2) the vessel could be capsized by a collision with much smaller impact than that which could cause the structural damage.

Other Information

Previous Casualties and Hull Damage - Coast Guard records indicated that the LOBSTA-I had requested assistance to return to port on two occasions: (1) after failure of the main engine bearing which caused propulsion loss; and (2) after seawater leaked into and filled the fish hold and caused the entire stern to submerge to the top of the bulwark. There was no evidence that other serious flooding incidents occurred.

The flooding incident occurred in October 1973. Former crewmembers attributed the leakage to running the vessel in moderate quartering seas over a 2-day period, not securing the hatch cover in place, and clogging of the hold's bilge suction by loose bait. The former master testified that seas were 10- to 12-ft high and winds were 50 mph (43 kns). When the vessel returned to Point Judith, crewmembers pumped the water out of the hold. To prevent the incident from recurring, the hold was kept clean, the deck hatch was bolted closed, and the inspection plate was removed from the opening to the shaft alley so that water could drain from the hold through the shaft alley to the engineroom.

The LOBSTA-I showed normal deterioration, as well as abrasion and minor denting along the sheer guard and plating on the starboard side between frames 17 and 20 from lobster pot handling, and rubbing marks and minor dents along the sheer guard on the portside and port transom from vessel contact with pilings and other vessels when docking.

ANALYSIS

Location and Time of Capsizing and Sinking

The time at which the LOBSTA-I capsized was estimated by determining the place where the reciprocal drift intersected the LOBSTA-I's trackline. The LOBSTA-I was assumed to have proceeded on a course about 170° magnetic from

Point Judith until its capsizing and then drifted under the influence of wind and current until 1616 on September 23 when it was sighted by the Coast Guard helicopter crew. Since the LOBSTA-I normally required 11 1/2 to 12 hours to reach its fishing area about 95 nmi away, the Safety Board considered 8 kns to be the LOBSTA-I's most likely speed.

The Coast Guard computed the drift of the LOBSTA-I's capsized hull between the time of the ANGELA-F and helicopter sightings as 230° T at 0.533 kn, but because of the short distance between the two sightings, small errors in reported positions could lead to significant errors in this computation. The drift measurement of 223° T at 0.677 kn, using a DMB, was applied with caution since that measurement was made at a later time when the drift could have changed and because DMB drift under similar environmental conditions would not necessarily be the same as that of the LOBSTA-I. The Pilot Chart indicated prevailing currents toward the southwest from 0.5 to 0.6 kn. A northeast wind blowing at 21 kns for over 12 hours would generate a current slightly over 0.45 kn toward the west southwest. This wind driven current would strengthen the prevailing current and indicates that the actual drift may have been higher than that measured by the DMB.

The locations where the vessel's trackline and the reciprocal drift intersect for a vessel speed of 8 kns and drift rates up to 0.8 kn were computed; higher drift rates were considered unlikely. At a 0.8-kn drift rate and for the capsizing to have occurred on a 170° magnetic trackline, the computations indicated that the LOBSTA-I would have had to depart Point Judith before 1820. For later departure times and lower drift rates, the capsizing would have had to occur to the west of the expected trackline. Because the evidence indicated that the LOBSTA-I would have gotten underway after the 1820 weather broadcast, the capsizing probably occurred west of the 170° magnetic trackline. This would be consistent with expected lower drift rates and the vessel's leeway while navigating a 170° magnetic course with winds out of the northeast. Based on its analysis, the Safety Board concludes that the LOBSTA-I departed Point Judith sometime shortly after 1830, September 22, at an average speed of 8 kns and generally progressed along a trackline of 158° T (173° magnetic) until it capsized about 0100 on September 23 at a location near 40° 37.5' N, 71° 06.5' W. This location is 2 3/4 nmi west of the expected trackline and about 47 nmi south southeast of Point Judith.

After capsizing, the LOBSTA-I drifted in a southwest direction at an estimated rate of 0.75 kn and was sighted by the ANGELA-F and the Coast Guard helicopter pilot. The LOBSTA-I then drifted about 1 nmi further where it sank to the bottom. Based upon drift rates from 0.5 to 0.80 kn and the time of the helicopter pilot's sighting, the vessel sank sometime between 1730 and 1800 on September 23.

As the vessel drifted, the LOBSTA-I flooded through topside openings and open discharges. The large hinged hatch on the forward lobster tank probably swung open and allowed that tank to fill with water quickly, leaving only a small air pocket. Since the fish hold was open to the engineroom through the shaft alley, this would allow flooding to progress either way between these two compartments. Water flooding the pilothouse through its sliding windows, nonwatertight door, and vents would have also flooded the engineroom. Pictures taken by the Coast Guard helicopter crew indicated that the hull had a large volume of air entrapped in its forward section when it capsized which had kept it afloat for about 17 hours.

The Safety Board sought to determine whether the LOBSTA-I may have lost steerageway before it capsized because the line fouled the propeller or whether the line became entangled in the propeller after the vessel capsized. Photographs taken during the underwater survey showed that the line leads down the stern ramp, under the vessel, and forward past the rudder and then wrapped around the propeller blades. The LOBSTA-I's propeller blade tips were about 3 ft below its waterline and 5 1/2 ft forward of the bottom edge of the stern ramp. Because the line, which was identified as polypropylene, floats in seawater and because it leads down the stern ramp, it would be expected to stream aft on the surface when the LOBSTA-I was underway. Further, the Safety Board determined that there was sufficient air in the engineroom to supply the engine for about 2 minutes after the vessel capsized and that the displacement of lubrication oil would have had negligible effect on short-term engine operation. With the vessel capsized, the line would float up and could become entangled in the turning propeller. Therefore, the Safety Board concludes that the line most likely became entangled in the propeller after the LOBSTA-I capsized.

Weather and Sea Conditions

Although higher winds and seas were reported by ships southwest of the accident site, meteorological information reported by ships in the vicinity of the capsizing indicated that the forecast issued by the NWS was substantially correct. The observed winds were also consistent with the 21 kns northeast wind which would be expected to result from the surface pressure patterns and these winds would generate seas consistent with observed seas.

Although the LOBSTA-I may have encountered thunderstorms, which were not forecast by NWS, en route to the accident site, wind gusts associated with these storms would have been less than 50 kns. Moreover, because of the small size and short duration of these thunderstorms, they would have had little effect on sea conditions. The weather radar pictures indicated that the LOBSTA-I probably did not encounter thunderstorm activity at the time of its capsizing.

Assessment of Damage

According to persons familiar with the LOBSTA-I, certain distortions shown by the underwater photographs and CCTV playbacks did not exist before the accident: hull plate and sheer guard near frames 8 to 11 starboard side; frames 17 to 20 starboard side; frame 20 portside; frame 33 portside; and the port stern transom plate. These distortions indicated that the hull of the LOBSTA-I had been under great stress during or following its capsizing. The Safety Board considered a number of factors, which by themselves or in combination with others, might have caused this damage. These factors were the slamming pressure of breaking waves; the differential pressure between the inside and outside of the hull, especially tanks; the impact of the vessel at the end of its descent to the bottom; and the collision with another vessel or object.

Breaking waves or pressure differential would have caused similar deformations of all plate panels being acted upon by the pressure. For instance, all plate panels forming the boundary of the starboard fuel oil tank alongside the engineroom, frames 11 to frame 20, should have exhibited similar distortions if caused by water pressure effects. However, the photographs showed that the only

damage to this tank was between frames 10 and 11 and between frames 17 and 20. Also, calculations indicated that the deformation of the plate panels resulting from the full pressure differential developed at a 234-ft depth would have been too small to notice on the photographs.

Consideration of the buoyant, weight, and drag forces acting on the LOBSTA-I after it was fully immersed determined that it would have assumed an upright attitude as it sank to the bottom. This analysis indicates that the vessel fell stern first while in a nearly upright attitude. The vessel's stern probably struck the soft silty bottom at a speed of about 10 kns. The compressive stresses caused by striking the bottom were sufficient to cause buckling of the local structure near the point of impact, as occurred to the port quarter after frame 33 and the port stern transom. The forces acting on the vessel's structure away from the stern are a complex combination of bending, twisting, and compression, and their determination requires a more precise knowledge of the vessel's motion as it struck the bottom than is known. The bending and twisting could set up sufficiently large in-plane compressive and tensile forces to cause buckling and paint peeling near frame 20 port and starboard. However, it is unlikely that any combination of bending, twisting, and compression stresses resulting from striking the bottom stern first could have caused the damage between frames 8 and 11 starboard side. Therefore, the Safety Board concludes that this latter damage was not caused by water pressure and most likely was not caused by impact with the bottom.

The Safety Board considered whether the damage could have been the result of a collision. A possible collision scenario was developed which could have caused the damage observed between frames 8 and 11 and frames 17 and 20 starboard and frame 20 portside. In the postulated collision, the LOBSTA-I would have been struck near frame 8 starboard side in an oblique angle, and the force of the collision would have caused the LOBSTA-I to roll, sway, and yaw. The vessels might have bounced apart momentarily because of seaway motions and the springing action of the hull plate, or the vessels could have slid alongside each other while the LOBSTA-I was yawing counterclockwise to port. As the point of contact moved toward frame 20, the impact force would have gradually increased. At frame 20, the impact force would have been acting through the LOBSTA-I's center of gravity and the hull was reinforced greatly near the bulkhead. The bulkhead would have acted as a sliding stopper and the maximum force would have developed there.

Based on the structural and collision mechanics, the impact force at frame 20 starboard was estimated at 490,000 lbs, and this force would have created an upsetting (heeling) moment estimated at 855 ft-tons which was much greater than necessary to capsize the LOBSTA-I. The shell plate of the LOBSTA-I has a capacity to sustain a maximum force of about 100,000 lbs without rupture. However, the shell would have deformed and shifted most of the load to the bulkhead and deck, which were relatively strong structural members before rupturing. A computer modeling of the postulated force distribution by Hydronautics, Inc. resulted in a pattern of deformations similar to those observed in the photographs taken near frame 20 starboard side.

The energy absorbed by the LOBSTA-I's structure if it were caused by the postulated collision was estimated and used to determine the speed-size relationship for the striking vessel. The results indicated that for a vessel much larger than the LOBSTA-I, the estimated striking speed was 2.4 kns; for a vessel of

the same displacement, the estimated speed was 4 kns; and for a vessel of a displacement of about 50 long tons (LT), the estimated speed was 6 kns. Although a collision with another vessel, followed by further damage resulting from striking the ocean floor, appears to be a plausible explanation for the observed damage, the Safety Board believes that there are too many unknowns and assumptions to conclude that collision was the cause of the capsizing.

Stability of the LOBSTA-I

The LOBSTA-I had been underway less than 7 hours when it capsized. Fuel oil transfer during this time would have caused an estimated 3° list. Because it was operating in moderate seas with 3- to 6-ft waves striking its port quarter, some seawater may have flooded the after lobster tank through its overflow discharges. Also, occasional quartering seas may have boarded over the stern ramp, the hatches, and the deck plates over the fish hold. The ingress of a small quantity of water through the hatch and deck plate edges also could have caused some water to accumulate in the fish hold. Allowing for 45 in of water in the after lobster tank and 18 in of water in the fish hold, the vessel's maximum righting moment would have been reduced from 165 ft-tons to 130 ft-tons, a 21 percent reduction; most of this reduction would be due to flooding of the lobster tank. A liquid depth of about 45 in. in the lobster tank is the most detrimental level for seawater in that tank.

The overboard discharge arrangement for the after lobster tank could allow this tank to flood without the crew being aware. Although flooding of this tank by itself would not endanger the vessel's stability, it would have caused a significant reduction in stability after several days of operation of which the crew should have been aware. Testimony indicated it would have taken 4 days for this tank to become partially filled with 1 to 4 ft of water. Because the LOBSTA-I had been underway less than 7 hours when it capsized, it is unlikely that a significant quantity of water filled this tank before the capsizing.

As much as 1/2 LT of seawater could flow through the shaft alley into the engineroom every minute if water accumulated in the fish hold. If this water inflow had not been detected during the normal practice of checking the engineroom bilge, the high water bilge alarm should have sounded when the water level reached 18 in, at which level, less than 9.5 LTs of water would have flooded the engineroom. This flooding would have reduced the LOBSTA-I's righting moment by about 13 ft-tons. When the effect of this water in the engineroom is combined with that of the water in the after lobster tank and fish hold, the LOBSTA-I's maximum righting moment would have been reduced to 117 ft-tons. In this condition, a 50-kn wind blowing on the vessel's beam would have developed an upsetting moment of about 37 ft-tons, much less than the reduced maximum righting moment, and heeled the vessel about 11°, not enough to indicate capsize. Thus, the bilge alarm should have sounded well in advance of a serious reduction in stability due to engineroom flooding and should have given the crew sufficient time to take corrective action or call for assistance.

The LOBSTA-I's maximum righting moment would have been reduced as waves in the quartering sea passed under it. The most dangerous condition to the LOBSTA-I would have occurred when the LOBSTA-I was poised on the crest of a wave approaching its own length, and such a wave would have progressed at a speed slightly faster than the LOBSTA-I's. Waves of this length will rarely reach a height

of 8 ft for the moderate sea conditions reported by ships in the area. Because the wave and vessel speed would have been similar, the vessel would have been poised on the wave crest for an abnormally long period of time. During that time, a 5-ft wave would have reduced the LOBSTA-I's maximum righting moment nearly 30 percent to 117 ft-tons and an 8-ft wave would have caused a nearly 45 percent reduction to 90 ft-tons. However, even while poised on an 8-ft wave, the upsetting moment of a 50-kn wind would only heel the vessel about 13°, indicating that this condition by itself was not enough to cause the capsizing.

If the LOBSTA-I capsized due to loss of stability, factors, other than those already considered, must have been involved. One such factor is water trapped on deck. However, because of the large freeing port area together with the open stern ramp, the amount of water that could have been trapped on deck would have been limited and even the largest volume would have freed itself in 3 to 5 seconds in moderate sea conditions. There was no evidence to indicate that the flow through the freeing ports might have been obstructed significantly. Therefore, the Safety Board concludes that it was unlikely that a enough water became trapped on deck to significantly affect the vessel's stability.

The practice of checking the engineroom bilges and oil pressure for the generator engine would leave the navigation bridge unattended for a short period of time during each watch. If there was a significant level of water which required actuation of the bilge pump, the bridge might have remained unattended for several minutes. With the wheel unattended and the autopilot out of service, the LOBSTA-I might have turned beam to the seas where synchronous rolling motions could build up until the vessel capsized. Thus, the practice of leaving the bridge to make engineroom checks or for any other reasons when sea conditions were a factor in setting the vessels course was dangerous. Further, it would have reduced the opportunity to radio a distress message if an emergency condition were to develop. However, there is no evidence to indicate that the crewmember on watch on board the LOBSTA-I would have left the helm unattended when sea conditions would affect the vessel's navigation. An experienced operator might have chosen to call another crewmember to make the engineroom checks rather than leave the helm unattended if sea conditions threatened the vessel's safe navigation.

The LOBSTA-I's stability, even when reduced by those factors discussed above, was not so marginal that it would indicate a likely capsizing in the reported sea conditions. However, the LOBSTA-I's stability, as indicated by its righting moment and the area under its righting moment curves, would have been seriously reduced, although not completely lost, if the more significant factors would have combined. For example, if the vessel had become poised on a steep 8-ft wave, crest amidship while the after lobster tank, the fish hold and the engineroom were flooded partially, then the LOBSTA-I would have been in great danger of being capsized by wind heel and sea induced rolling motions. However, the Safety Board believes that there are too many unknowns and assumptions to determine whether the LOBSTA-I capsized because of loss of stability in the seaway.

Although not required to meet any stability standards, the LOBSTA-I, as loaded on September 22 and 23, 1978, met the intact stability requirements of the U.S. Coast Guard Weather Criteria and the stability criteria of the Torremolinos International Convention for the Safety of Fishing Vessels, 1977. However, meeting these criteria does not assure a vessel will not capsize. The Safety Board's

investigation of the capsizing of the clam Dredge PATTI-B 5/ indicated that it met these criteria.

Coast Guard Response

The capsizing probably occurred unexpectedly and rapidly because no distress message was received by the Coast Guard. The LOBSTA-I's SSB radiotelephone had sufficient range to alert Coast Guard stations and an independent power supply was located on the bridge if primary electric power was lost. Even if a crewmember had attempted to broadcast a distress message initially over the VHF radiotelephone, he probably would have abandoned that effort in favor of the longer range SSB radiotelephone after 2 or 3 minutes if the accident circumstances allowed that much time. If any crewmen escaped, they probably did not have time to don personal flotation devices. The Safety Board was not able to determine if the inflatable liferaft was released. Without the inflatable liferaft, the crewmembers probably would have been immersed in water near 60° F where their survival time would be less than 6 hours. Without personal flotation devices, survivors immersed in the water who became unconscious would drown much sooner than 6 hours. When the Coast Guard was notified nearly 13 hours after the LOBSTA-I had capsized, there were probably no survivors.

In circumstances where the Coast Guard is notified shortly after a vessel capsizing or sinking, a fast response is critical to saving lives. To provide a fast response, the Coast Guard's policy is to have a helicopter airborne within 30 minutes after a decision is made to launch a helicopter. In the case of the LOBSTA-I, an HH-3 helicopter was airborne about 30 minutes after the RCC duty officer in the Third Coast Guard District requested that the First District provide a helicopter. However, that request was not made until 49 minutes after the Third District was notified of the wreck by the radio operator at Portsmouth. It appears that many of the rescue coordination actions were not made in a timely manner. A request for helicopter support from the National Guard at Suffolk was not made until 8 minutes after the Third District was notified. Nine minutes later, the duty officer called the commanding officer, who was not at home. Apparently, no action was taken until the commanding officer returned the call 23 minutes later. The duty officer then determined that two HH-52 helicopters would have to be flown from Brooklyn and that a request for an HH-3 helicopter from the First District should be made. These actions suggest that the rescue coordination was not well organized and that personnel on duty may have lacked the experience and instruction needed to process the SAR operation in the timely manner necessary to save lives. As a result, it took 1 hour 25 minutes to get a helicopter airborne. Had there been survivors in the water, this protracted response could have been critical to their rescue. The Safety Board concludes that the Coast Guard's search and rescue response was too slow for a lifesaving mission even though in this accident it did not contribute to the loss of life.

The helicopter pilot's report that the LOBSTA-I was a 20-ft raft suggests that he lacked familiarity with fishing vessels and other small vessels which operated in the offshore New England area. To attach the DMB, the helicopter had to come very close to the capsized hull. Such a closeup examination should

5/ Marine Accident Report - Grounding and Capsizing of the Clam Dredge PATTI-B, Ocean City Inlet, Ocean City, Maryland, May 9, 1978 (NTSB-MAR-79-9).

have indicated that it was a vessel considerably larger than a 20-ft raft. The fact that a more accurate description of the capsized hull was elicited from the pilot about 9 hours after he saw the wreck suggests that he was able to examine the vessel sufficiently but lacked the necessary familiarity to make an accurate report. This erroneous report delayed the formulation of a search plan for several hours. Again, this delay could have been critical if the initial accident notification had been earlier when survivors might have been expected.

There were other fishing vessels in the area which might have been able to assist the Coast Guard in their search and rescue. Some of these vessels could have arrived on scene earlier than a Coast Guard cutter and could have provided professional advice and assistance to the Coast Guard. Had there been survivors, this early response and assistance could have been important to saving lives. The Coast Guard failed to take advantage of this potential lifesaving resource in the early stages of the SAR.

The helicopter pilot attached a DMB which contained a radio beacon and strobe light to a line streaming from the LOBSTA-I. As long as it remained above the water surface, it could be relocated. Once the DMB sank with the LOBSTA-I, the Coast Guard had to conduct a time-consuming and very costly search to relocate the vessel. Acoustic beacons are available and are used routinely to aid in relocation of submerged objects. The attachment of an acoustic beacon to the LOBSTA-I would have speeded its relocation and resulted in considerable savings in SAR resources.

Within 2 hours of the time the Coast Guard was notified of the wreck sighting, the cutter POINT WELLS was underway and was on scene about 4 hours later. This response was consistent with the Coast Guard's readiness conditions for cutters. The Safety Board concludes that the initial orders for the POINT WELLS to prepare to get underway and the cutter's response were timely.

LOBSTA-I Unable to Signal Distress

Either the LOBSTA-I's crew did not have sufficient time to broadcast a distress message or if the crew had attempted to broadcast a distress message over their VHF radiotelephone, the Coast Guard did not hear it. The Coast Guard's radio stations are set up for reliable VHF reception from ships and boats up to 40 nmi away, and the LOBSTA-I was about 40 nmi from the nearest station. The ANGELA-F's attempt to contact the Coast Guard over channel 16 VHF probably was an indication of the VHF range limitations. If the LOBSTA-I's distress had been known immediately, the Coast Guard should have had helicopters on scene and searching for possible survivors in the water within 2 hours, and vessels in the area could have been diverted to the scene shortly thereafter. The fishing vessel HUNTRESS was about 18 nmi away from the accident site and two U.S. Navy ships passed near the accident site about 4 hours after the capsizing. The lives of some LOBSTA-I crewmembers may have been saved by the early arrival onscene of helicopters and ships. The Safety Board concludes that the lack of a distress notification may have contributed to the loss of life.

Emergency position indicating radio beacons (EPIRB) can automatically signal a vessel's distress in the event of a sinking or capsizing, can be heard by aircraft 200 nmi away, and are available at a reasonable cost. Coast Guard cutters and

Navy ships are also equipped to detect EPIRB signals. From June 1976 through August 1978, 123 EPIRB signals were reported in the Maritime Search and Rescue (SAR) Region. Of those, 60 signaled real emergencies. Many rescues have resulted from EPIRB signals.

Because of the large volume of commercial and military aviation traffic within 200 nmi of the accident site, there was a high probability that an EPIRB signal from that location would have been detected shortly after activation. Therefore, the Safety Board concludes that lives may have been saved if the LOBSTA-I had carried an EPIRB.

In addition to their lifesaving potential, EPIRBs might greatly reduce the Coast Guard resources expended in search and rescue. The loss of the CAPT COSMOS on September 8, 1978, in the North Atlantic caused a 293-hour search over 142,232 square miles and involved 67 aircraft sorties, including an Air Force U-2 overflight. The CAPT COSMOS was never found. Other unsuccessful searches for fishing vessels operating out of New England have caused the Coast Guard to commit its ships and aircraft at great cost.

There are about 25,000 U.S. flag documented fishing vessels 6/ which are not required to be inspected by the Coast Guard. From 1972 to 1977, 819 fishing vessels reported casualties involving flooding, foundering, and capsizing in which 238 lives were lost. Nevertheless, it is unlikely that the Coast Guard will be given authority to inspect these vessels in the near future. Therefore, efforts to reduce the loss of life in fishing vessel accidents should be directed more toward improvements in distress notification, survival after an accident, and locating persons in the water including accidents which occur during darkness. The use of EPIRBs can provide automatic distress notification which should assure a reasonably fast rescue response. However, survival for even short periods of time in cold water requires suitable thermal protection. Additionally, the rescue of survivors in the water during darkness is greatly dependent upon the visibility of the survivors by means, such as the use of lights attached to their personal flotation devices or survival suits. In addition to vessels being equipped with EPIRBs, fishing vessel crews must be made aware of how to improve their chances of survival while awaiting rescue after an accident.

All documented U.S. fishing vessel could be outfitted with an EPIRB for less than $5 million in addition to installation costs. The Safety Board believes that the lifesaving potential alone is worth this cost. Further, this cost may be discounted by a large saving in SAR resources. The Safety Board believes that the Coast Guard should pursue all available means to encourage or require EPIRBs on documented U.S. fishing vessels. In conjunction with this effort, the Coast Guard should determine to what degree the carriage of EPIRBs might reduce the loss of life on U.S. fishing vessels.

Rescue from a Capsized Vessel

While it remains afloat, a capsized vessel will usually contain a large volume of air which can support life. Generally, the Coast Guard encounters situations requiring rescue of persons trapped inside a large vessel so infrequently and the

6/ Documented vessels are over 5 net tons.

circumstances vary so much with each incident that they have not developed a general response plan. Unless the hull of a capsized vessel can be supported by external buoyancy or lifting provisions, divers entering the hull could be trapped inside if the vessel sank. Divers could disturb openings which could cause additional flooding and sinking, or their air bubbles could disturb a delicate balance and cause additional flooding. Coast Guard cutters normally do not carry divers, and the cutters do not have the lifting capability to prevent a large capsized vessel from sinking. Further, Coast Guard helicopters do not carry divers and are greatly limited in their capability to carry equipment suitable for rescue of persons entrapped in capsized vessels. However, Coast Guard cutters could inject additional air into a capsized hull to keep it afloat and to extend life support, and their helicopter crews could deliver and sometimes attach emergency flotation bags to keep the vessel afloat longer. Then, the Coast Guard could bring in its own, U.S. Navy, or civilian divers and floating cranes or flotation of adequate capacity to support a rescue.

Location, time, and weather, as well as vessel arrangement — factors over which the Coast Guard has no control -- will determine the proper rescue response. However, with increased use of EPIRBs, the Coast Guard might be faced with the extraction of survivors entrapped in capsized vessels more frequently. The Safety Board believes that the Coast Guard should determine the most effective methods of extending survival time and effecting rescue from inside capsized vessels which require minimal increases in their resources.

CONCLUSIONS

Findings

1. The fishing vessel LOBSTA-I capsized about 0100, September 23, 1978 after proceeding 47 nmi along a trackline about 158° T from Point Judith, Rhode Island.

2. The LOBSTA-I drifted southwest and sank about 17 hours after it capsized and less than 2 hours after it was sighted by a U.S. Coast Guard helicopter.

3. By the time the U.S. Coast Guard was notified—about 13 hours after the capsizing—there were probably no survivors.

4. The NWS forecast of winds and seas in the area of the capsizing were substantially correct.

5. The LOBSTA-I's master probably obtained the NWS forecast before departure from the Boston Marine Operator's scheduled broadcast at 1820, on September 22.

6. Although collision appears to be a plausible explanation for the observed damage, the physical evidence is not sufficient to establish that such a collision occurred.

7. In its operating condition, the LOBSTA-I met the weather stability criteria of the U.S. Coast Guard and the stability criteria of the Torremolinos International Convention for the Safety of Fishing Vessels, 1977.

8. The LOBSTA-I's stability, even if reduced by partial flooding of the after lobster tank, the fish hold, and the engineroom, was not so marginal as to indicate a likely capsizing in the reported sea conditions. However, there are too many unknown factors and assumptions to determine whether or not the LOBSTA-I capsized due to loss of stability in the prevailing seaway.

9. The arrangement whereby the after lobster tank could fill with seawater without the crew being aware is considered undesirable, but in the short underway time preceding the accident, flooding of this tank most likely did not reduce the LOBSTA-I's stability significantly.

10. The apparent practice of leaving the bridge unattended to make engineroom checks is unsafe, especially if done when sea conditions are a factor in setting the vessel's course, because it can endanger the vessel's stability; moreover, it makes the radiotelephone inaccessible in an emergency. However, there was no evidence to indicate that the experienced crewmember on watch on board the LOBSTA-I would have left the bridge unattended under such sea conditions, especially since he had the choice of calling another crewmember to make the necessary checks.

11. The LOBSTA-I capsized before the crew had sufficient time to broadcast a distress message, or if the crew attempted to broadcast a distress message over the VHF radiotelephone, the Coast Guard could not hear it because the vessel was out of range for reliable VHF reception.

12. The Coast Guard's SAR response was too slow for a lifesaving mission even though in this accident it did not contribute to the loss of life. The Coast Guard helicopter pilot's erroneous description of the LOBSTA-I delayed the formulation of an SAR plan. Further, the Coast Guard's failure to issue an urgent marine broadcast precluded early broadcast assistance from other vessels near the accident scene.

13. The datum marker buoys and other marking devices used by the Coast Guard do not provide underwater signals for use in marking vessels when the risk of sinking is evident.

14. The lack of a distress message or signal from the LOBSTA-I delayed the initiation of SAR efforts beyond the likely survival time for crewmembers who may have been exposed to the cold North Atlantic waters and may have contributed to the loss of life.

15. The Coast Guard could provide more timely SAR service to fishing vessels in distress if those vessels were equipped with EPIRBs.

16. The Coast Guard is not prepared to rescue persons trapped in capsized fishing vessels at sea where environmental conditions indicate a short survival time. This lack of capability is partially attributed to the infrequent occurrence of such incidents.

17. The evidence indicates that the crewmembers were reasonably competent and cautious and that their actions would not be expected to have contributed to the accident.

Probable Cause

The National Transportation Safety Board is unable to determine the cause of the capsizing of the LOBSTA-I. Vessel damage indicates a collision with another vessel as a possible cause of the capsizing; however, the evidence is not sufficient to establish that such a collision occurred. Another possible, but less likely, cause is the loss of stability due to internal flooding. The lack of distress notification may have contributed to the loss of life.

RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board made the following recommendations to the U.S. Coast Guard:

Seek authority to require the carriage of emergency position indicating radio beacons (EPIRB) on documented U.S. fishing vessels, and in the interim period, pursue all available means to encourage their use. (Class II, Priority Action) (M-80-23)

Advise fishing vessel operators of actions which they should take to improve their chances of survival and rescue from accidents occurring in cold water and in darkness. (Class II, Priority Action) (M-80-24)

Determine the most effective means to utilize onscene Coast Guard resources to rescue persons trapped within a capsized vessel, and determine how these resources can be augmented, adapted, or trained for more effective use in such rescues. (Class II, Priority Action) (M-80-25)

Review the Coast Guard's rescue coordination for this accident and improve the rescue coordination procedures to provide a more timely response. Include provisions for more effective coordination with local fishing vessel operators who may assist in search and rescue efforts. (Class II, Priority Action) (M-80-26)

Develop a list of unsafe practices and vessel arrangements - such as leaving the bridge unattended in a seaway, which affects the vessel's navigation, and overboard discharges, which allow tanks to flood without crew knowledge - found on the U.S. fishing vessels. (Class II, Priority Action) (M-80-27)

Advise fishing vessel operators and insurers of these unsafe practices and arrangements, and urge them to correct any unsafe practices and arrangements found on their vessels. (Class II, Priority Action) (M-80-28)

Provide cutters and helicopters with acoustic beacons for attachment to vessels in danger of sinking to aid in their relocation. (Class II, Priority Action) (M-80-29)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JAMES B. KING
Chairman

/s/ ELWOOD T. DRIVER
Vice Chairman

/s/ FRANCIS H. McADAMS
Member

PATRICIA A. GOLDMAN and G.H. PATRICK BURSLEY, Members, did not participate.

April 16, 1980

APPENDIX A

Crewmember Information

Captain Stephen M. Hoyt

Captain Stephen M. Hoyt, 27, master, had operated lobster trawlers out of Point Judith, Rhode Island, for about 3 years before becoming master of the LOBSTA-I. He had attended Roger Williams Junior College, Providence, Rhode Island, before starting his fishing career in 1972.

Crewmember Nigel H. Allan

Crewmember Nigel H. Allan, 26, had worked with Captain Hoyt for about 2 years on the fishing vessel SNUG HARBOR before joining him on the LOBSTA-I.

Crewmember Stephen T. Stickley

Crewmember Stephen T. Stickley, 25, had worked with Captain Hoyt for about 2 years on the fishing vessel SNUG HARBOR before joining him on the LOBSTA-I.

Crewmember Bradford L. Williams

Crewmember Bradford L. Williams, 25, had worked with Captain Hoyt for about 2 years on the fishing vessel SNUG HARBOR before joining him on the LOBSTA-I.

Crewmember David A. Patty

Crewmember David A. Patty, 29, had worked previously on the LOBSTA-I before it was taken over by Captain Hoyt. He was retained by Captain Hoyt at the request of the owner.

APPENDIX B
Weather and Sea Observations in the Area of the Accident

Source	Location Relative to Accident Site	Time	Weather	Wind	Waves*
EDB	115 nmi E	2300-0300 Sept 22,23	-	17 to 24 kns from 020° T to 040° T	- -
EDB	110 nmi SSE	2300,Sep 22 0200,Sep 23	- -	calm 14 kns from 040° T	Seas 3 ft Seas 3 ft
Nantucket Lightship	70 nmi E	2300,Sep 22	-	25 kns from 060° T	Seas 5 ft & 5 sec from 060° T
Nantucket Lightship	70 nmi E	0200,Sep 23	-	22 kns from 030° T	Seas 5 ft & 5 sec from 030° T, swell 5 ft & 5 sec from 050° T
GLOMAR PACIFIC	125 nmi SW	0000,Sep 23	Light rain	25 kns from 050° T	Seas 8 ft
S/S OCEANIC	145 nmi WSW	0200,Sep 23	-	24 kns from 060° T	Seas 5 ft
USS DYESS** (DD 880)	8 nmi S	0500,Sep 23	Rain, air temp 56° F	20 kns from 060° T	Seas 3 ft & 2 sec, swell 4 ft & 3 sec from 045° T
USS MYLES C.FOX** (DD 829)	12 nmi SE	0500,Sep 23	-	18 kns from 303° T	Seas 3 ft

*Darkness precluded or impaired some wave observations.

**The DYESS and FOX passed close to the Nantucket Lightship about 0130, Sep 23 and recorded weather consistent with the Lightship.

Source	Location Relative to Accident Site	Time	Weather	Wind	Waves
USS NITRO (AE-23)	20 nmi S	2000,Sep 22 air temp 61° F	Rain, from 074° T	23 kns	Seas 2 ft & 3 sec, swell 6 ft & 5 sec from 068° T
USS GARCIA (FF 1040)	95 nmi SW	0100,Sep 23	Haze from 016° T	36 kns	-
Offshore Supply Vessel VIGILANT	35 nmi WSW	2330,Sep 22	Rain from NNE	35 kns 18 ft from NNE	Seas 15 ft to
Fishing Vessel HUNTRESS	Pt Judith to 18 nmi W	1730-0420 Sep 22,23 rain	Occasional NE diminishing after midnight	15 to 25 kns from from NE, diminishing during period	Seas 4 ft to 6 ft

APPENDIX C

USCG Weather Criteria

§ 74.10–5 Weather criteria.

(a) The required minimum metacentric height (GM) in feet at any particular draft is obtained from the following formula:

$$GM = \frac{PAh}{\Delta \tan \theta} \qquad (1)$$

where:

$P = .005 + \left(\frac{L}{14{,}200}\right)^2$ tons/ft² for ocean and coastwise service.

$P = .0033 + \left(\frac{L}{14{,}200}\right)^2$ tons/ft² for partially protected waters such as lakes, bays, and sounds, and Great Lakes (summer service).

$P = .0025 + \left(\frac{L}{14{,}200}\right)^2$ tons/ft² for protected waters such as rivers, harbors, etc.

L = Length between perpendiculars in feet.

A = Projected lateral area in square feet of portion of vessel above waterline.

h = Vertical distance in feet from center of A to center of underwater lateral area or approximately one-half draft point.

Δ = Displacement in long tons.

θ = Angle of heel to one-half the freeboard to the deck edge or 14 degrees whichever is less. (For vessels having a discontinuous weather deck or abnormal sheer, the angle to one-half the freeboard may be suitably modified.)

APPENDIX D

Torremolinos Convention Criteria

Regulation 28

Stability Criteria

(1) The following minimum stability criteria shall be met unless the Administration is satisfied that operating experience justifies departures therefrom:

(a) the area under the righting lever curve (GZ curve) shall not be less than 0.055 metre-radians up to 30 degrees angle of heel and not less than 0.090 metre-radians up to 40 degrees or the angle of flooding θf if this angle is less than 40 degrees. Additionally, the area under the righting lever curve (GZ curve) between the angles of heel of 30 degrees and 40 degrees or between 30 degrees and θf, if this angle is less than 40 degrees shall not be less than 0.030 metre-radians. θf is the angle of heel at which openings in the hull, superstructure or deckhouses which cannot rapidly be closed watertight commence to immerse. In applying this criterion, small openings through which progressive flooding cannot take place need not be considered as open;

(b) the righting lever GZ shall be at least 200 millimetres at an angle of heel equal to or greater than 30 degrees;

(c) the maximum righting lever GZ_{max} shall occur at an angle of heel preferably exceeding 30 degrees but not less than 25 degrees;

(d) the initial metacentric height GM shall not be less than 350 millimetres for single deck vessel In vessels with complete superstructure or vessels of 70 metres in length and over the metacentric height may be reduced to the satisfaction of the Administration but in no case shall be less than 150 millimetres.

(2) Where arrangements other than bilge keels are provided to limit the angles of roll, the Administration shall be satisfied that the stability criteria given in paragraph (1) are maintained in all operating conditions.

(3) Where ballast is provided to ensure compliance with paragraph (1), its nature and arrangement shall be to the satisfaction of the Administration.