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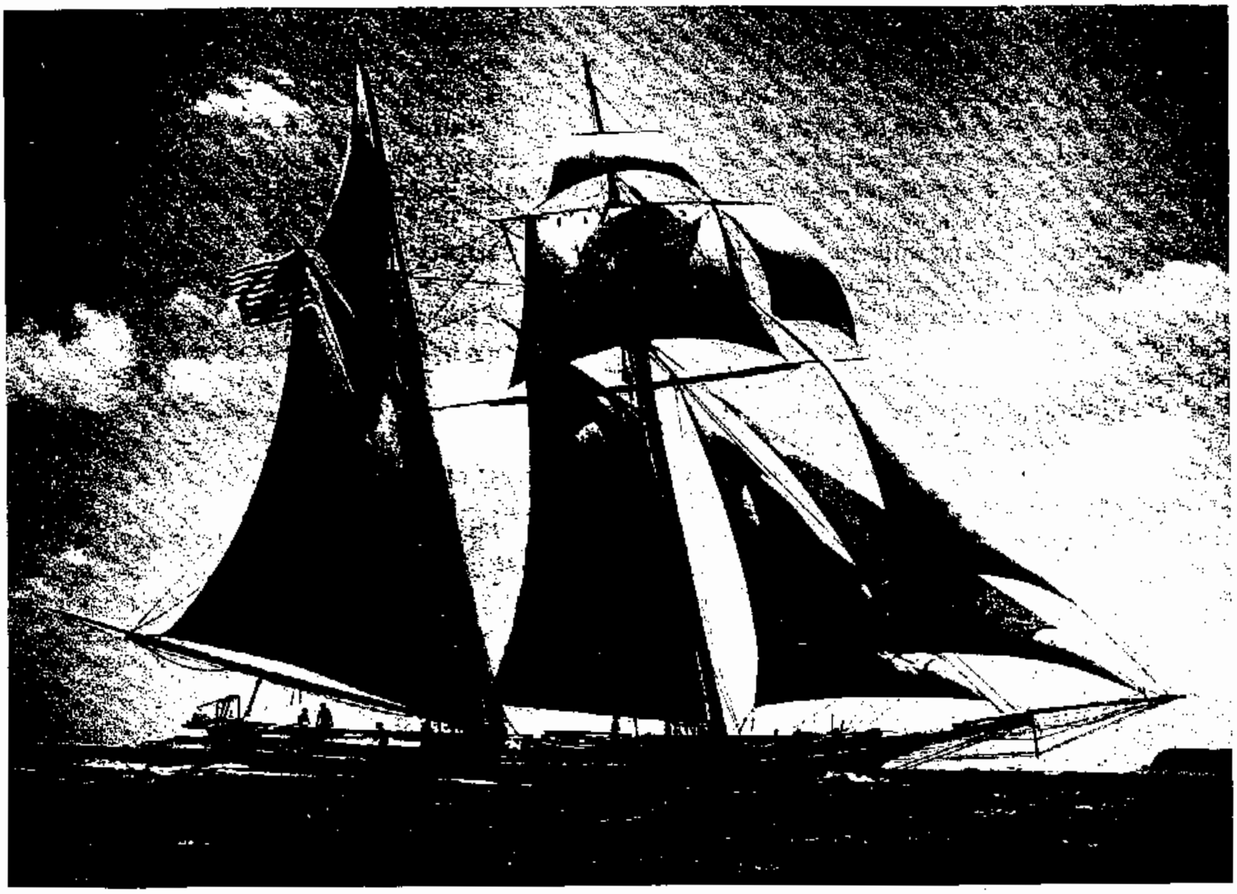
The **Pride of Baltimore** *capsized on May 14, 1986, with a loss of four lives. The Coast Guard investigation determined that a sudden and extreme wind heeled the vessel beyond its stability range and knocked it down. Contributing factors included flooding through an open hatch and a lack of watertight bulkheads. This month's issue highlights the dangers of microbursts: the sudden, intense wind which capsized the* **Pride**. *(Cover photo copyright Greg Pease, Pride of Baltimore, Inc.)*

The Loss of the Pride of Baltimore

CAPT J. C. Maxham and LT W. E. Diaduk



Surviving crew member Scott Jeffrey took this photo of the Pride of Baltimore in the Virgin Islands shortly before the vessel capsized.

At approximately 1:40 a.m. on May 19, 1986, a sharp-eyed lookout on the Norwegian tanker **Toro** observed a pinprick of light in the distance. The eight crew members of the uninspected sailing vessel **Pride of Baltimore**, cramped in their six-man liferaft, did not know it yet, but the sixth ship to pass them in 4 days had seen their signal. Within and hour and a half, they were safely aboard the **Toro**, and the tragic story of the loss of the **Pride of Baltimore** began to unfold.

The **Pride of Baltimore** was built in Baltimore, Maryland, in late 1976 and early 1977 as a historical reproduction of the **Baltimore Clipper**. The wood-hulled vessel had a 7-foot rosewood tiller connected to the rudder for steering and could set 12 sails with a combined sail area of over 9,500 square feet.

CAPT John C. Maxham is the Commanding Officer of the Coast Guard's Marine Safety Center, Washington, DC. LT William F. Diaduk is the Senior Investigating Officer at the Coast Guard Marine Safety Office, Baltimore, MD. CAPT Maxham was the Investigating Officer for the Pride of Baltimore *casualty and was assisted by LT Diaduk.*

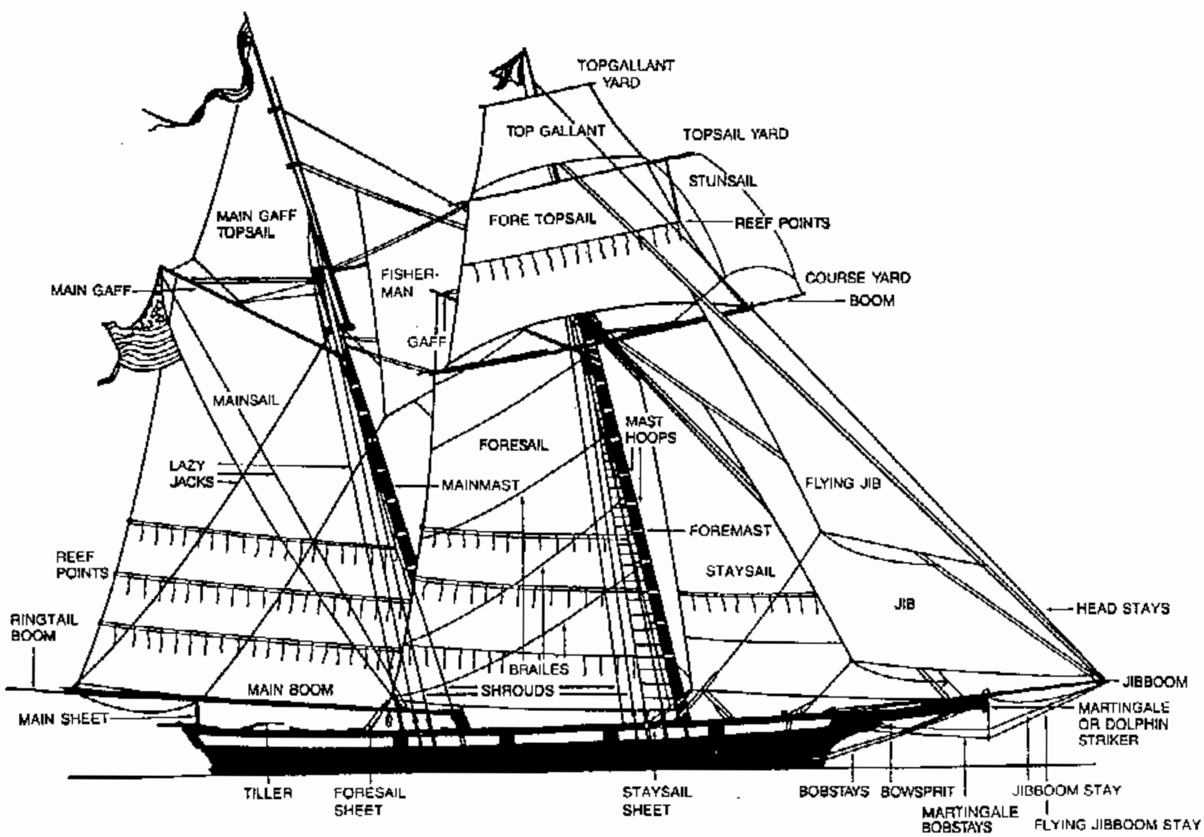
Over 40 tons of ballast were carried. Below decks the vessel was open with berthing, cooking, storage and work areas, an engine room, and a radio room. Access below decks was through five weathertight hatches.

The **Pride of Baltimore** was well-equipped with safety and communications gear. A rigid-hull, inflatable raft and a Chesapeake traveling skiff were stowed in chocks over the main hatch. A yawl boat was hung upside down over the stern. Two six-man liferafts with hydrostatic releases were stowed under the tiller. Each of the 12-person crew was issued a life preserver, work vest, foul weather gear, and a safety harness. This equipment was normally stowed below deck at the individual's bunk. Two ring buoys, two horseshoe life buoys with line and lights, a signal gun and flares were also carried. Two manually activated Emergency Position Indicating Radio Beacons (EPIRBs) were stowed below deck. The navigation and communication equipment included Decca, Loran C, satellite navigation, radar, radio direction finder, depth sounder with recorder, VHF and single-sideband radio, and a weather facsimile recorder.

The **Pride of Baltimore** was an "uninspected" vessel (46 CFR Subchapter C) used as a promotional and goodwill ambassador for the City of Baltimore. In its first 9 years of service, the **Pride** logged approximately 150,000 miles, including voyages to Bermuda, Nova Scotia, the Great Lakes, the Caribbean, California, and Europe. In early May 1986, the **Pride of Baltimore** was in the Caribbean preparing to return to Baltimore after completing its second transatlantic voyage.

The Casualty

On the morning of May 11, the **Pride of Baltimore** weighed anchor and motored away from St. John, U.S. Virgin Islands, enroute to Chesapeake Bay. After 3 days of motoring and sailing, the wind began to fill in during the early evening of May 13. After double-reefing the mainsail, which reduced its area by about 55 percent, the **Pride of Baltimore** sailed on a



Sail plan of the Pride of Baltimore.

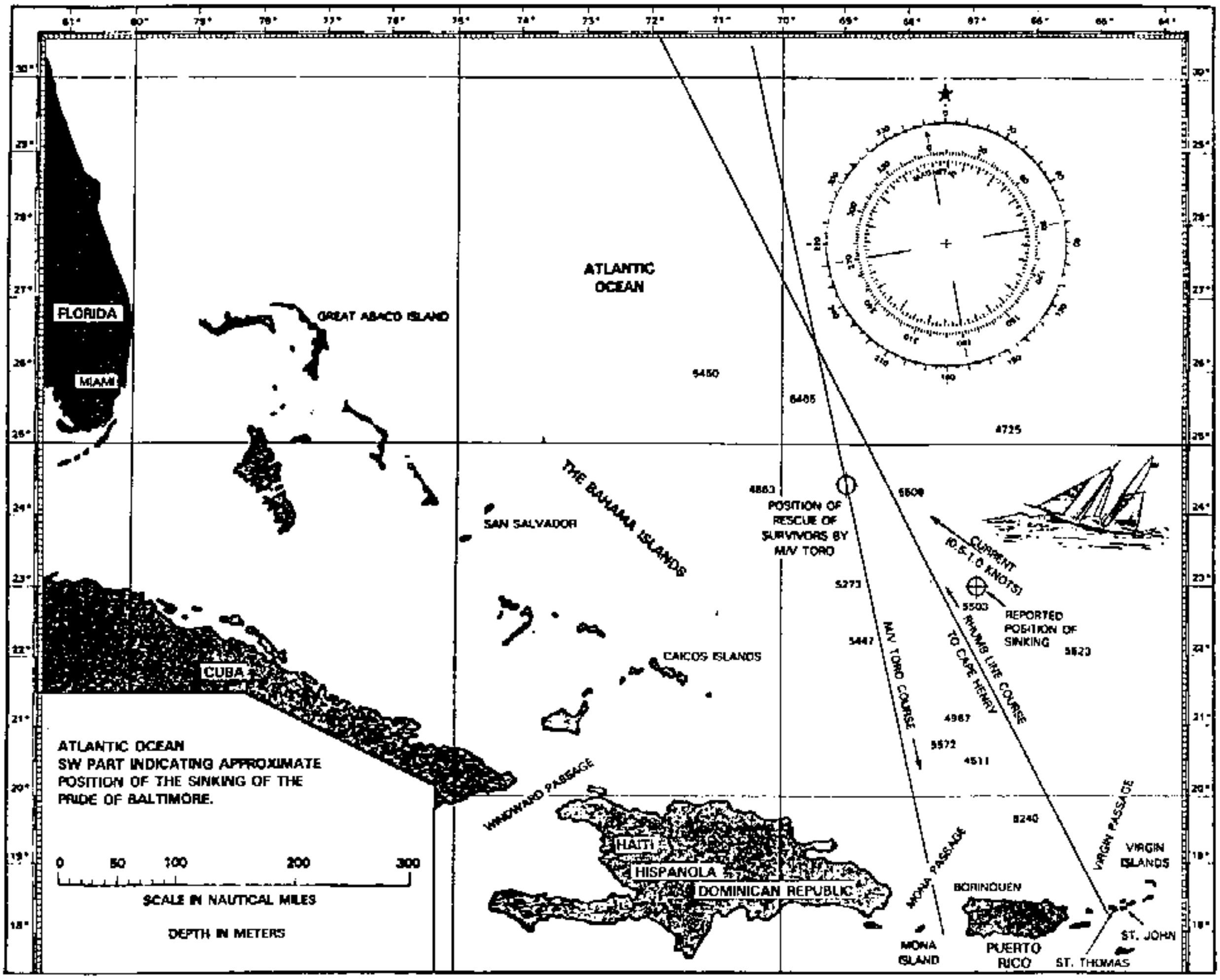


Chart of the Atlantic Ocean showing the approximate position of the sinking of the vessel and the position of the rescue.

beam reach with the double-reefed main, foresail, staysail, and jib set. Winds were easterly at about 25 knots and picked up to 25 to 28 knots the next morning. At this time, all hatches were fully battened down except the aft companionway hatch (the main entryway below deck) and the hinged forecastle hatch.

About 11:15 on the morning of May 14, the Captain came on deck and, noting the wind had increased, decided to reduce sail. He took the helm and called for the standby watch. About 5 minutes later, all hands were called to take in sail. The Captain fell off the wind about 25° further to facilitate sail reduction. The foresail was struck first, then the jib. While working on the jib, the forecastle hatch was closed, leaving only the aft companionway hatch open. The crew triced up the jib to get it clear of the head rig and began cleaning up lines. The vessel was now sailing on a broad reach and a starboard tack with only the double-reefed mainsail and the staysail set. Wind velocity was about 30 knots from east by north. Seas were from abaft the beam at 4 to 7 feet. The vessel was sailing comfortably, and the crew expected that they would be heading back up to their original course.

Just before noon, all hands except the cook were on deck. The Captain and the First Mate were aft at the tiller discussing the weather. The Captain ordered the mainsheet eased. The First Mate went to the bit and began easing the mainsheet, when suddenly a steady, intense gust of high-velocity wind slowly heeled the **Pride of Baltimore** over on her side. Visibility decreased. A deckhand watched the wind blow the tops off the waves. The force of the wind was "unbelievable," according to the First Mate. It was estimated by several crew members to be 70 to 80 knots.

The First Mate eased out the main sheet until the boom hit the water and called for the staysail sheet to be eased. The Captain put the tiller hard to starboard, attempting to fall further off the wind. A deckhand made his way to the staysail sheet but could not release it because it was under water. Very quickly, all hands on the leeward side were under water. The deck became vertical. Those on the starboard side held on and attempted to climb up the deck to the rail. The cook was below deck at the foot of the aft companionway ladder. As the vessel heeled to port, he observed water begin to rush in through the opening. He made three attempts to swim out through the hatch against the inrushing water, but could not. Just before his last attempt, he stated that there was just enough air space left in the aft cabin to take a breath. He was successful on his fourth attempt to escape.

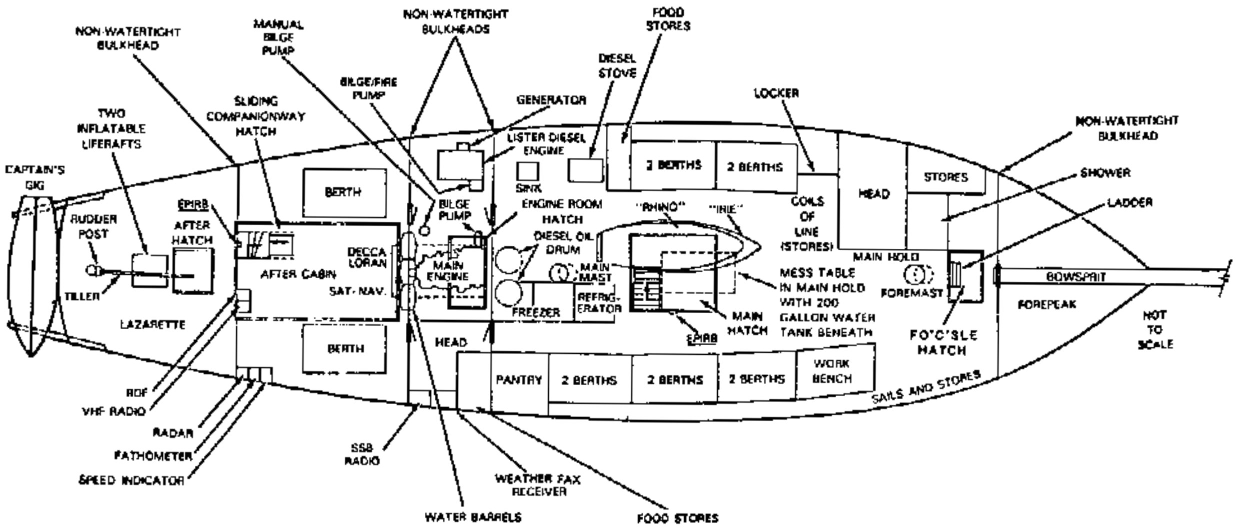
In a matter of minutes, the **Pride of Baltimore** sank in about 17,000 feet of water at an approximate position of 23°N and 67°W. With the exception of the liferafts, most of the safety equipment onboard sank with the vessel.

As the vessel sank, the crew made their way aft and began to swim toward the liferafts. The First Mate unsuccessfully tried to manually release the liferafts, but both eventually deployed by hydrostatic release. One raft inflated automatically, then began deflating when the hard rubber plugs for the three inflation/"disinflation" valves popped out. The other raft inflated but was snagged by the sinking **Pride of Baltimore's** rigging. It also deflated. The crew managed to push the rafts together and surround them. After struggling in the water for about 6 hours, the crew reinflated one raft, blowing it up by mouth, and eight survivors climbed aboard what was to be their "home" for the next 4 days. Four persons, the Captain, Engineer, Carpenter, and a Deckhand, drifted away from the rafts and are missing and presumed dead.

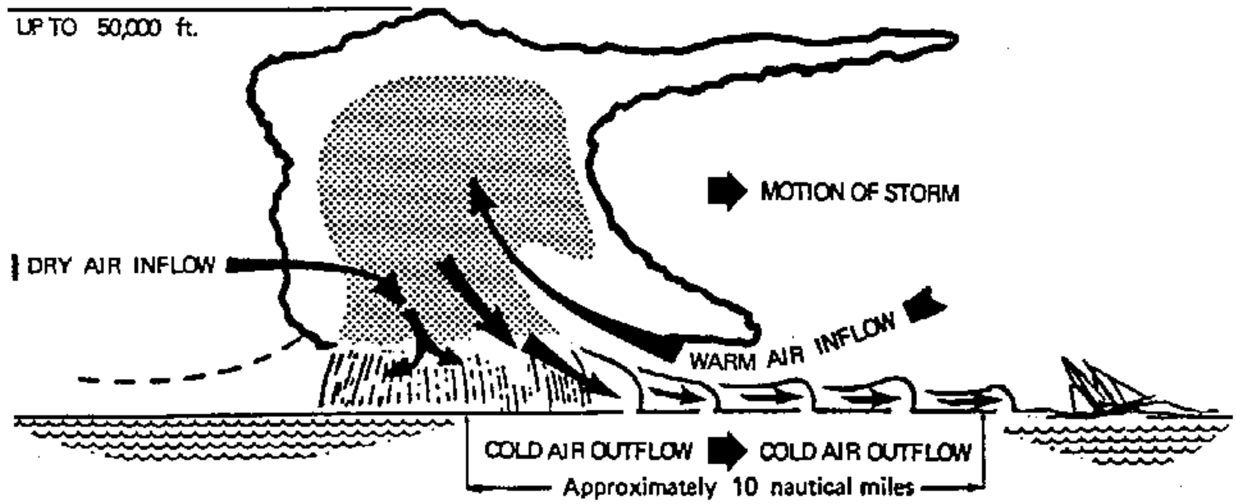
On the morning of May 19, the **Toro**, after spotting the raft, turned and put over a small boat to pick up the survivors. The liferaft was cut up and sunk because it could not be brought aboard the small boat. On May 20, the survivors were flown to Coast Guard Air Station Borinquen, Puerto Rico, and the next day, after medical examination, were flown back to Baltimore.

Coast Guard Investigation

The Coast Guard conducted a one-man formal investigation jointly with the National Transportation Safety Board (NTSB) at the Coast Guard Marine Safety Office, Baltimore, commencing on May 22, 1986. On February 11, 1987, the Commandant approved the Coast Guard investigation report with comments and remarked, "In concurrence with the investigating officer, the proximate cause of the sinking was a sudden and extreme wind that



Plan view of the Pride of Baltimore.



Typical thunderstorm gust front.

heeled the vessel beyond its range of stability and knocked it down. Contributing factors included flooding through the open aft companionway hatch and a lack of watertight bulkheads, which permitted the entire vessel to flood and sink in a matter of minutes."

During the Coast Guard investigation, a number of issues were explored, including stability, weather, communications, and stowage of safety equipment. In commenting on the investigation report, the Commandant concurred with recommendations to disseminate information to the public regarding these subjects.

As a sailing vessel, the **Pride of Baltimore** was affected greatly by the weather. A stability study was conducted as part of the Coast Guard investigation, and it found that the **Pride of Baltimore** compared quite favorably with a number of Coast Guard-inspected sailing schooners in the technical files of Marine Safety Office, Portland, Maine. In fact, under conditions of loading assumed for the time of the casualty, the **Pride of Baltimore** met Coast Guard stability requirements for passenger vessels on partially protected waters and for sailing school vessels on exposed waters with the mainsail double-reefed and staysail set. And while not meeting all of the stability criteria for passenger vessels on exposed waters, the **Pride of Baltimore's** stability numerals at the time of the casualty for deck edge immersion, downflooding, and knockdown conditions well exceeded requirements for service on exposed waters. This, combined with the fact that the vessel was sailed by a well-trained, professional crew, makes the total loss of the vessel all the more disturbing.

Microbursts

The winds that knocked the **Pride of Baltimore** down could have been generated by a "microburst." This weather phenomenon, more widely known by the public as "wind shear" associated with aircraft accidents, is a strong downdraft which produces damaging winds on or near the earth's surface extending 2-1/2 miles or less. The rapid evaporation of water droplets in a cloud formation causes the air density to increase. Gravity then causes the column of denser air to accelerate downward. For aircraft, this downward-moving air negates lift when it flows over the aircraft's wings. Ships may encounter difficulty after the downdraft of air reaches the earth's surface and spreads out as high-velocity wind. An intense microburst can induce damaging winds with velocities as high as 175 miles per hour. Microbursts are short-lived, usually lasting less than 10 minutes. They are sometimes accompanied by rain reaching the ground and sometimes are not. They can occur wherever there are cumulus (fluffy) cloud formations or thunderstorms.

In addition to the high winds, these unpredictable microbursts present a problem to the weather forecaster. According to the National Weather Service, it is not possible to give specific warnings to ships in the offshore area concerning small-scale or short-lived phenomena, such as microbursts, because of the area's vast size and the lack of radar coverage.

The energy associated with winds from microbursts should not be underestimated. The **Pride of Baltimore** is at least the fourth casualty attributed by the Coast Guard and NTSB to high-velocity winds that could have been generated by a microburst. Other cases include the charter fishing vessel **Dixie Lee** on Chesapeake Bay in 1977; the showboat **Whippoorwill** on Lake Pomona, Kansas, in 1978; and the sternwheeler **Scitanic** on the Tennessee River in 1984. In the case of the **Pride of Baltimore**, the wind speed more than doubled, from 30 -35 knots to over 70 knots, in a matter of seconds. With no advance warning, the wind overpowered a vessel that was otherwise reasonably rigged for the weather conditions and was operated by a competent crew. An excellent book, which provides more detailed information about microbursts, is *The Downburst*, by Dr. T. Theodore Fujita.

EPIRBs

The two EPIRBs on the **Pride of Baltimore** were the manually activated type (Class C). One was clipped in beneath the aft companionway ladder, the other sat in a wooden tray below the main hatch. Although easily retrievable and included in the list of equipment to bring during abandon-ship drills, neither EPIRB was in a location to float free, and neither was activated during the casualty. Had they been, an earlier indication of the casualty and an earlier search might have significantly shortened the time between the casualty and the rescue.

Communications

During the **Pride of Baltimore's** first transatlantic voyage, a 24-hour reporting schedule was maintained with the home office. This schedule proved cumbersome, and on the return trip from the Madeira Islands to the Caribbean, the **Pride of Baltimore** went on a 72-hour reporting schedule. After arriving in Barbados, they returned to what was described as a normal stateside reporting schedule of calling on arrival and before departure. The Captain called the home office on May 9 from the Virgin Islands and was expected to call from Virginia sometime around May 19. The company's first indication of the loss came after the Second Mate called his mother from the **Toro**.

Again, an earlier indication of the loss might have speeded search efforts and reduced the time the survivors had to spend in the liferaft. The Coast Guard did conduct a massive search, using a total of 164 aircraft hours and covering 61,800 square nautical miles, but nothing was sighted that could be positively attributed to the **Pride of Baltimore**.

Conclusions

The **Pride of Baltimore's** loss along with four of the crew was indeed tragic; however, some important lessons can be learned to help prevent similar accidents in the future.

The wind energy from phenomena such as microbursts is powerful enough to overpower a reasonably rigged vessel with an experienced crew. These winds are not predictable by weather forecasters for offshore areas and may occur any time there are cumulus cloud formations or thunderstorm activity.

Accidents may happen so quickly that there is no time to retrieve emergency equipment, thus negating the best prepared abandon-ship plan. EPIRBs, in particular, should be stowed in float-free locations so that they can activate or be retrieved after an accident. The liferafts, although not without their problems, did release hydrostatically, floated free, and were instrumental in saving eight members of the crew in this case.

Finally, communication schedules are vitally important for vessels on extended voyages. It is recommended that masters or operators of vessels not otherwise required to make reports under 46 CFR 307 set up and follow communication schedules with the vessel owners or other responsible persons ashore.

Captain Arne Rostad, Master of the Norwegian tanker Toro, received the Slocum Society's Northern Light Award on February 27, 1987, in Baltimore, Maryland, for rescuing the surviving crew members of the **Pride of Baltimore**. The **Pride of Baltimore II**, which will be a Coast Guard-inspected small passenger vessel, is now under construction at Baltimore's Inner Harbor.

The Scitanic: A Microburst Casualty

About 10:00 a.m. on July 7, 1984, the uninspected vessel **Scitanic** was preparing to depart its pier at Ditto Landing, a marina on the right descending bank of the Tennessee River at mile 333.7, near Huntsville, Alabama, on the first of two excursion cruises scheduled for that day. The **Scitanic** was owned and operated by a local electronics company, SCI Systems, Inc., solely to provide recreation for the company's employees and their families, and for a limited number of guests. No fee was charged. The **Scitanic** usually got underway at 10:00 and 2:00 on Saturdays, and it usually traversed the same route -- up the river to Hobbs Island, around Hobbs Island via the back channel, and then northward, down the river past Hobbs Island and the highway bridges at mile 333.3, where the course was reversed to return to Ditto Landing. Each cruise lasted about 2 hours. The captain stated that he was authorized to vary the route and could bring the vessel directly back to Ditto Landing after rounding Hobbs Island, omitting passing under the bridges, when the vessel was running late or when the weather deteriorated. Also, the captain stated that he was authorized to cancel any cruise because of poor weather conditions, and that his policy was to cancel a cruise when winds were 20 miles per hour (mph) or greater, or were so forecast.

At 10:00, because only about 12 of the 70 persons who had made reservations to take the Saturday morning cruise had arrived at the vessel, the captain elected to delay sailing to allow the others to board. The captain stated that it was not uncommon for the actual number of passengers on the Saturday morning cruise to vary considerably from the number of reservations.

This article was excerpted from NTSB's Marine Accident Report, "Capsizing of the Uninspected Vessel M/V Scitanic on the Tennessee River Near Huntsville, Alabama, July 7, 1984," NTSB/MAR-86/12, Report No. PB86-916413.

The Scitanic's hull was distorted during salvage, and the top of the pilothouse was sheared off. *(Photo from the Coast Guard casualty file)*

The captain said that before getting underway, he had listened to the weather forecast on channel 2, the weather band of the vessel's marine radio, to determine if 20-knot or greater winds might occur. He recalled only that the weather forecast called for thunderstorms later in the day. At 10:20, the **Scitanic** departed Ditto Landing, with 15 passengers and a crew of 3, including the captain, a first mate, and a deckhand, on board. The captain testified that the weather was clear and warm, that the wind velocity was about 2 to 3 miles per hour, and that there was no indication of any storm activity. Passengers and witnesses in the vicinity described the weather as being a pretty summer morning.

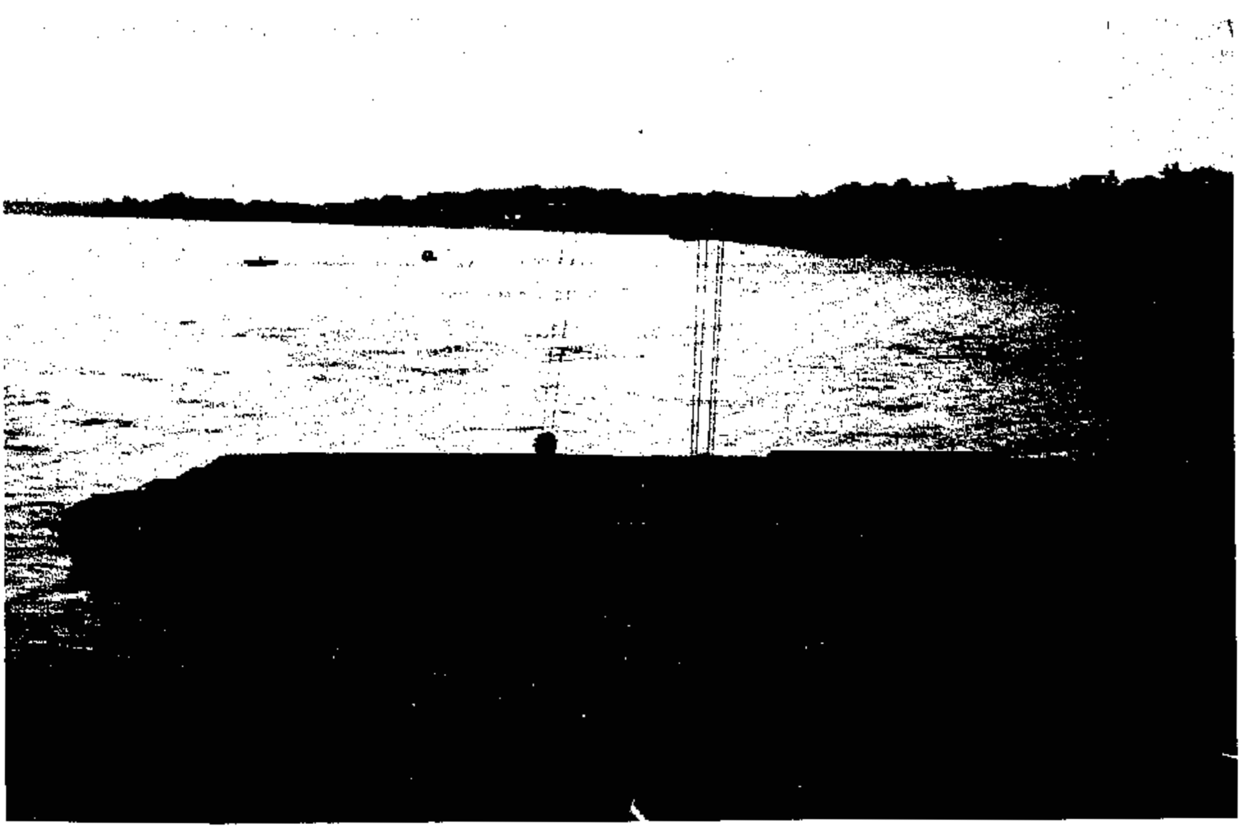
The captain remained in the pilothouse steering the vessel and controlling the engine speed. The vessel's marine radio was tuned to channel 16 to communicate with the marina office at Ditto Landing, and a portable marine radio was also available in the pilothouse. The first mate made occasional rounds of the vessel and then stood by in the pilothouse, assisting as a lookout.

The deckhand distributed soft drinks and sandwiches to the passengers, who were free to move about the main, second, and third decks. Company policy did not permit any alcoholic beverages to be brought on board. The deckhand also made rounds of the vessel. However, most of the time she remained in the passenger areas, offering additional refreshments, answering questions, and checking that any spillage or litter from the refreshments was placed in trash containers and that all ladders and decks were clear.

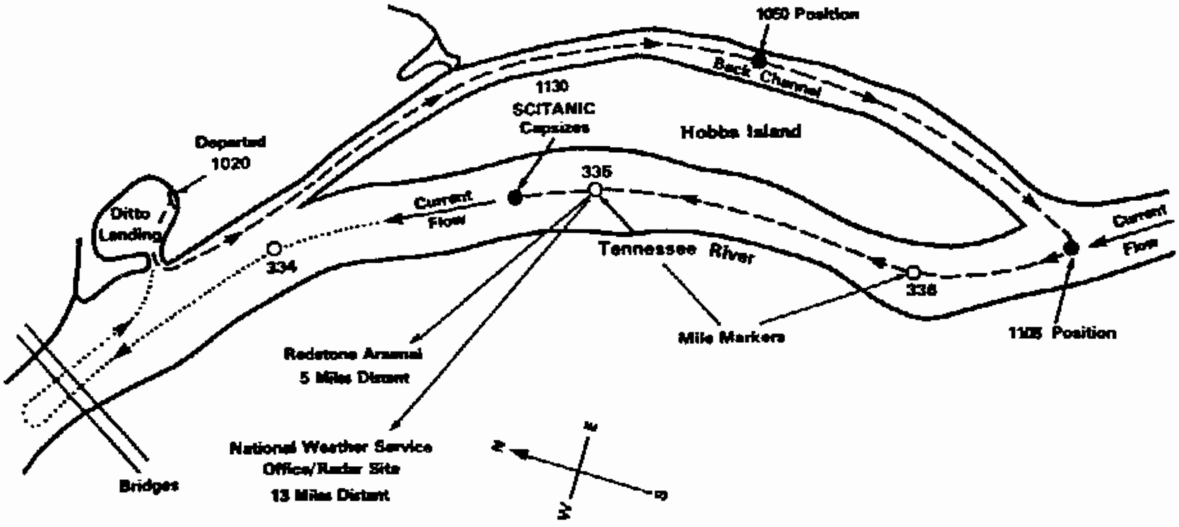
About 11:05, the vessel reached the upstream end of Hobbs Island at about mile 336.6 and commenced heading back downstream. At this time, it was becoming cloudy and a stronger wind was blowing from the west. The captain stated, however, that there was no indication of bad weather.

About 11:20, both the captain and the first mate observed lightning and dark clouds to the northwest, about 4 to 5 miles away in the vicinity of the U.S. Army Redstone Arsenal. The **Scitanic** was off the middle of Hobbs Island, at about mile 335 and about 1.3 miles from Ditto Landing at this time. The captain tuned the portable marine radio to the weather channel and for the first time heard that severe thunderstorm activity was moving into the area. The captain instructed the deckhand to move all passengers from the third and second decks down to the main cabin on the main deck. After the passengers were inside the main deck cabin, the deckhand secured the folding chairs on the third deck and closed all windows in the second deck and main deck cabins. The deckhand reported to the captain that the passengers were in the main cabin and that the windows were closed, and then she returned to the main cabin and remained with the passengers.

By about 11:25, the wind velocity had increased, and it had begun to rain. The captain said that the wind was blowing from the west and was striking the vessel on the port side. To head into the strong westerly wind, the captain turned the vessel to the left until the wind was



Salvors used a floating crane to right the Scitanic. Repairs were estimated to exceed $65,000. The owner decided not to restore the vessel. *(Photo from the Coast Guard casualty file)*



Approximate trackline of the Scitanic.

directly ahead, which placed the vessel approximately crosswise to the river's axis. The captain estimated that the wind was about 50 to 60 mph by this time. He adjusted the vessel's engine speed to maintain the vessel in the center of the river while it drifted downstream in the 2-mph current. The captain testified that he had used this maneuver successfully in about 12 previous thunderstorms. He stated that the **Scitanic** was steering well and that he had no difficulty controlling the vessel.

The captain stated that about 5 minutes later, visibility ahead decreased to nearly zero due to the heavy rain. He said that he believed the vessel still was heading into the wind since he could look aft and see the direction that the vessel's flag was flying. Suddenly, there appeared to be an abrupt shift in wind direction and an exceptionally strong wind struck the port side. The vessel heeled to starboard, causing the captain to fall down. The captain quickly got up and attempted to transmit a Mayday on VHF-FM channel 16. A few seconds later, without ever having recovered from the heeling, the vessel capsized to starboard, becoming completely inverted. The captain and first mate then exited the submerged pilothouse through the port door and reached the water surface.

Meanwhile, as the vessel capsized, the deckhand, who was standing near the after port door, urged the passengers to grab the life preservers which had been brought into the cabin by one of the passengers shortly before the vessel capsized, and to follow her out the door. The deckhand and four passengers escaped from the main deck cabin. Upon reaching the surface of the river, the deckhand and three of the passengers were assisted by the captain and the first mate in climbing onto the inverted hull. About 10 minutes later, these survivors were rescued by recreational vessels which arrived at the scene to render assistance. The fourth passenger floated downriver and was later rescued. He and another survivor stated that shortly before the vessel capsized, the two forward windows of the main cabin were blown in.

The **Scitanic** was kept afloat by its pontoon hull (comprised of five individual pontoons, each filled with styrofoam) until it grounded near Hobbs Island shortly after capsizing. About one-half hour after the accident, volunteer divers arrived on scene and began diving attempts to rescue the 11 passengers trapped in the main deck cabin. By about 12:30, approximately five bodies had been recovered from the capsized vessel, one reportedly wearing a life preserver. All 11 bodies were recovered by about 3:00.

Vessel Information

The **Scitanic** was a shallow-draft paddle wheel vessel, approximately 92 feet long. It had a beam of 20 feet and measured about 85 gross tons. The vessel was built in 1976 and had two prior owners before its sale to SCI Systems, Inc., in March 1983. Because the **Scitanic** was operated solely to provide recreation for the company's employees and their families and fora limited number of guests, the vessel was not subject to inspection by the U.S. Coast Guard.

In March 1983, after being purchased by SCI Systems, Inc., the vessel was drydocked and repairs were made to sections of the pontoons which were found to be leaking. The pontoons then were filled with styrofoam. Most of the electric wiring was renewed, and the gasoline generator was replaced by a diesel generator to improve safety. Additional rudders were installed to improve the vessel's maneuverability. When repairs were completed, the vessel was tested underway and then placed in service in August 1983. The vessel was equipped with over 100 Coast Guard-approved adult life preservers, and various sizes of children's life preservers were stowed in bins located on each side of the vessel under the outside ladders leading from the main deck to the second deck. The life preservers in the storage bins were clearly visible and accessible.

Crew Information

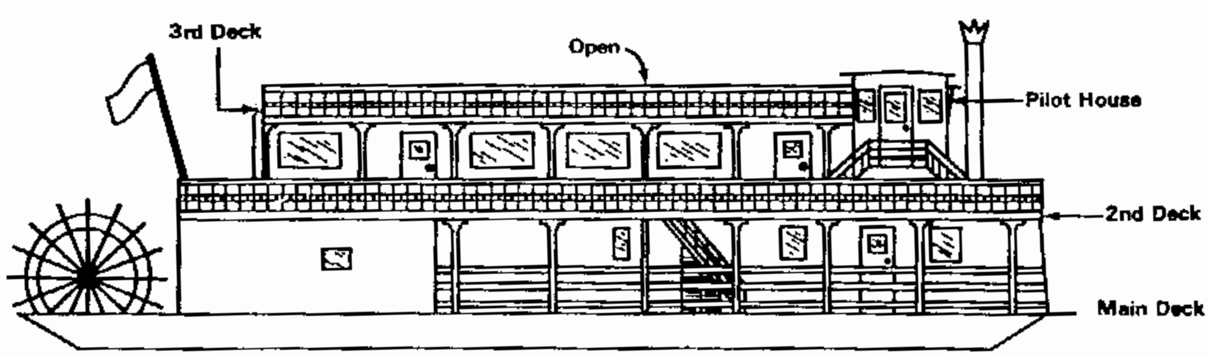
Because the **Scitanic** was a privately owned recreational vessel not engaged in commerce, it was not required to meet any U.S. Coast Guard manning or crew qualification standards. The **Scitanic** was registered as a recreational vessel in the State of Alabama, but the State's boating law and boating regulations do not specify any manning or crew qualifications applicable to vessels like the **Scitanic**. However, SCI Systems, Inc., elected to employ captains who possessed either an inland masters license for vessels of 100 gross tons or a license as operator of uninspected towing vessels upon the Western Rivers to ensure that the vessel was operated by a competent mariner. Two other crew members assisted the captain in operating the vessel and in caring for the passengers.

Conclusions

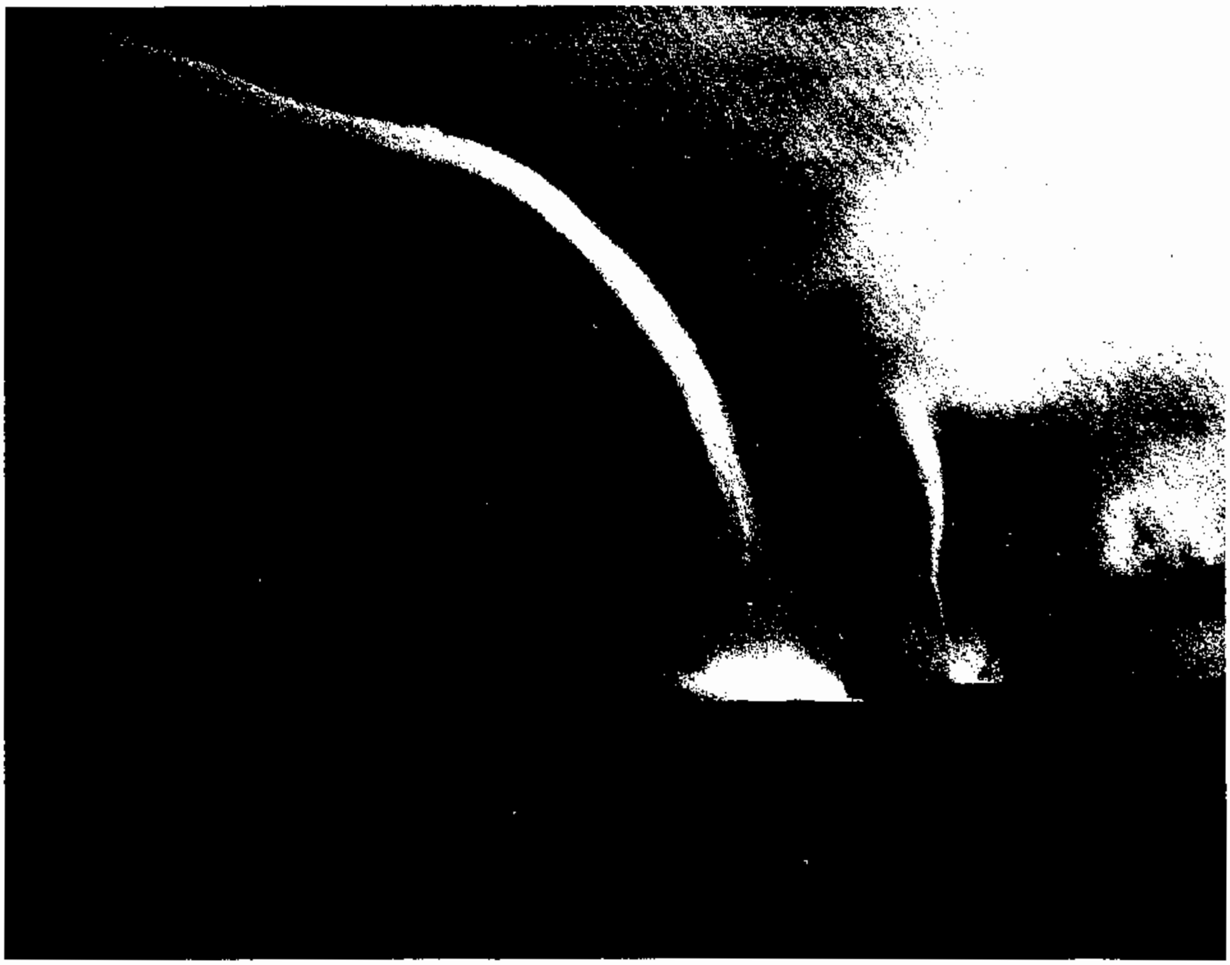
A study of the thunderstorm damage, conducted after the accident by experts in microburst phenomena, indicated that as many as four microbursts had been generated at the time the thunderstorm activity passed through the area. One microburst which occurred within a quarter-mile south of the accident site probably produced the high-velocity wind which struck the **Scitanic**. The captain's report stated that the vessel was suddenly struck by a very strong wind approximately 90° from the winds he had been heading into.

Damaging microbursts are believed to occur relatively infrequently compared with the number of thunderstorms that occur throughout the continental United States. However, due to the small size of the area affected and due to the relatively short duration of a microburst, most are not detected by weather stations, or brought to the attention of weather stations, unless significant damage occurs. In recent years, considerable effort has been directed to predicting or detecting microbursts at airports, since wind shears, often microbursts, have caused serious aircraft accidents. The capsizing of the **Scitanic**, however, is the first marine accident investigated by the National Transportation Safety Board where a microburst has been implicated as a causal factor.

The National Transportation Safety Board determined that the probable cause of this accident was the wind load from the exceptionally high velocity winds, generated by a microburst from an approaching thunderstorm, which exceeded the stability limitations of the **Scitanic**.



The Whippoorwill: Victim of a Waterspout



These waterspouts were photographed in the Bahamas in May 1961. *(Photo courtesy National Oceanic and Atmospheric Administration)*

Tornadoes are the most violent storms that occur in the atmosphere. The wind speeds within a tornado's core have been estimated to exceed 400 miles per hour in some cases -- enough power to splinter wooden buildings or level entire communities. The funnel-shaped cloud of a tornado is usually visible due to its concentration of water vapor. When the funnel cloud touches the ground, its appearance is affected by dust, water, or debris picked up from the surface. Waterspouts -- tornadoes occurring over water -- are just as dangerous as their counterparts on land. The severe winds generated by a waterspout were partially responsible for a fatal capsizing on a Kansas lake.

The **Whippoorwill**, a small-scale replica of a sternwheel river steamboat, was operated by a Kansas theater group for pleasure cruises. Because the vessel was operated exclusively on inland waters which are not navigable waters of the United States, the **Whippoorwill** was not subject to the U.S. Coast Guard's rules and

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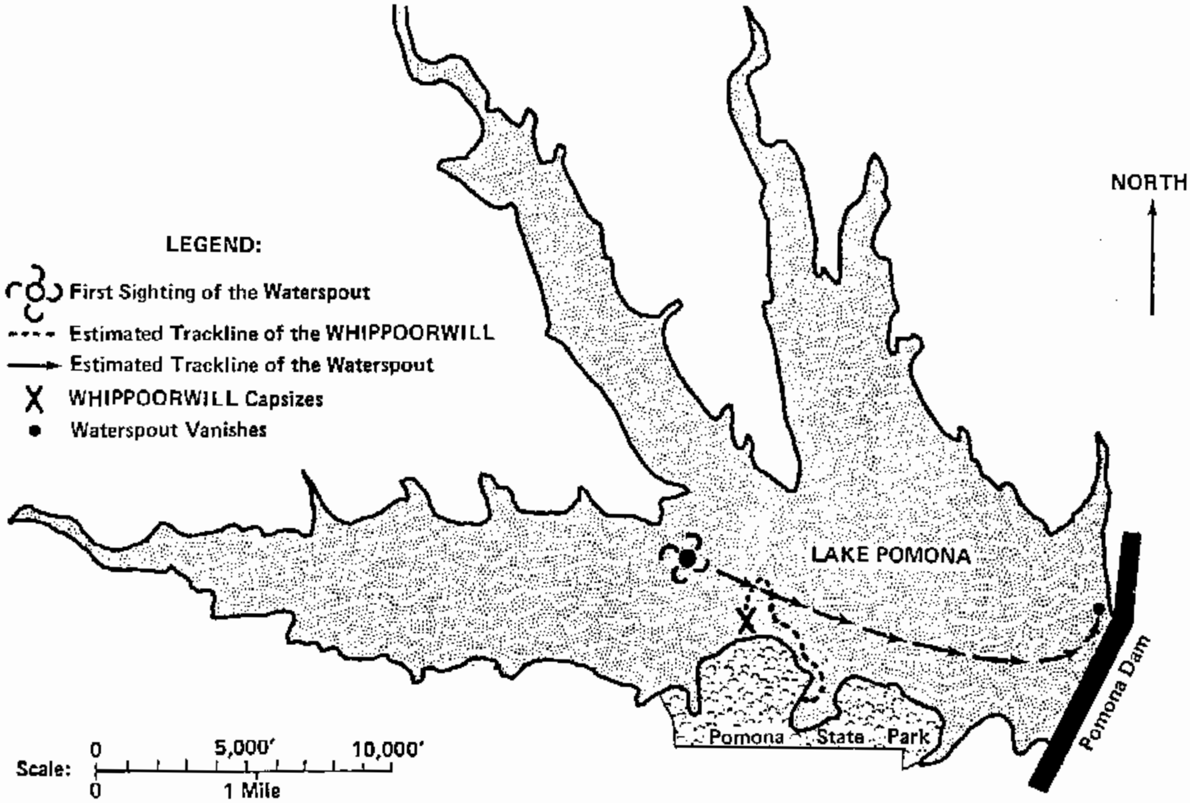
This article was based on NTSB's Marine Accident Report, "Showboat Whippoorwill Capsizing, Pomona Lake, Kansas, June 17, 1978," Report No. NTSB-MAR-79-2.



The Whippoorwill's course through the waterspout's path.

regulations for small passenger vessels. It was, however, subject to the Kansas Boating Act and carried all required equipment, including 75 Coast Guard-approved, lifejacket-type personal flotation devices (PFDs). But the waterspout's winds capsized the vessel so quickly that none of the persons on board had time to don a PFD.

The Accident

At about 6:30 p.m. on June 17, 1978, 46 passengers boarded the **Whippoorwill** at its berthing area on Pomona Lake, near Topeka, Kansas. The **Whippoorwill** was scheduled to make an excursion cruise on the lake which would include dinner and a theatrical production. Several passengers were concerned that the trip would be canceled because portions of the sky were overcast, and thunder and lightning were observed in the distance.

About 7:00 p.m., the vessel backed away from the berth, turned, and headed out of the marina area and into the main body of the lake. The **Whippoorwill** maintained a course about 30 yards from the south shore. The sky over the south shore was overcast, and the operator ordered the pilot to head for the north shore where the sky was clear. The **Whippoorwill** proceeded toward the north shore at a speed of 3 to 4 knots.

At about 7:12, the **Whippoorwill** was approximately 300 yards from the south shore when a disturbance on the lake's surface was sighted. The disturbance was described as a large front of water spray similar to a dust storm, about 150 yards from the vessel, and coming from the north shore toward the **Whippoorwill**. The water spray was approximately 100 yards wide and extended about 20 feet above the water's surface. Except for the immediate area of the spray, the lake's surface was calm.

The operator immediately ordered the pilot to change course toward the south shore. The operator then went below and ordered the engineer to "Give it all you've got." The engineer secured steam to the electrical generator, increased fuel to the boiler, and closed the cylinder drain valves on the main propulsion steam engine.

About a minute later, the **Whippoorwill** had turned to port and was steaming toward the south shore at full speed, about 9 knots. The vessel began to encounter a strong, steady, westerly wind that was accompanied by rain. The canopy over the upper deck was lowered to shelter the passengers from the rain. The operator opened the lifejacket locker on the upper deck and was removing lifejackets for the passengers and crew when the vessel began to roll. The roll began as a quick, steady inclination to port, stopped momentarily, and then continued until the vessel completely overturned at about 7:15 p.m. The vessel capsized so quickly that the lifejackets were not distributed.

As the **Whippoorwill** was capsizing, several passengers and crew escaped through the vessel's open sides. They clambered up the vessel's starboard side as it rolled, and onto the **Whippoorwill's** bottom when it capsized. When it overturned, the **Whippoorwill** was about 30 yards from the south shore, close to the marina and park administration building, and in view of several witnesses. The vessel remained floating in an inverted position.

Seconds after the capsizing, survivors began to surface within a few feet of the overturned craft. Survivors who had climbed onto the hull began pulling others from the water. They saw a funnel-shaped cloud heading east, away from the vessel toward Pomona Dam. The funnel-shaped cloud changed to a northerly direction at the dam and then vanished. The lake's surface remained relatively calm throughout the capsizing. Apparently, the **Whippoorwill** was the only property damaged by the waterspout.

Less than a minute after the **Whippoorwill** capsized, it was surrounded by small boats manned by campers, marina personnel, and park employees who rescued 45 of the 60 persons on board. Fourteen passengers and one member of the crew could not be recovered in time.

Waterspouts occur over oceans and inland waters. This spout formed over Jackfish Lake, near North Battleford, Saskatchewan, Canada, in 1923. *(Photo courtesy U.S. Naval Institute)*

Vessel Information

The **Whippoorwill**, the only commercial passenger vessel operating in the State of Kansas, was about 59 feet long, 16 feet wide, 3 feet deep, and measured 33 tons. It was fitted with a 16-foot-high wooden superstructure over a steel barge hull. The hull was essentially box-shaped, 48 feet long, 14 feet wide, 3 feet deep, and subdivided into four relatively large tanks (Nos. 1 through 4) that extended the full width of the hull. Two machinery spaces were constructed in the hull and surrounded by the tanks. The forward machinery space contained the steam boiler, electrical generator, and associated equipment. The after machinery space housed the main-propulsion, reciprocating steam engine. Several holes of 1 inch to 1-1/2 inches in diameter were cut in the bottom of the machinery spaces to drain bilge water directly into the Nos. 2 and 3 tanks. The Nos. 1 and 4 tanks were not fitted with drain holes and, according to the owner, were supposed to be kept empty. None of the tanks was fitted with a means to accurately determine the water level in them.

The **Whippoorwill's** steam propulsion system generated a relatively large amount of bilge water. On the day of the accident, the bilges were pumped; however, the engineer testified that he did not pump all the water out of the No. 2 tank. He believed that the Nos. 1, 3, and 4 tanks were empty and that the No. 2 tanks was one-quarter to one-half full (200 to 400 gallons) of bilge water during the June 17 excursion.

Stability

Stability is a vessel's ability 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 called 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 always greater than the righting moment, the vessel will capsize.

Whenever liquid within a vessel is free to move, the vessel's stability will be decreased when the vessel rolls. As the vessel inclines, the liquid in its tanks moves toward the low side and shifts the vessel's center of gravity. Shifting the center of gravity reduces the righting moment and reduces the vessel's stability. This reduction in stability is known as *free surface effect* and is dependent on the liquid's surface area rather than on the liquid's volume. At the time of the accident, the **Whippoorwill** had a significant free surface effect of water from the estimated 200 to 400 gallons of water in the No. 2 tank.

Probable Cause

The **Whippoorwill** rolled to port and capsized at a relatively uniform rate when it was subjected to strong, westerly winds, according to witnesses. The vessel was not buffeted by the rotating winds that form a tornado or waterspout. In addition, examination of the vessel after the accident did not reveal any severe damage associated with such storms. Therefore, it is likely that the waterspout did not actually strike the **Whippoorwill**, but rather passed near the vessel and generated wind speeds of up to 50 knots. Because the **Whippoorwill's** stability was so poor at the time of the accident, any sustained wind with a speed over 25 knots could have capsized the vessel. The 50-knot winds which developed on the waterspout's periphery were more than adequate to capsize the **Whippoorwill**.

The **Whippoorwill** was not required to meet Coast Guard stability requirements because it was operated exclusively on an inland lake which is not considered navigable waters of the United States. If the **Whippoorwill** had met the requirements, however, it would have been able to withstand a wind speed of up to 54 knots without capsizing.

The National Transportation Safety Board, which investigated this casualty, concluded that the probable cause of this accident was the **Whippoorwill's** reduced stability as a result of accumulated water within the vessel's integral hull tanks, the vessel's inadequate design stability, its operation during adverse weather conditions, and the failure of the operator to obtain current weather forecasts.

The Role of Microbursts in Marine Casualties

H. Chatterton and LT R. Gilbert

Was it a squall? Or a microburst? Evidence tells us the answer is both!

The loss of the sailing vessel **Pride of Baltimore** has been blamed on a microburst which descended from a rain squall. A microburst is a meteorological phenomenon that is just now receiving the publicity it deserves.

A microburst can best be defined as an intense, short-lived downburst of wind which induces an outburst of damaging winds on or near the earth's surface in a 2.5-mile or less diameter. On land it has been known to leave a distinctive "starburst" pattern of damage. If you picture in your mind's eye a garden hose pointed to the ground, you will see the starburst effect as the stream hits the hard surface and then fans out. Frequently, damage that is attributed to tornadoes is actually caused by the winds of a microburst. At times, a squall or a thunderstorm may even produce a combination of tornadoes and microbursts.

The microburst phenomenon was first identified in the early 1970s due to some very tragic airline casualties. A microburst occurs when water droplets evaporate rapidly within a storm cloud. The density of the air increases, and the air column moves rapidly toward the ground. When it hits the ground, it creates a high-speed surface wind which moves out in all directions from the storm center. Wind velocities can exceed 100 knots. Because microbursts occur rapidly and their winds move radially, even a vessel which is not directly in the storm's path is in danger. Survivors of casualties usually note that the fatal winds "suddenly came from a completely different direction without any warning."

Microbursts have additional dangerous characteristics. They are difficult to predict and detect. Airports can now obtain some advance warning using special instruments called Doppler radars, which are able to show wind speed and direction. However, a microburst is a very local phenomenon, and wide areas cannot be scanned over water. A microburst may come from a very innocent-looking storm. It might not even have any thunder. Meteorologists estimate that the number of microbursts capable of inducing surface winds stronger than 70 knots can reasonably be as many as 13,000 per year in the United States. Their peak season is during the months of June through August. They should not be considered a low-risk hazard.

The microburst phenomenon has been as destructive over water as over land. Maritime accidents attributed to microbursts include the following:

- The charter fishing vessel **Dixie Lee** on Chesapeake Bay in 60- to 85-knot winds, with the loss of 13 lives, in 1977.
- The showboat **Whippoorwill** on Lake Pomona, Kansas, in 50-knot winds, with the loss of 15 lives, in 1978.
- The sternwheeler **Scitanic** on the Tennessee River in 60-knot winds, with the loss of 11 lives, in 1984.
- The sailing vessel **Pride of Baltimore** off Puerto Rico in 80-knot winds, with the loss of 4 lives, in 1986.

Two of the these vessels were uninspected, and all met Coast Guard stability standards for

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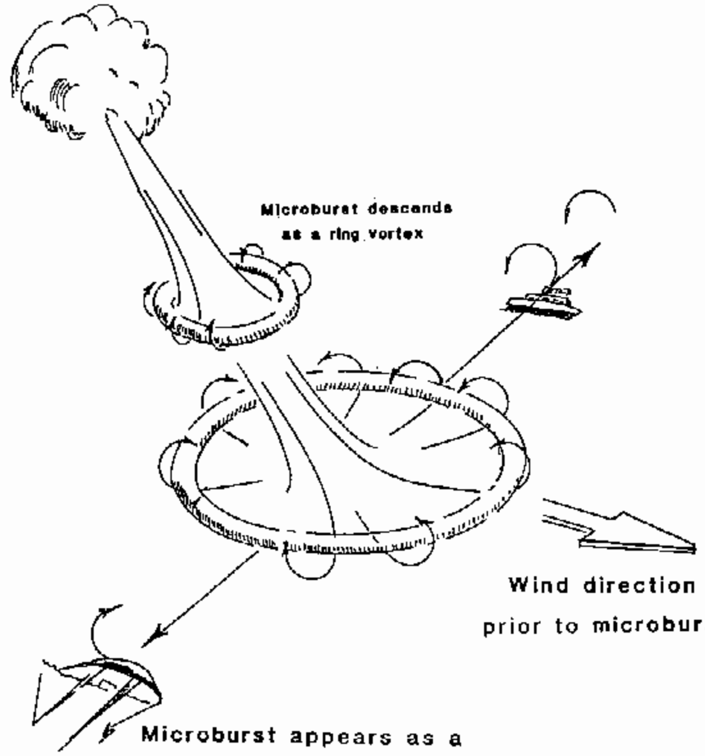
At the time this article was written, Mr. Chatterton was the Assistant Chief, Naval Architecture Branch. He is no longer with the Coast Guard. LT Gilbert is a Staff Naval Architect in the Coast Guard's Marine Technical and Hazardous Materials Division, Office of Marine Safety, Security, and Environmental Protection.

Microburst



protected waters only. All but the **Pride of Baltimore** were operating on protected waters at the time of their casualties. One possible protection from microbursts would be to require intact stability sufficient to survive a microburst. This may not be a practical solution for all vessels since microbursts vary considerably in strength due to locality, and it would most probably require a vessel in protected service to meet an exposed ocean service criteria.

Another possible solution is to install a Doppler radar on each vessel, or in marina areas where there is a large number of vessels. During a storm, the operator would be able to detect a microburst and head for shelter. This also may be a poor solution because it would be very expensive, and the vessel still might not have sufficient time to seek shelter.

The Coast Guard believes the best security from microbursts comes from the awareness and avoidance of storms. Small craft can easily be overwhelmed by a microburst. Operators must watch for storm development, particularly on protected waters where local conditions can cause these storms to develop rapidly. Inexpensive, battery-powered weather radios are available which have auto-alarms that sound for severe storm warnings. The prudent operator can detect a storm at a distance by careful observation of cloud formation. Vessel operators should avoid the path of storms whenever possible.

If a storm cannot be avoided, the operator should take early action to increase stability and watertight integrity. All gear and stores should be stowed and secured low in the vessel. Slack tanks should be emptied or pressed up in accordance with pollution prevention regulations. Passengers and crew should be asked to don lifejackets until the storm passes. In the midst of the storm, the operator must be keenly aware of any shift in wind direction and make timely course adjustments to keep his bow into the wind.

Mariners must learn to respect microbursts just as much as any other serious hazard. It is important to become aware of how to avoid their presence in order to prevent marine casualties caused by microbursts.▪

U.S. Coast Guard Safety Advisory

Static Electricity and Tank Barge Explosions

Recently there have been several serious explosions on tank barges during operation to strip or "vacuum" tank residues using portable equipment. These have resulted in extensive property losses, serious injuries, and fatalities. Accident investigations have identified static electric discharge as the most probable cause of the explosions.

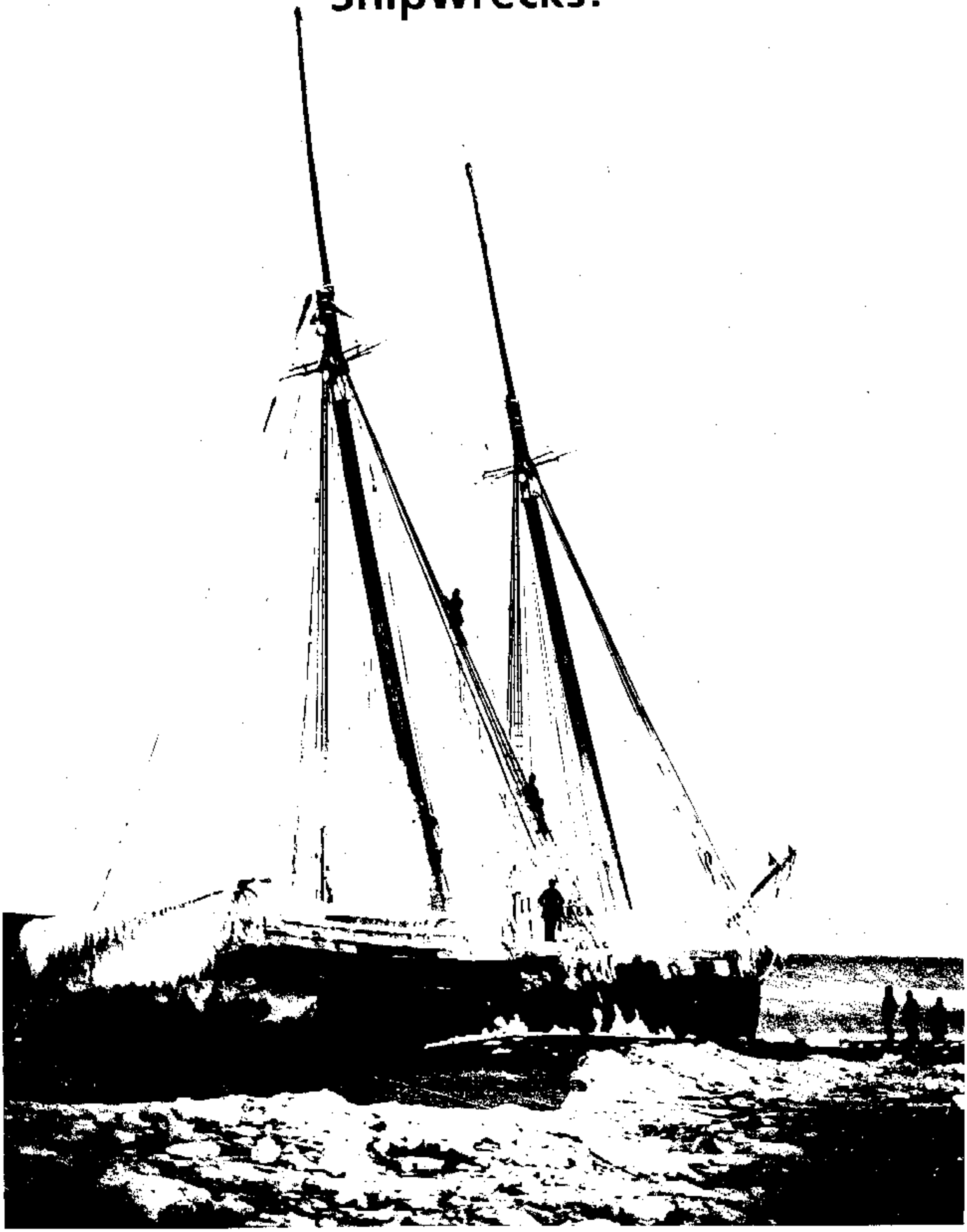
For static electricity to be a source of ignition, three things must occur: charges must be generated, generated charges must be stored, and the stored charges must be discharged. Charges are generated by the friction of liquid droplets, or solids such as rust particles, passing through a hose or pipe. The liquid does not have to be combustible; water droplets can generate a static charge. If the hose or pipe is electrically isolated from the vessel's structure, the charges will be stored and will build up. Eventually, the stored charge will discharge to a part of the vessel's structure. If the spark energy is high enough and the tank atmosphere is in the explosive range, an explosion will occur. During stripping or "vacuuming" operations, liquid and solid residues moving through portable hoses or pipes generate a large static charge. If the hose or pipe is nonconductive (such as fiberglass, rubber, or plastic), or if it is conductive but electrically isolated from the barge structure, charge storage occurs. Charges are also stored on isolated metallic fittings on nonconductive hose or pipe.

To reduce the risk of an explosion resulting from a static discharge during tank stripping or vacuuming operations, all pipe (wands), hose, and fittings lowered into a cargo tank should be electrically continuous and should be grounded to the ship's structure. Paint, grease, rust, and other insulating material should be removed from all grounding points.

Efforts to eliminate static electricity as a source of ignition must not create a "sparking" source of ignition. Certain conductive materials, such as aluminum and magnesium, can create an incendive spark upon impact with rusty steel. These materials should generally not be used in, or in the vicinity of, the cargo tank. A metallic conductor is not needed to prevent static buildup. Conductive plastic pipe can provide a path to ground that will prevent static charge buildup. Even where charges are generated rapidly, a resistance of 1 megohm or less to ground (the vessel's structure) can provide an adequate leakage path to prevent charge buildup.

Additional information on static electricity hazards associated with the handling of flammable or combustible liquids may be found in the National Fire Protection Association Standard ANSI/NFPA 77, "Static Electricity"; the "International Safety Guide for Oil Tankers and Terminals," published by the International Chamber of Shipping, the Oil Companies International Marine Forum, and the International Association of Ports and Harbors; and the American Petroleum Institute Recommended Practice 2003, "Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents."

Shipwrecks!



The American schooner John Rommel, Jr. came ashore at Provincetown, Massachusetts, badly iced up, during a storm in February 1875. The 185-ton ship, registered in New Haven, Connecticut, was a total loss. *(Photo courtesy of Cape Cod Photos, Orleans, MA, and provided by William P. Quinn)*

Chemical of the Month

Scott Rogerson

Formaldehyde

Most people who took biology in high school have dealt with this month's chemical. The preservative that the class specimens were stored in was most likely formaldehyde, the simplest member of the organic compound class known as aldehydes. Formaldehyde is used for many other things besides preserving specimens, but this is its best-known use.

Formaldehyde's principal use is to produce synthetic resins and adhesives by reaction with phenols, urea, and melamine. This use accounts for about 75 percent of the total production. Approximately 15 percent is used in manufacturing textiles, dyes, drugs, paper, leather, photographic materials, embalming agents, disinfectants, and insecticides. Formaldehyde is copolymerized with phenol to produce Bakelite resins, with urea to form molding plastics, and with ammonia to form hexamethylene tetramine, which is used in making high explosives.

The first step in dealing with an accidental discharge of formaldehyde is to shut off or eliminate all possible ignition sources. The next step is to stop the discharge. Anyone working in the area should be wearing a chemical protective suit (including rubber gloves and goggles) and should be using a self-contained breathing apparatus. The National Response Center should be called (800-424-8802), as should the local fire department. If possible, large spills should be covered with sodium bisulfite ($NaHSO_3$). Local health and pollution control agencies should be notified, and in the case of a spill in natural waters, wildlife officials and operators of nearby water intakes should also be notified. Formaldehyde can be dangerous to aquatic life and can be extremely dangerous if it enters water intakes. In the case of a small spill, one should add small amounts of water and mix it with the spill. The mixture should be scooped up, and the site should be washed thoroughly with soap solutions.

In case of exposure to the chemical, a doctor should be notified. At a vapor concentration of 10 to 20 parts per million (ppm), breathing becomes difficult. Exposure to 650 ppm for a few minutes may cause death. Symptoms of contact with the chemical include coughing, copious watering of the eyes, and severe respiratory irritation. If exposed to the vapor, the victim should be moved to fresh air, and artificial respiration should be applied if breathing stops. If contact is made with the liquid, all contaminated clothing should be removed, and the affected area should be gently flushed with water for 15 minutes.

Fires involving formaldehyde should be extinguished with CO_2, dry chemicals, alcohol foam, or water fog. The vapors are highly irritating, so fire parties should wear respiratory protection.

Formaldehyde is usually shipped at elevated temperatures and in 37- to 50-percent concentrations to prevent polymerization. The chemical is regulated by the Coast Guard as a Subchapter O commodity for shipment by tank barge and tankship (Parts 151 and 150, respectively, of Title 46 of the Code of Federal Regulations). The Department of Transportation regulates formaldehyde as a flammable liquid and requires that it be labeled as such. It is found on page 3139 of the International Dangerous Goods (IMDG) Code and is assigned a Hazard Class of 3.3 by the International Maritime Organization.

Scott Rogerson was a Third-Class Cadet at the Coast Guard Academy at the time this article was written. It was written under the direction of LCDR J. J. Kichner for a class in hazardous materials transportation.

Chemical Name
Formaldehyde

Formula
$H_2C=O$

Synonyms
formalin
formal
methylene oxide

Physical Properties
boiling point: 97°C (206°F)
melting point: -92°C (-134°F)
vapor pressure: 20°C (68°F) - 1.3 mmHg

Threshold Limit Value
time weighted average: 2 ppm

Flammability Limits in Air
7.0 - 7.3 (formaldehyde vapor)

Combustion Properties
flash point: 122 - 185°F
autoignition temperature: 806°F

Densities
vapor (air = 1): 1.03
solubility in water: complete

U.N. Number: 1198

CHRIS Code: FMS

Cargo Compatibility Group: 19
(Aldehydes)

LCDR Jerry Kichner, our "Chemical of the Month" liaison at the U.S. Coast Guard Academy, has been transferred to a new position. We thank him for his past efforts with the **Proceedings** *and wish him well in his new duties.*

We look forward to a productive year with our new liaison, LT Thomas Chuba, who is a chemistry instructor at the Academy. Welcome aboard!

Nautical Queries

The following items are examples of questions included in the Third Mate through Master examinations and the Third Assistant Engineer through Chief Engineer examinations:

Engineer

1. An alternator operating in parallel begins to vibrate severely and then trips out on the reverse power relay. The cause of the vibration was ______.

A. the dropping of load by that alternator
B. overspeeding of the vibrating alternator
C. that alternator being out of synchronism
D. flashover at the alternator collector rings

Reference: Hubert, *Preventive Maintenance of Electrical Equipment*

2. What can cause above-normal air temperature in the intake manifold of a turbocharged and aftercooled diesel engine?

A. A faulty turbocharger turbine diffuser ring
B. A faulty turbocharger compressor ring
C. Insufficient cooling water flow
D. Clogged air intake filters

Reference: Pounder, *Marine Diesel Engines, 5th Ed.*

3. Moisture is removed from an R-12 system by ______.

A. bleeding refrigerant from the condenser
B. opening a drain petcock on the oil separator
C. condensing the water in the heat interchanger
D. using a dehydrator cartridge

Reference: Nelson, *Commercial and Industrial Refrigeration*

4. Regulations require that no person may transfer oil or fuel to a vessel of 3000 gross tons constructed after June 30, 1974, unless each fuel tank vent overflow and fill pipe is equipped with a (an) ______.

A. fixed container or enclosed deck area of one barrel capacity
B. portable container of at least 5 U.S. gallon capacity
C. automatic back pressure shutoff nozzle
D. quick-closing, anti-spill valve

Reference: 33 CFR 155.320(a)2

5. Relief valves in the fuel oil service system discharge to either the service pump suction or the ______.

A. settling tanks
B. recirculating line
C. simplex fuel oil strainer
D. slop retention tank

Reference: Osbourne, *Modern Marine Engineer's Manual, Vol I*

Deck

1. In the North Atlantic between latitudes 5 degrees and 30 degrees, the winds you would expect to encounter are known as the

A. doldrums.
B. westerlies.
C. trades.
D. easterlies.

Reference: Bowditch, *American Practical Navigator*

2. Who should be consulted for changing conditions of controlling depths in major channels?

A. U.S. Coast Guard
B. Defense Mapping Agency
C. National Ocean Survey
D. U.S. Army Corps of Engineers

Reference: Bowditch, *American Practical Navigator*

3. Assuming an even transverse distribution of weight in a vessel, which condition could cause a permanent list?

A. Empty double-bottoms and lower holds, and a heavy deck cargo
B. Flooding the forepeak to correct the vessel's trim
C. Having KG smaller than KM
D. Having a small positive righting arm

Reference: Ladage, *Stability and Trim for the Ship's Officer*

4. When a block and tackle is "rove to advantage," this means that the

A. blocks have been overhauled.
B. hauling parts of two tackles are attached.
C. hauling part leads through the movable block.
D. hauling part leads through the standing block.

Reference: Turpin, MacEwen; *Merchant Marine Officer's Handbook*

5. During the day, a dredge will indicate the side on which it is safe to pass by displaying

A. two balls in a vertical line.
B. two diamonds in a vertical line.
C. a single black ball.
D. no shape is shown during the day.

Reference: International Rules, Rule 27; COMDTINST M16672.2A

Answers

Engineer
1-C; 2-C; 3-D; 4-A; 5A
Deck
1-C; 2-D; 3-A; 4-C; 5-B

If you have any questions concerning "Nautical Queries," please contact Commanding Officer, U.S. Coast Guard Institute (mvp), P.O. Substation 18, Oklahoma City, Oklahoma 73169; telephone (405) 686-4417.

Marine Safety Council Membership

CAPT Joseph J. Smith

CAPT Joseph J. Smith assumed the duties of Executive Secretary of the Marine Safety Council and Executive Director of the Towing Safety Advisory Committee on July 1, 1987.

CAPT Smith, a native of New York City, is a graduate of the U.S. Coast Guard Academy, New London, Connecticut, where he received his Bachelor of Science degree in 1962. His first assignment was aboard the cutter **Campbell**, homeported in New York, where he served in the deck department. His subsequent tours were aboard the cutters **Chautauqua** and **Half Moon**. In 1965, CAPT Smith was the Commanding Officer of the Coast Guard Loran station, Kure Island, Hawaii, followed by an assignment to the Marine Inspection Office, Miami. Following his tour of duty aboard the cutter **Owasco** as engineering officer, CAPT Smith was transferred to the Marine Investigation Division at Headquarters, and then in 1977 was assigned as Executive Officer of the newly formed Marine Safety Office in Valdez, Alaska. CAPT Smith then served as Senior Investigating Officer in the Marine Inspection Office, New York. Before his current assignment as Executive Secretary of the Marine Safety Council, CAPT Smith was Chief of the Marine Investigation Division at Headquarters from 1984-87.

CAPT Smith's decorations include the Coast Guard Commendation Medal, a Letter of Commendation, and the Coast Guard Meritorious Unit Commendation.

He is married to the former Carol A. Milazzo of New York City. They have four children: Christopher, Caroline, Joseph Jr., and Gregory.

Keynotes

Advance Notice of Proposed Rulemaking

CGD 86-025, Equipment Standards for Uninspected Fish Processing Vessels; Correction (August 10)

This document corrects the address and procedure for ordering Navigation and Vessel Inspection Circular (NVIC) 5-86, "Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels" previously published in the **Federal Register** July 9, 1987 (52 FR 25890). The address appearing on page 25890, in the second column, is changed to read as follows:

Navigation and Vessel Inspection Circular (NVIC) 5-86 will be made available for examination or copying between the same hours and at the same location as noted above. Additionally, NVIC 5-86 is available at local U.S. Coast Guard Marine Inspection and Marine Safety Offices or through the Marine Safety Center in Washington, DC. If ordering through the Marine Safety Center, include the NVIC number (NVIC 5-86) along with a check or money order, in the amount of $11.00 payable to the "Treasury of the United States," to Commanding Officer, Marine Safety Center, 2100 Second Street, SW, Washington, DC 20593-0001, ATTN: NVICs.

For further information, contact LCDR William J. Morani, Jr., (202) 267-1055.

Notice of Proposed Rulemaking

CGD 87-017, Assistance Towing Licenses (August 20)

The Coast Guard is proposing to amend the regulations for the licensing of maritime personnel to include specific licensing and manning requirements for all vessels, regardless of size, which engage in towing a disabled vessel for consideration. This proposal is being made in response to a statutory change requiring such licenses. This action is intended to provide assurance to all involved parties that persons who provide assistance towing services have met minimum established standards for knowledge and experience.

Comments must be received on or before October 19, 1987. Comments should be mailed to Commandant (G-CMC/21) (CGD 87-017), U.S. Coast Guard, Washington, DC 20593-0001. For further information, contact LCDR Gary R. Kaminski, (202) 267-0218.

New Publications

Nautical Etiquette and Customs, Second Edition

Here is a little book about nautical etiquette that will appeal to all those who sail for sport or pleasure, from the neophyte to the veteran boater. With a light but sure touch, marked by gentle humor, Lindsay Lord explores both the past and present state of yachting culture. Alert to the foibles and excesses of the pleasure-boating tradition, he succeeds in extracting from the elaborate and sometimes extravagant mores of bygone years those practices that are sound and worth preserving today. His common-sense approach, enriched by many happy boating years, enables him to save what is valuable in time-honored ways while adjusting creatively to today's needs.

With Mr. Lord's guidance, yachters can achieve a rightful pride in their vessels, whether sail or power, and a sure sense of what is proper and fitting conduct. There are also apt descriptions of the protocol for the yacht club ashore.

Mr. Lord, a retired naval architect, holds graduate degrees from MIT and Pacific University. He is also the author of *Naval Architecture of Planing Hulls.*

(*Nautical Etiquette and Customs, Second Edition*, by Lindsay Lord, is available from Cornell Maritime Press, P.O Box 456, Centreville, MD 21617; price $8.95.)

Steamboat on the Chesapeake: *Emma Giles* and the Tolchester Line

"In the early summer of 1887, a new steamboat cleared her Light Street moorings and set out on a series of ventures: as an excursion steamer bound for an amusement park and as a transporter of passengers and freight for landings along certain tributaries of the Chesapeake. She was designed to carry picnickers to the playground of a beach resort. She was meant, also, to be a workhorse of the fleet."

In his prologue to *Steamboat on the Chesapeake:* **Emma Giles** *and the Tolchester Line*, David C. Holly describes in vivid detail the revitalized harbor of Baltimore and invites the reader to look back 100 years, when white steamboats, with tall smokestacks and elaborate paddleboxes, plied the waters of the Chesapeake to serve hundreds of landings on its tributaries.

The 150 years of steamboating on the Bay -- between 1813 and 1963 -- saw nearly 300 steamboats in service. During four decades, from 1880 to 1920, over 50 steamboats operated at any given time. Although Mississippi steamboating may have had a greater publicist in Mark Twain, the Chesapeake steamboat era had a color and glamour all its own. Sturdy enough to last for half a century, Chesapeake boats were well built and had a large, affectionate following.

Emma Giles is the centerpiece of a story that dramatizes the rise and fall of the steamboat era on the Chesapeake Bay. Important as the boat was as a transport vehicle, Holly's research included hundreds of hours of conversations with people who remember trips and excursions on the Chesapeake steamboats. Holly's book also covers steamboat design and construction, navigation on the Bay, symbolism in paddlebox decoration, the history of amusement park development, the walking beam engine, and some comparison with steamboating in other regions: the Mississippi, the Hudson, and the Delaware. Maps and photos, some never before published, illustrate the text.

(*Steamboat on the Chesapeake:* **Emma Giles** *and the Tolchester Line*, by David C. Holly, is available from Tidewater Publishers, P.O Box 456, Centreville, MD 21617; price $24.95.)

Computer Programming Ship's Business

This manual on programming your personal computer for ship's business is the first of its kind to be addressed to the ship's officer. Assuming that the reader has a working knowledge of the BASIC language (it is not a text on that subject), the book goes into detail on the "whys" and 'hows" of the specific programs provided and is written in a style that the layperson will comprehend.

The first part of the book deals with administrative matters and provides easily duplicated forms: standing orders, vessel particulars, official log entry, and station bills and drills. These are lists that can be made up on a word processor and retained on a diskette.

Programming begins with an uncomplicated procedure for those who have not programmed before. The list for vessel documents is set up on a BASIC program, mainly because it is information that will be referred to many times and can be called up and run quickly, saving the time required to put a word processor in operation. The program is documented line by line, the text explains each line's purpose, and an example of the hard copy is presented. This pattern of development of programs continues throughout.

Using the many other programs in the book, an individual can speedily complete such time-consuming tasks as updating crew lists and personnel information files; calculating payroll and vouchers; preparing forms to enter and clear ports; providing figures for the ullage report and dry certificate, diagramming load, discharge, and ballast sequences; and even navigation problems.

The author, Franklin P. Liberty, is a retired master of VLCCs and teaches computer classes at the District 2 MEBA-AMO School of Marine Engineering and Navigation.

(*Computer Programming Ship's Business*, by Franklin P. Liberty, is available from Cornell Maritime Press, P.O Box 456, Centreville, MD 21617; price $24.00.).

U.S. Department
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**United States
Coast Guard**

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