

# Proceedings

of the Marine Safety Council

No. 46, No. 3

May 1989

U.S. Department  
of Transportation  
United States  
Coast Guard



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DIST (S) (No. 123) -- A: abcde(2); fghiklmntuv(1) B: n(50),  
c(16); e(5); f(4); g(3); r(2); bklqz(1) C: egimp(1) D: adghlmw(1)  
E: mn(1) F: abcdehjkloqst(1) List TCG-06

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### Cover

As early pioneers and commerce pushed westward through the Great Lakes, the federal government provided four small organizations to help them. Eventually, these four small agencies were combined to form the modern-day Coast Guard. This issue's cover story traces the Coast Guard's history and development in the Great Lakes region. (*U.S. Coast Guard photo of the Westwind, a 269-foot polar icebreaker. Shown here in the Arctic, the Westwind was often brought to the Great Lakes to keep shipping lanes open in winter.*)

# The Coast Guard in the Great Lakes

Dennis L. Noble

The Great Lakes provide a natural waterway for the transportation of goods from the rich American heartland. Together, they form the most important inland waterway in North America.

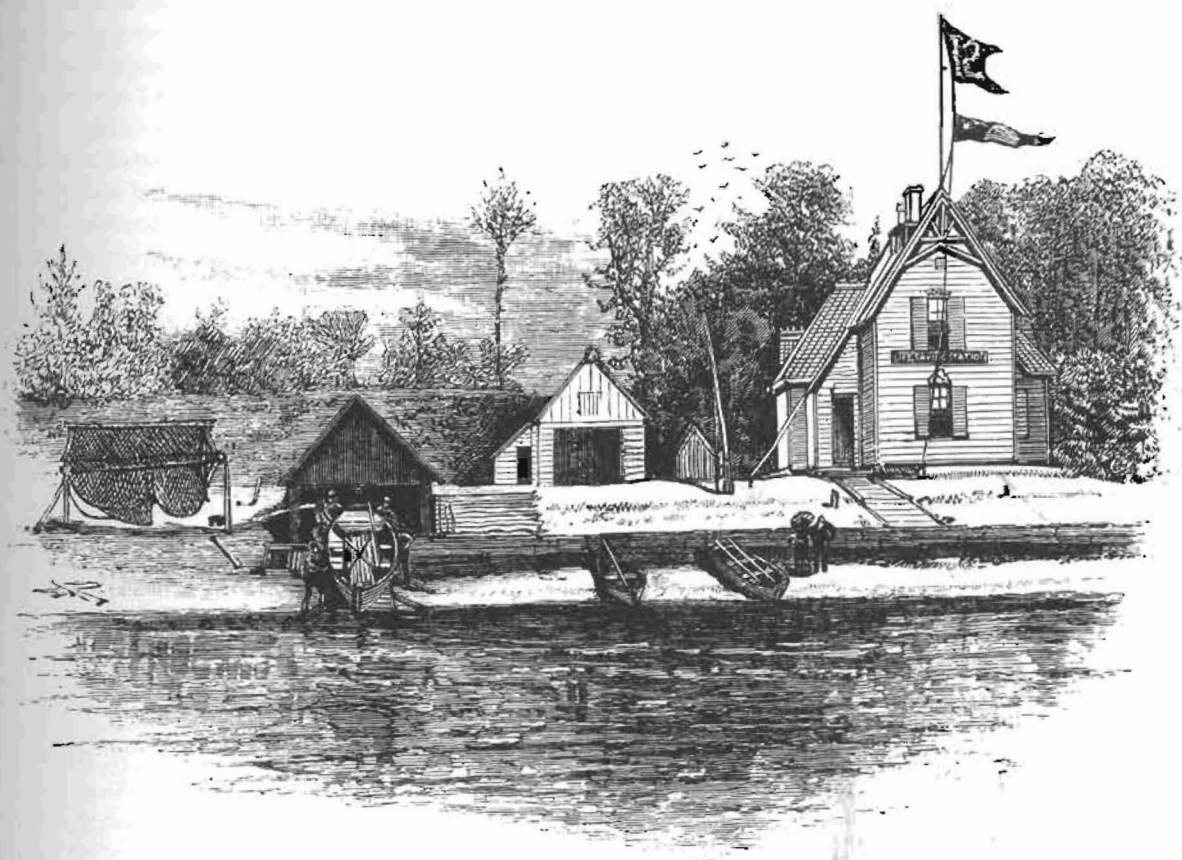
As early pioneers and commerce pushed westward through this great waterway, the federal government provided four small organizations that helped those who sailed upon the lakes and provided a maritime federal law enforcement presence in the old Northwest. Eventually, these four agencies were amalgamated to form the modern day U.S. Coast Guard.

The need for assistance to those upon the lakes brings up the old argument between salt

and fresh water sailors. Many an old salt would ask what danger could there be on a lake? With the opening of the St. Lawrence Seaway in 1959, some of the questioning sailors had a chance to sail on the "mill ponds" and soon found that waves of 20 feet in height, or higher, can be quickly generated, and danger is as real for a sailor on Lake Michigan as on the ocean.

If one looks at the statistics, it becomes abundantly clear that this body of fresh water is huge. The chain of lakes making up the region encompasses 94,510 square miles. Indeed, it does appear that the lakes are, in the words of one writer, the "Eighth Sea."

The U.S. Lighthouse Service was the first of the four agencies that would eventually make



An artist's rendition of one of the first station along Lake Superior's shoreline. Many of the first U.S. Life-Saving Service stations were in small cottages at isolated locations.



One of the drills the men of the Life-Saving Service had to perform weekly was the capsizing and righting of the lifeboat. This drill is being performed at Marquette, Michigan. Note the keeper climbing over the gunwale.

up the U.S. Coast Guard on the Great Lakes. The service traces its roots to 1716 with the establishment of a lighthouse on Little Brewster Island, at the entrance to Boston harbor. By 1789, there were 12 lights located within the new United States.

There is considerable debate on where the first light was established in the Great Lakes. A fire in 1920 destroyed many of the service's records, so an accurate listing is not possible. However, F. Ross Holland, the foremost writer on U.S. lighthouses, sets the 1819 establishment of Presque Isle, on Lake Erie, as the first light in the region. Whichever lighthouse it was, the need for aids to navigation grew as shipping increased. By 1866 there were 72 lights guiding ships to safety. The need for lights is well illustrated when one realizes that by the 20th century there would be more than 100 lighthouses dotting the shorelines of the lakes and the St. Lawrence River.

The builders of Great Lakes lighthouses faced great difficulties in erecting their structures. Lighthouse Service engineers had to contend with high bluffs, sandy coasts, shoals, and other problems. The hazards are best illustrated by the establishment of Spectacle Reef Light, the "greatest engineering achievement in lighthouse construction on Lake Huron, and one of the outstanding feats in the lighthouse service as a whole..."

Spectacle Reef, located at the eastern approach to the Straits of Mackinac, was,

according to official reports, "probably more dreaded by navigators than any other danger now unmarked throughout the entire chain of lakes." Congress, in 1869, authorized work to begin on the project with an estimated cost of \$300,000. Major O.M. Poe, of the U.S. Army Corps of Engineers, was the supervising engineer for the project. Poe selected a shallow area on the reef with only 11 feet of water over it. Before commencing work on the foundation, however, the wreckage of the iron ore schooner **Nightingale** had to be cleared away.

A crib dam was then constructed ashore and then transported to the reef. Once the dam was in place, the water was removed so the work crew would have a dry location in which to labor. Next, the construction force leveled the foundation and, using 3-foot-long bolts, bolted pre-shaped stones to the base rock, with 21 inches of the bolt sunk into the reef. Then, the courses of stone were bolted to each other and to the layers of stone below. Each bolt was "set in pure portland cement which today is as hard as the stone reef."

The tower of the light itself is a solid stone mass for the first 34 feet and then rises at least five stories to the top of the structure. It took at least 4 years to complete Spectacle Reef Light. So severe was the winter of 1873 that when the keepers came to open the new light, they found ice rafted against the structure to 30 feet in height. This was 7 feet above the entrance, and the men had to chop the ice away before they



could seek shelter. The light was officially first exhibited on June 1, 1874, and "has since guided lake vessels past the dangerous reef and toward the Straits of Mackinac which lead into Lake Michigan."

Lighthouses may seem a perfect place for many of us in this hectic, modern age. However, the words most used by keepers to describe their existence are "loneliness" and "monotony." A great deal of a keeper's life centered on the mundane duties of keeping the station and its equipment clean.

Before the advent of electricity, one of the keeper's primary duties was to keep a close watch on the lamp which was the main source of illumination. The wick of the lamp had to be carefully trimmed to produce a strong light. In fact, a keeper was judged by how well his lamp was trimmed. This constant attention to wicks led to lighthouse keepers earning the nickname "wickies."

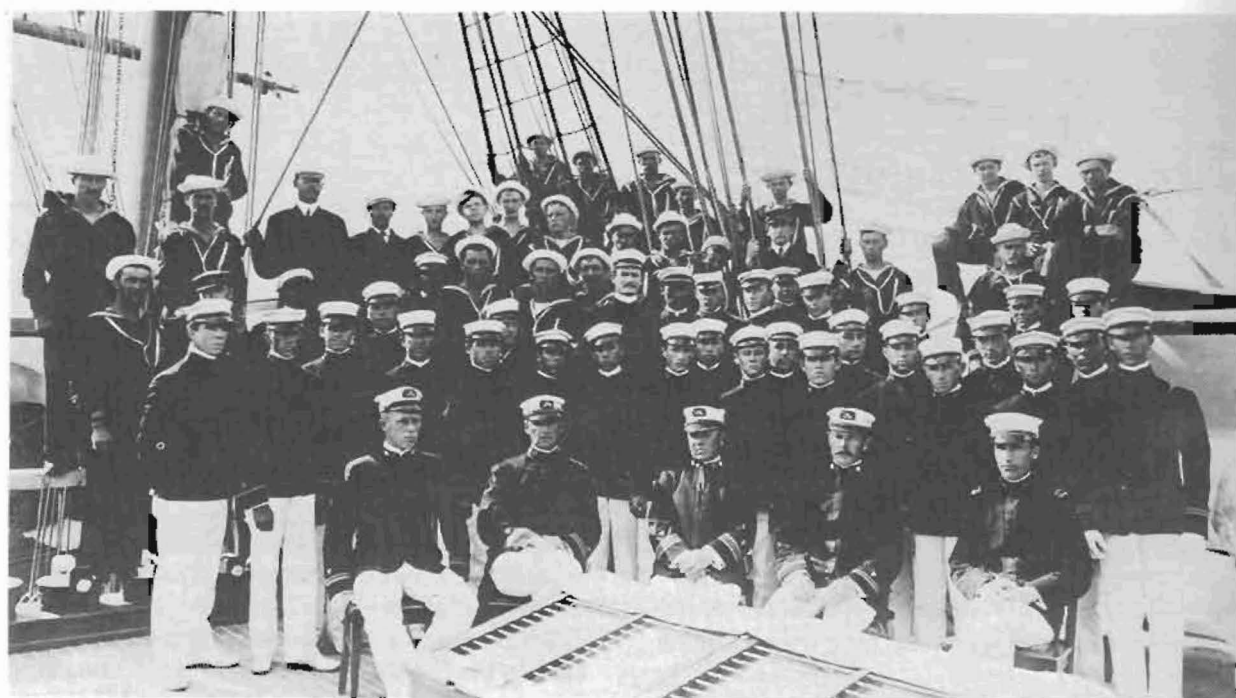
Most people today probably view the profession of lighthouse keeper as male-dominated. This is in large part true, but in the

United States many of those lighthouses whose histories go back at least to the 1800s "at one time or another had female assistant keepers; and a surprising number had women as principal keepers." This was, however, not because of an enlightened view on the part of the service.

Rather, it was a means of saving money. Many of the principal keepers were married, and it was cheaper to have a husband and wife team than to provide two separate quarters. Both wives and family members helped in the running of a light. For example, on May 11, 1890, a rowboat capsized in the Detroit River. A passing tug signaled to the keeper of the Mamjuda Light for help. The keeper and his boat, however, were not at the station, so 14-year-old Maebelle L. Mason, daughter of the keeper, with the help of her mother, launched a small punt. Then, by herself, the girl pulled for 1 mile and managed to get the exhausted man aboard the boat and then rowed back to the lighthouse. For her rescue, the young woman received the Silver Lifesaving Medal, the second highest award for rescue work.



The lightship Huron was the last of its type on the Great Lakes. It left its station on August 21, 1970, replaced by a horn buoy.



The crew of a Revenue Cutter sometime around the turn of the century. During the Spanish American War, World War I, and World War II, cutters were pulled from the Great Lakes to fight on the oceans.

Lighthouses, such as Spectacle Reef, were some of the most isolated stations in the service. For the most isolated and dangerous duty, however, one had to serve aboard lightships. These small, special ships guarded areas where it was impossible to build a light structure. The obvious danger in this type of duty is that the vessel must remain on station no matter how fierce the gale, plus the everpresent danger of being rammed by another ship in thick weather.

The first lightships on the Great Lakes, numbers 55, 56, and 57, took their stations on Simmons Reef, White Shoal, and Gray's Reef in northern Lake Michigan on October 22, 1891. Unlike many early vessels of this class, which were fitted with sails, the first lightships in this region were, as one official report put it, able to go "to and from their stations with their own steam, the only lightships in any service to which this is possible." The number of lightships grew to 20, and a total of 18 different stations were occupied. The complement of the small ships was usually one warrant officer and 10 crew. In general, their duties were "monotonous, repetitious, dangerous, and above all, lonely."

The U.S. Lighthouse Service also operated another fleet of ships, known as lighthouse

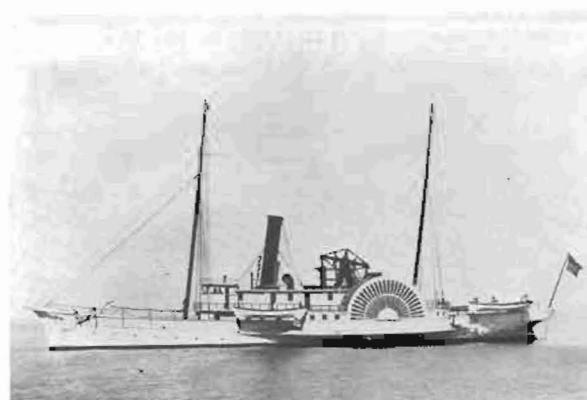
tenders. The tenders provided the means to bring supplies and needed work parties to the scattered and isolated lighthouses. The locations of lights made this duty hazardous, as lighthouses by their very nature are located in dangerous areas. The fleet of tenders consisted of "vessels whose duty it is to go where no other vessels are allowed to go, and who, through storm, darkness and sunshine, do their work..." The first tenders on the lakes were vessels chartered by the Lighthouse Service. In 1874, the *Dahlia* was the first tender constructed especially for light ice on the inland seas. She was 141 feet in length, steam-powered, iron-hulled, and the first to start the custom of naming this class after flowers, shrubs, trees, or plants.

The next predecessor agency of the modern-day U.S. Coast Guard to be stationed on the Great Lakes was the U.S. Revenue Cutter Service. Established in 1790 by the first Secretary of the Treasury, Alexander Hamilton, the service was formed to help combat the loss of revenue by sea-going smugglers. The service operated small cutters and, in 1831, received the assignment of "winter cruising," or performing lifesaving duties on the the high seas.



(Left) Presque Isle Light Station at Erie, PA, considered the first lighthouse established on the Great Lakes. This photograph was taken in the 1870s.

(below) The U.S. Revenue Cutter William P. Fessenden, a side-wheeler type of craft that began service on the Lakes in 1865. It operated from Cleveland, Ohio, to Detroit, Michigan. In 1882, the hull was replaced with a new iron hull and it was relaunched. The vessel was decommissioned in 1903, but was again placed back into service in 1905 and served until 1907 in Florida. (bottom) Many of the isolated stations kept the old building plans of the U.S. Life-Saving Service. When the Coast Guard was formed in 1915, some of the stations looked like small, lakeshore cottages. This photo shows the Sleeping Bear Point, Michigan, station in 1916.





Crew of the Evanston, Illinois, Life-Saving Station (above) in 1894. Keeper Lawrence O. Lawson, center row facing left, was in charge of this station from 1880 to 1903. The entire crew earned the highest lifesaving award -- the Gold Lifesaving Medal -- for their rescue of the *Calumet* during a driving sleet storm on November 28, 1889. Under Lawson's leadership, the station is credited with rescuing 447 people. Evanston Historical Society photo. (below) The Evanston, Illinois, station was unique because it was crewed by students from Northwestern University.

By the 1820s, U.S. Revenue Cutter Service cutters were cruising the Great Lakes enforcing revenue laws and assisting lakers in distress. The nature of the duty on the Great Lakes was different. When the winter freeze halted shipping, most of the crew was paid off, except for a small watchkeeping force. The officers and the ship were laid up.

The Revenue Cutter Service on the Great Lakes had a wide variety of duties. For example, in 1906 the cutter **Mackinac** was assigned to Sault Ste. Marie, Michigan, "for customs duty, and to enforce the rules and regulations governing the movements and anchorages of vessels in the St. Mary's River." The cutter's crew, assisted by two launches, carried out this assignment, which became known as the St. Mary's River Patrol. To help in regulating traffic, the cuttermen manned six permanent lookout stations located along the waterway. In addition to this assignment, the cutter was also required to patrol local regattas.

The next predecessor organization to appear in the Great Lakes was the U.S. Life-Saving Service. The mission of this service was to launch small boats in an effort to rescue people shipwrecked close to shore. The service began as a volunteer organization on the eastern seaboard. The federal government entered the picture in 1848 and moved haphazardly until 1854, when a strong storm swept the east coast, and many died due to shipwrecks. Congress then authorized more money for the construction of lifesaving stations.

The early years of the service were marked by a series of disasters in which weaknesses were pointed out, and Congress responded with money to strengthen the organization. After the 1854 storm, for example, Congress authorized \$12,500 to purchase lifeboats to serve 25 points on Lake Michigan and such other points as the Secretary of the Treasury might determine. By the end of the year, there were 9 boats on Lake Ontario, 14 on Lake Erie, 23 on Lake Michigan, and 1 on Lake Superior. These boats were generally placed at light stations.

The winter of 1870-1871 on the Great Lakes was harsh. More than 214 died in maritime-related accidents and, once again, the Life-Saving Service came under fire for its poor performance. This time, however, Sumner Kimball was appointed to head the service. Kimball, an inveterate organizer, managed to



remake the organization. The improved reputation of the service can be traced to the efforts of this man.

Officially, the service began on the Great Lakes in 1876 with 11 stations on Lakes Erie, Ontario, and Huron. The next year, additional units were added and expanded to include Lakes Superior and Michigan. As shipping increased, so did the need for more stations. By 1914, there were 62 stations scattered throughout the lakes.

The rescues performed by the crews of the service caught the imagination of the public and the press. Indeed, the sight of a keeper, erect in the stern of his boat, urging on his crew as the boat pitched in high surf, could make the most staid journalist gush forth with purple prose. Surfmen soon began to be dubbed "soldiers of the surf" and "storm warriors." The men who served at the stations, however, led lives that could be best described as consisting of hours of boredom, interspersed with seconds of sheer terror.

The man in charge of a station, officially known as a keeper, had years of maritime experience and could handle men and boats in difficult situations. The keeper spent many years in one area, becoming an expert on the weather and surf conditions. Furthermore, because crewmen, called surfmen, were chosen from the local community, the stations remained principally a local affair, and this is one of the main reasons behind the strong bond that now exists between the modern-day U.S. Coast Guard and the municipalities that dot the Great Lakes shorelines.

One of the best examples of the old U.S. Life-Saving Service keepers and his bond to a local area is Lawrence O. Lawson of the Evanston, Illinois, Station. Lawson was born in Sweden on September 11, 1842. After working on Baltic Sea ships for a period of time, he emigrated to the United States and worked on the inland waters, eventually settling in Chicago and pursuing a living as a fisherman. On July 12, 1880, he was appointed keeper of the Evanston Station. The station was unique in the annals of the service, for it was located on the grounds of Northwestern University, and the surfmen were all college students. For the next 23 years, Lawson instilled in his crews "a sense of responsibility, faithfulness and courage." One memorial to the keeper states that under "his superb leadership 447 persons were rescued from more than 35 shipwrecks..."

Arguably the greatest rescue of Lawson's long career, and one of the most difficult on the Great Lakes came on November 28, 1889, when the steamer **Calumet** foundered off Fort Sheridan. The entire crew of the Evanston Station, and their boat, were transported by rail to the location. Then the crew had to wrestle the boat down a steep bluff to the beach. Lawson and his college crew next had to face a howling gale, towering waves, and wind-lashed sleet to reach the shipwreck. For their rescue of the 18 crewmen of the **Calumet**, the entire Evanston crew received the Gold Lifesaving Medal, one of the few times that the highest lifesaving award had been presented to an entire crew. Lawson finally left the service on July 16, 1903, and died on October 29, 1912, still residing in the Evanston area. At the time of his retirement, one writer aptly summed up the old lifesaver: he "set standards and traditions that will last a lifetime."

The last of the four predecessor agencies to eventually form the U.S. Coast Guard on the Great Lakes is also the one that has been the least documented and, therefore, will be discussed only briefly. The Steamboat Inspection Service came about due to the large growth of steam-powered ships and the resultant explosions of faulty boilers, with great loss of life. The mounting death toll led to the passage of the first laws, in 1838, to regulate passenger-carrying steam vessels.

In the early years of steamboat development, inland waterways were better suited to the new vessels than ocean navigation. The waters of the Great Lakes, of course, were ideally suited to this new type of propulsion. The Steamboat Inspection Service grew in fits and starts. The service usually gained more responsibilities after a marine disaster. By 1911 the organization would list the following as its duties: the inspection of vessel construction and equipment; the examination and licensing of marine officers; the examination of seamen and investigations of marine casualties and violations of inspection laws; establishing regulations to prevent collisions; and establishing regulations for transporting passengers and merchandise. There were two Steamboat Inspection Service Districts in the Great Lakes: the Eighth included all the waters north and west of Lake Erie, and the Ninth District, which encompassed the St. Lawrence River, Lakes Erie, Ontario, and Champlain.

Headquarters for the Eighth was in Detroit, and the Ninth District headquarters was located at Cleveland, Ohio.

The first decades of the 20th century would bring huge changes to the four small federal maritime agencies on the Great Lakes. The gradual adding of stations and shifting of various cutters continued but, in general, as the new century began, the status quo was maintained until 1915.

Then, in an effort to streamline government operations, a major change came about. On January 15, 1915, the U.S. Revenue Cutter Service and the U.S. Life-Saving Service were amalgamated to form the U.S. Coast Guard.

At first glance there seems to be little difference between the new service and its predecessors. Cutters still performed their traditional duties, the St. Mary's River Patrol still operated during shipping season, and small rescue boats continued to put out into storm-tossed lakes to rescue those in distress. Indeed, in November 1919, during a strong gale, with the temperature hovering at 18 degrees above zero, the rescue of the **H.E. Runnels** near Grand Marais, Michigan, was a feat that one historian noted was "worthy...even by the standards of the old Life-Saving Service..." All of the U.S. Coast Guardsmen who rescued the 19 crewmen of the **Runnels** received the Gold Lifesaving Medal. There were, however, large changes on the horizon.

The first major task of the new service came in 1920 with the passage of the Volstead Act, the experiment to outlaw liquor in the United States. For the next 14 years, the U.S. Coast Guard waged a war against the smugglers of illegal spirits. With easy access to Canada, smugglers had a field day. Illegal activities on the lakes reached their zenith during the fall of 1927 and the spring of 1928. To combat the rum runners on the Great Lakes, station crews were doubled, patrol boats were increased, and a 75-foot picket boat class was added to the U.S. Coast Guard's inventory. Although these measures helped, the flow of liquor was never completely stopped, and only the passage of the 21st Amendment, the repeal of Prohibition, brought the rum war to a close.

The new U.S. Coast Guard's role in the effort to keep America dry was not a popular one. One historian has noted the service was unpopular with the "drys" because it could not completely cut off the supply of illegal liquor. On

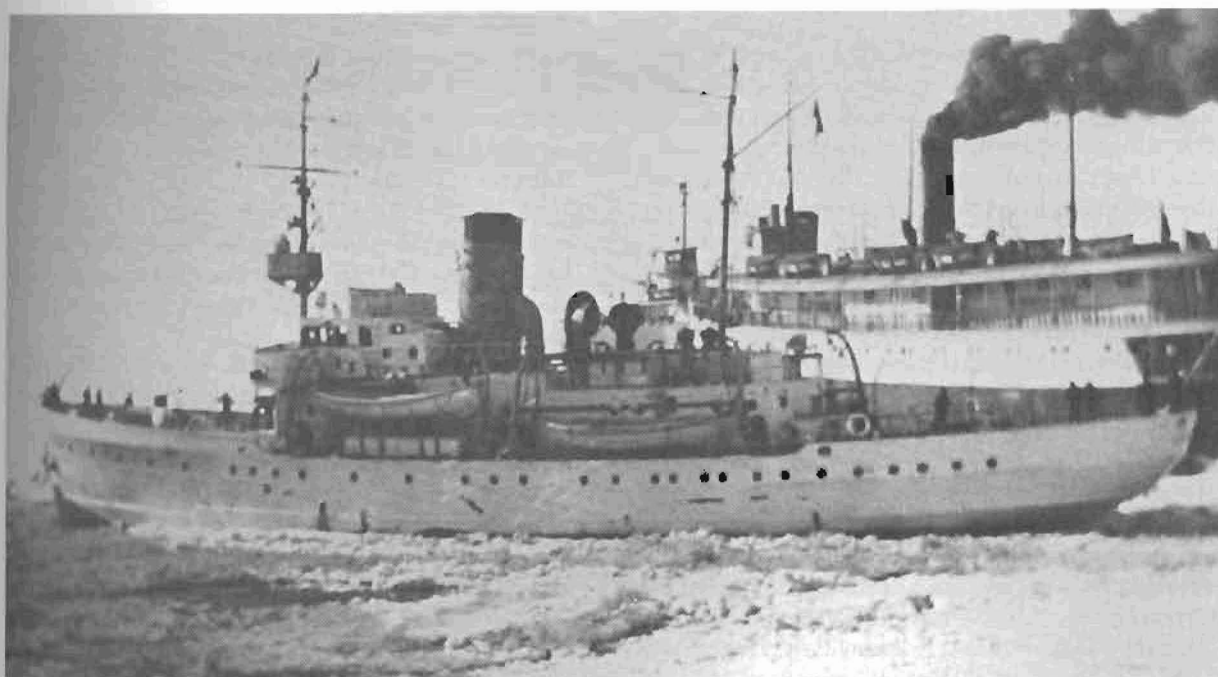
the other hand, it was also unpopular with the "wets" who were angry over the supply of spirits that were interrupted. "It was a cross which the Coast Guardsmen had to bear, and he bore it well." Out of the long rum war, however, some good did emerge. The U.S. Coast Guard had, in general, been known only locally. Now it received national and international notice. Most importantly, the service "remained larger and more important than it had been previously."

The 1930s not only marked the end of Prohibition, it also ushered in the beginnings of new technology for the U.S. Coast Guard on the Great Lakes. In 1932, a new class of cutter was constructed at the DeFoe Works, Bay City, Michigan, and christened the **Escanaba**. She was 165 feet in length and powered by a 1,500-horsepower steam turbine. On December 9, 1932, the new cutter was assigned to her homeport of Grand Haven, Michigan. The **Escanaba** was designed to help keep shipping lanes open as late as possible. Twenty days after arriving in Grand Haven, the cutter participated in her first rescue, pulling two downed pilots from the cold waters of Lake Michigan.

In 1938, a Grumman V-118 twin-engine amphibian airplane was assigned to the Great Lakes Air Patrol Detachment at Traverse City, Michigan. The detachment operated for 3 months to test the feasibility of constructing an air station in the area. The first evaluation, however, recommended operations only during shipping season.

One year later, as war clouds began to thicken, President Franklin D. Roosevelt made another major change to the U.S. Coast Guard. Again, citing governmental efficiency, the U.S. Lighthouse Service was taken over by the Coast Guard. Shortly after this, the service itself became part of the U.S. Navy as the nation prepared for World War II.

The Great Lakes assumed an even greater role as a transportation artery during World War II. It now became an important part of the war effort for the Coast Guard to keep shipping moving as late as possible and to guard against sabotage. U.S. Coast Guard personnel guarded shorelines, docks, vessels, bridges, patrolled harbors, and manned lookout stations to protect vital shipping. In 1942, as a wartime measure, the Steamboat Inspection Service, now called the U.S. Bureau of Marine Inspection and Navigation, was transferred to the U.S. Coast Guard. The transfer was made permanent in



*Escanaba* was assigned to Grand Haven, Michigan, in 1932. When the vessel was sunk in June 1943, only two crew members survived.

1946. In order to keep shipping moving as long as possible, \$8 million was appropriated to build an icebreaker for Great Lakes use. On March 20, 1943, the 290-foot **Mackinaw's** keel was laid. She was launched and commissioned on March 4, 1944, the most powerful icebreaker in the world at the time for her designed purposes.

At the outbreak of World War II, some cutters were transferred from the Great Lakes to help in the Battle of the Atlantic. One of the cutters making the move to the Atlantic was the **Escanaba**. In June 1943, while operating with a convoy out of Narsarsuak, Greenland, Seaman First Class Raymond O'Malley, at 5:10 in the morning, heard "a noise which sounded like three or four bursts of 20 mm machine gun fire." Within minutes after this noise, there was a tremendous explosion that ripped the cutter in two. Only two men survived, O'Malley and Boatswain's Mate Second Class Melvin Baldwin. The citizens of Grand Haven, to pay tribute to the men who died, established a memorial park and raised more than a million dollars in U.S. war bonds to build another ship to bear the name **Escanaba**. Since World War II, Grand Haven has held the U.S. Coast Guard Festival in August of each year.

The U.S. Coast Guard that emerged from World War II is basically the service that still

operates its multifaceted missions today. To be sure, there have been major changes. Technology, for example, has made it possible for the closing of many units. Better ship navigation has made the use of some lighthouses no longer necessary. Technology has also made it possible to automate lighthouses, and keepers are no longer required. In fact, when the U.S. Coast Guard took over the U.S. Lighthouse Service, it began to seek ways to automate many of the isolated stations. Spectacle Reef Lighthouse, the great engineering feat of the 19th century, for example, was automated in 1972. It is estimated that at the end of the 1980s, there will be no manned lights in the United States, thus ending an era in our maritime history. Lightships have also been replaced. The last lightship on the Great Lakes, the **Huron**, was disestablished, and a lighted horn buoy and radio beacon replaced the station on August 21, 1970. Lastly, the number of small boat stations has been greatly reduced by changing technology, including Keeper Lawrence O. Lawson's old Evanston, Illinois, unit. Keeper Henry Cleary of the Marquette, Michigan, U.S. Life-Saving Service Station, conducted tests on the first 34-foot lifeboat equipped with a two-cylinder, 12-horsepower engine. Eventually, these tests developed the work horse of the U.S.

Coast Guard's small boat stations: the 36-foot motor lifeboat. In 1961 a new 44-foot motor lifeboat replaced the older boat. While these boats made it possible to reduce the number of small boat stations, one of the largest reasons for the reduction was the development of the helicopter as a rescue tool and the addition of more air stations on the Great Lakes. In 1966, a new air station was opened near Detroit and equipped with Sikorsky HH-52A helicopters. This "chopper" has a top speed of 125 mph. It was designed to pick up an injured person either by rescue hoist or by landing in the water and then return to base with a safe margin of fuel remaining. In its first year of operation, the station is credited with saving 330 lives.

In 1967 another major administrative change came to the U.S. Coast Guard on the Great Lakes. After nearly 177 years in the Treasury Department, the service, on April 1, 1967, became part of the Department of Transportation. Under the new Department, an air station was added at Glenview, in the Chicago area.

Like the old U.S. Revenue Cutter Service, the U.S. Coast Guard still continues to perform a multitude of duties on the Great Lakes. In the 1960s, icebreaking to keep the shipping lanes open as long as possible was one of its larger missions, following lifesaving duties. Beginning in mid- or late December, three operations were usually underway to accomplish this duty:

- "Taconite," centered mainly in Whitefish Bay, the St. Mary's River, and the Straits of Mackinac, is designed to keep the ore boats carrying taconite from Minnesota to Gary, Indiana.
- "Coal Shovel," along the south shore of Lake Erie to Detroit, keeps the coal supply moving to factories in Michigan's largest industrial city.
- "Oil Can" assists tankers in the Green Bay, Wisconsin, and Grand Traverse Bay, Michigan, region.

In the early 19th century, units of the modern-day U.S. Coast Guard began their long service to the maritime community of the Great Lakes region. Nearing the 200th birthday of the U.S. Coast Guard, the dangers to modern-day sailors on the lakes are still as strong as ever: witness the sinking of the **Carl D. Bradley** and the **Edmund Fitzgerald**. Indeed, the men and women of today's U.S. Coast Guard, who respond to the emergencies upon the waters of the Great Lakes, are carrying on, and surpassing, the strong foundations of service to others established by the deeds of their illustrious predecessors. ■

*(This article is part of the Coast Guard's Bicentennial Series and originally appeared in Commandant's Bulletin #3-89, March 1989.)*



The Coast Guard cutter **Mackinaw**, a familiar sight in Great Lakes waters.



# Things That Go Bang

## *Explosion and Fire at Sea*

LT R. D. Castle

Mariners face hardships and potential disasters -- it's in their line of work. Fires and explosions top the list of at-sea disasters to prevent, but a fire *and* explosion on the same day? Terrifying, to say the least! A recent casualty reinforces the severity of these disasters and the need to prevent them.

On the evening of 21 April 1988, a 38-foot, fiberglass shrimp trawler with two persons aboard was enroute to a rendezvous off South Carolina. At about 7:00 p.m., a fire was discovered in the engine room. With quick thinking and decisive action, the pair successfully extinguished the blaze. The captain received some burns, but these were not serious enough to warrant immediate attention. The fire had done considerable damage, and the vessel was unable to continue under its own power. The F/V **Boss Lady**, which had accompanied the trawler thus far, took the crippled vessel in tow and headed for home.

Exhausted by the evening's events, the captain rested in his bunk. He got up to get a cold drink and stood looking out the aft door of the cabin. Suddenly, he recalled, "Everything was on fire. My whole world was on fire." It all happened so quickly. His next remembered being in the water and struggling to breathe. The dazed and shaken crew member knew that the captain could not swim and called to the other boat for help. A second explosion then forced the crew member into the water and, once again, the F/V **Boss Lady** came to the rescue.

Both men suffered burns over 65 percent of their bodies. The captain said, "I was laying in skin. I would raise my hand and the skin would just fall off." A Coast Guard helicopter later moved the two victims to a shoreside hospital.

Portable propane cylinders supplied the cooking and heating equipment in the vessel's cabin. Rubber supply lines connecting the tanks to the equipment were routed very close to where the engine room fire had occurred. The lines may have been damaged during the initial fire.

It is probable that the subsequent explosion was caused by the ignition of propane gas which collected in the cabin, engine space, and bilges. The primary source of ignition was thought to be the automatic bilge pump switch. The captain had secured the electrical power on the boat after the fire, but the bilge pump switch was directly connected to the battery and continued to operate.

The vessel did not comply with the guidelines established in Navigation and Vessel Inspection Circular (NVIC) #5-86, the Voluntary Standards for U.S. Uninspected Commercial Fishing Vessels, nor did it comply with the standards set forth in NFPA-302, the Fire Protection Standard for Pleasure and Commercial Motor Craft. The vessel had no automatic means for closing the gas supply valves should low pressure be detected, and the supply lines were not made of steel as specified. A gas detection and alarm system was also absent. There is little doubt that any or all of these safety measures could have prevented this near-fatal casualty. ■

*(This article was based on the casualty investigation report prepared by Coast Guard Investigating Officer R. K. Butturini of Marine Safety Office Charleston, South Carolina.)*

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LT Castle is Assistant Chief, Marine Safety Evaluation Branch, Marine Investigation Division, at Coast Guard Headquarters.

## Lessons from Casualties

### To Fire a Raft

Is it possible that some seamen still do not know how to inflate their liferafts, despite the passage of some 30-plus years since this equipment first came on the marine scene? The 1987 loss of a fishing vessel raises the question.

In this sinking, all eight persons onboard were saved from a vessel valued at \$190,000 by its master. The vessel sank north of Hawaii while underway at 0530 hours in conditions of clear weather with fair visibility, wave heights averaging 7 feet, and winds from the northeast at 15 to 20 miles per hour. Later, the vessel's master reported the following to the Coast Guard:

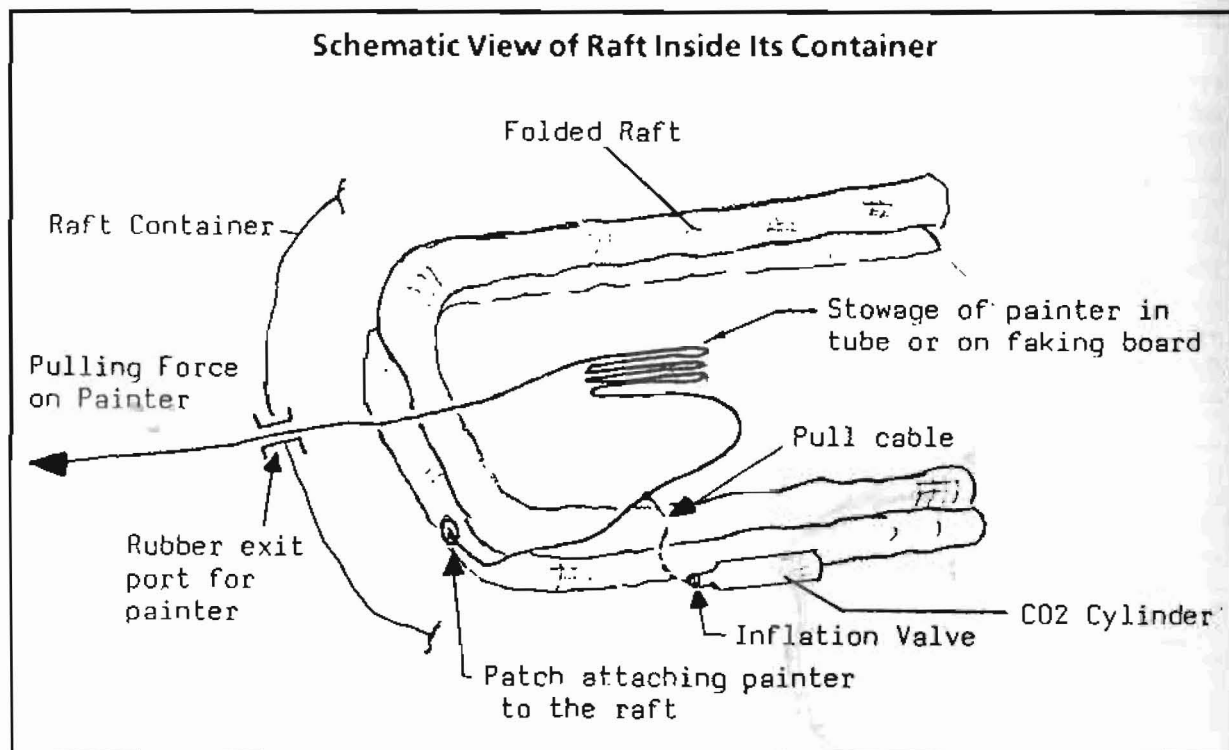
*We caught three large, 15-foot waves. The first wave flooded the boat and caused it to list to starboard. The second wave started to flood the*

*engine room. The third wave sank the boat. The raft did not inflate. Then we used flares to signal.*

To which the Coast Guard investigating officer added:

*Signal flares were the deciding factor; without them they might not have been spotted in that sea state. Debrief of Master indicates that the raft did not inflate because they did not understand how to inflate it properly.*

The crew told the investigating officer of putting their raft into the water after firing several distress signals. After pulling some of the painter from the raft's container and finding it failing to inflate, they broke the container open and spread the raft out on the water like a lily



pad. The eight survivors then remained on the raft more or less in the water until another fishing vessel, responding to the distress signals, picked them up in less than 1 hour.

Months later we can have no certainty as to why the raft failed to inflate: a leaking cylinder may have lost its CO<sub>2</sub> charge, or errors may have been made in assembling the inflation valve and connecting it to the raft. But in this case we will focus our attention on the marine investigating officer's conclusion that "...they did not understand how to inflate [the raft] properly."

On the prior page is a sketch of a typical hookup of a raft's CO<sub>2</sub> inflation system. (The small raft shown here has but one cylinder; larger sizes have two.) A crew, when pulling the raft's painter out of the container, will at some point exert a pull on the wire lanyard that opens the inflation valve of the cylinder. The thing to note is that a considerable length of the painter may have to be pulled out before the inflation valve operates. The critical yank on the inflation

lanyard that fires the cylinder usually takes place at a point about 7 to 15 feet before the painter becomes taut and pulls directly on the patch where the painter is made fast to the raft.

In this casualty, there is a possibility that the crew failed to pull out enough of the painter to the point at which its inflation lanyard would have operated the inflation valve. Some rafts have painters of 100 feet or more in length, so if this crew became impatient and did not pull the painter out to the bitter end -- perhaps they stopped pulling after only 75 feet -- the raft would not have inflated. Fortunately, they kept their heads and finally managed to get some use out of their raft after making a bad start.

When a pull cable fires its cylinder, a sharp pop will be heard, followed by the whooshing sound of CO<sub>2</sub> gas leaving the cylinder. Seamen trying to inflate a raft in an emergency can take heart from this noise because it means that the raft is coming alive and taking shape after months of being rolled up in its container. ■

## Marine Safety Center Relocates

Dear Member of the Marine Community:

The Coast Guard's Marine Safety Center, established on 1 July 1986, centralized the Coast Guard's commercial plan review functions by bringing field offices into the Washington, DC, headquarters.

On 1 May, the Marine Safety Center will move to permanent offices at the following address:

Commanding Officer  
U.S. Coast Guard  
Marine Safety Center  
400 Seventh St., SW  
Washington, DC 0590-0001

Plans submitted for review after 1 May should be sent to this address. A listing of the new Marine Safety Center phone numbers follows:

Commanding Officer  
(202) 366-6480

Executive Officer  
(202) 366-6480

Full Division Chief  
(202) 366-6481

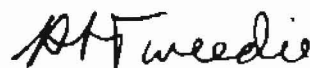
Engineering Division Chief  
(202) 366-6440

Cargo Division Chief  
(202) 366-6441

Facsimile  
(202) 366-3877

We are trying to keep work disruptions to a minimum during this move, and the Marine Safety Center expects to be in full operation by 2 May 1989.

Sincerely,



R.S. Tweedie  
Captain, U.S. Coast Guard  
Commanding Officer, MSC

## Ro/Ro Vessel Operational Inspections Demand Additional Safety Precautions

L. D. Glass

At 8:05 a.m. on January 30, 1987, the attending ABS surveyor on the freight barge **San Juan** suffered permanent injury after being run over by a trailer. At the time, the **San Juan** was conducting roll on, roll off (ro/ro) cargo operations.

The victim was employed for 8 years as surveyor by ABS, Philadelphia, Pennsylvania. On the accident date, he was inspecting the **San Juan's** ballast tanks near a lane of ro/ro traffic. There was considerable noise on the vessel at the time due to cargo activity. The surveyor emerged from a ballast tank manhole near the lane and was holding a flashlight to assist the next man in exiting the space. The surveyor evidently stepped back into the lane, where a trailer was backing up. The right rear tires of the trailer ran over both of the surveyor's legs. First aid was immediately administered at the scene, and the victim was taken to the hospital by ambulance.

The injuries to the surveyor's extremities were extensive. Both of his legs were fractured; the left leg had to be amputated above the knee.

Personnel of the Coast Guard Marine Inspection Office, Philadelphia, investigated the casualty. They concluded that the accident was caused by the failure to secure cargo operations in the lane nearest the surveying operations. Contributing to the casualty was the background noise level caused by trucks. Also contributing was the failure to assign personnel to alert the surveyors to moving hazards during their inspection.

Consideration should be given to ceasing cargo operations during inspections or, at the very least, posting a watch to alert inspectors and surveyors to moving hazards and communicate with both the truck/trailer drivers and attending personnel. Inspectors and surveyors must remain continuously aware of potential dangers onboard commercial vessels and take additional precautions during cargo operations. ■

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## Maritime Notes

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### MARAD News

The Maritime Administration has updated its Service Guide listing U.S.-flag liner companies serving ocean trade, the areas they serve, and the types of service provided. Copies of *Service Guide '89, Ship Your Cargo on U.S. Flag Ships* are available from the Office of Market Development, Room 7207, 400 Seventh St., SW, Washington, DC 20590; telephone (202) 366-5507.

The Maritime Administration also announces the availability of the technical report, *Application of Advance Diesel Technology to Inland Waterway Towboats*. The report, prepared by Detroit Diesel Corp. under a cooperative, cost-shared contract with MARAD, describes the computer simulation analyses, shoreside dynamometer tests, and in-service evaluations conducted aboard the inland waterway towboat **Escatawpa**. The purpose of the project was to validate the engine and towboat performance improvements and fuel savings associated with variable timing electronic fuel injection as applied to the Series ODC 16V-149 engine.

Copies of the report may be obtained from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161. The order number is PB89-177943; the price is \$21.95.

### John Ball Receives Shepherd Award

John Ball, of the National Oceanic and Atmospheric Administration, who worked tirelessly in the area of survival-suit training and cold-water survival techniques, has been awarded the 1988 RADM Halert C. Shepherd Award for Achievement in merchant marine safety. This award is given annually for a single outstanding contribution to merchant marine safety or for constructive participation in maritime safety activities over a period of time.

The Shepherd Award was established in 1975 by the American Institute of Merchant Shipping in honor of the late RADM Shepherd,



who served in the U.S. Coast Guard as Chief, Office of Merchant Marine Safety. The award is administered by the American Bureau of Shipping, the international ship classification society, headquartered in Paramus, New Jersey.

### **USNI Conference and Exhibition Assesses Current and Future Fleet Needs**

The U.S. Naval Institute's second annual conference and exhibition, *The Fleet and Industry: A Sea Power Team*, will be held at the San Diego Marriott Hotel and Marina on September 6-8, 1989. The conference will address important questions and issues concerning Navy/Marine research and development, acquisition policies and programs, and operation to satisfy national commitments.

Key members of the new Administration, Members of Congress, and senior Navy and Marine Corps officials have been invited to address the conference.

The conference and exhibition will feature displays from aerospace and naval industries. For information about corporate participation at the conference/exhibition, please contact Dr. Scott Truver at (703) 892-9000 or 1-800-443-7216.

### **ABS Chairman Announces Major Advances at Annual Meeting**

The 127th annual meeting of the members of the American Bureau of Shipping (ABS) was held at the ship classification society's world headquarters in Paramus, New Jersey, on April 18, 1989.

In his address, Richard T. Soper, Chairman and President, described three new initiatives undertaken by ABS: a special internal quality assurance program, a ready response team for contingency assistance, and a cooperative training program with the U.S. Coast Guard. he said, "These programs, each designed to satisfy a priority need, demonstrate our unique capabilities and our drive to further enhance the services we offer worldwide." The chairman also reported that during 1988 ABS classed 476 new and existing vessels.

### **Congressional Activities**

In late April, the U.S. House of Representatives passed by voice votes several authorization bills proposed by the Merchant Marine and Fisheries Committee, chaired by Walter B. Jones (D-NC).

H.R. 840 authorizes \$16,350,000 in fiscal year 1990 for the Federal Maritime Commission, and independent agency tasked with regulating ocean commerce. The bill, introduced by Chairman Jones, was cosponsored by Bob Davis (R-MI) and Norm Lent (R-NY). The amount is identical to the President's budget request.

The House also approved three fisheries authorization bills introduced by Gerry Studds (D-MA) and Don Young (R-Alaska)

H.R. 1223 authorizes \$75 million for a broad array of program of the National Marine Fisheries Service in each of fiscal years 1990 through 1992. These programs relate to information collection and analysis, fishery conservation and management, and state and industry assistance that are not authorized by other statutes.

H.R. 1224 reauthorizes the Anadromous Fisheries Conservation Act at \$8 million for fiscal years 1990 through 1992. A 1965 law, it is designed to enhance, manage, and conserve anadromous fish species, those which live in the open ocean but return to rivers and streams to spawn (salmon, striped bass, steelhead trout, etc.)■



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## Shipwreck!

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(Left) The G.A. Kohler came ashore on Cape Hatteras on August 23, 1933, during a hurricane. The schooner was bound from Baltimore, Maryland, to Haiti in ballast. Its crew was rescued by the U.S. Coast Guard. Eight men and one woman were brought ashore in a lifeboat. The hull lay on the beach for years and was burned for scrap metal just before World War II. (Bottom) The schooner A. Ernest Mills was rammed and sunk on April 4, 1929, at 9:00 p.m. about 50 miles southeast of the Virginia coast. When the destroyer Childs hit the vessel, the Mills' captain and two crewmen were lost. When the Mills' cargo of salt dissolved a month later, the hull surfaced. The ship ultimately washed ashore on the Virginia coast. (Photos from the collection of William P. Quinn)



## Isoprene

Natural rubber is the name given to the polymer cis-polyisoprene, which is tapped from the *Hevea brasiliensis* tree deep in the Amazon Valley. If you are short on *Hevea brasiliensis* trees, however, this month's chemical is what you're looking for.

Isoprene is the principal monomer necessary for manufacturing synthetic rubber. This colorless, volatile, liquid hydrocarbon is used exclusively as a chemical raw material and is obtained by several different methods.

Polymerization of isoprene (bonding many isoprene monomers to produce a single giant molecule), using Zeigler catalysts yields synthetic natural rubber that closely resembles the natural product. Isobutene combined with a small amount of isoprene yields butyl rubber which has outstanding impermeability to gases and is used in inner tubes.

Isoprene is categorized in packing group 1 and identified by a red label indicating a flammable liquid. Due to its volatile characteristics, it is recommended that isoprene be kept as cool as reasonably possible when being stored. Furthermore, it is recommended that the chemical be stored under an inert atmosphere such as nitrogen, with at least 50 ppm tert-butylcatechol present. This precaution would aid in preventing polymerization and violent container ruptures, should a fire occur. In the case of a fire, carbon dioxide, dry chemical or foam are to be used as extinguishing agents, while nearby isoprene storage containers should be kept cool with a stream or spray of water. In an isoprene leak or spill, all ignition sources must be secured, and rubber gloves, a face shield, and protective clothing should be worn to prevent contact with the liquid. An all-purpose

canister mask should also be readily available. As in the case of any chemical spill, the National Response Center must be notified at its toll-free number, 800-424-8802.

Isoprene is moderately toxic. Its vapors irritate the eyes and the upper respiratory tract, and the liquid may irritate the eyes. A 5-percent concentration of isoprene in air is fatal to laboratory mice, but there is no data on human exposure. Anyone exposed to isoprene vapors should be removed to fresh air. Exposure to the liquid calls for flushing the skin or eyes with water for at least 15 minutes, removing contaminated clothing and shoes, and immediately notifying a physician.

Isoprene is transported in tank rail cars and tank trucks, as well as on board cargo ships. Stowage on board passenger ships is prohibited except for those carrying not more than 25 passengers or 1 per 3 meters of length. It's not a household name, or even familiar to very many people, but when you change a tire or bounce a rubber ball, you're using it -- isoprene. ■

**Chemical Name:** Isoprene (inhibited)

**Formula:**  $C_5H_8$

**Synonyms:** 3 methyl-1, 3 butadiene  
2 methyl-1, 3 butadiene

**Physical Properties**

boiling point: 34°C (93°F)

freezing point: -146°C (-231°F)

vapor pressure: 400 mmHg  
(20°C, 68°F)

solubility in water: not soluble

**Combustion Properties**

flammable limits: 2.0 - 9.0%

flash point: -65°F

autoignition temperature: 428°F

**Densities**

vapor (air = 1): 2.35

**Chemical Designations**

CHRIS Code: IPR

Cargo Compatibility Group: 1  
(Flammable Liquids)

*Brett Alexander was a Third-Class Cadet at the Coast Guard Academy when he wrote this article for LCDR Kiehner's hazardous materials transportation class.*

## 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. A high velocity fog nozzle will produce the most effective spray pattern when the water pressure is \_\_\_\_\_.

- A. 35 psi
- B. 60 psi
- C. 75 psi
- D. 100 psi

**Reference:** Block, *Tankerman*

2. The gland exhaust fan draws steam and non-condensable vapors from the gland exhaust condenser and discharges to the \_\_\_\_\_.

- A. atmospheric drain tank
- B. atmosphere
- C. main condenser
- D. vent condenser

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

3. If a solenoid valve is leaking during the off cycle on an R-12 system equipped with a reciprocating compressor, this can cause \_\_\_\_\_.

- A. low suction pressure
- B. high superheat in the outlet coil
- C. noisy compressor operation on starting
- D. refrigerant slugs in the receiver

**Reference:** Nelson, *Commercial and Industrial Refrigeration*

4. Decreasing the exhaust valve clearance of a diesel engine will cause the exhaust valve to open \_\_\_\_\_.

- A. earlier and have less lift

- B. earlier and remain open longer
- C. later and have greater lift
- D. later and have less duration

**Reference:** Stinson, *Diesel Engineering Handbook*

5. A three-phase alternator operates at 450 volts with a power of 0.8. If the ammeter reads 250 amperes, what does the kw meter read?

- A. 90.00 kw
- B. 127.27 kw
- C. 155.88 kw
- D. 194.85 kw

**Reference:** Hubert, *Preventive Maintenance of Electrical Equipment*

### Deck

1. Which of the following is not a characteristic of cardinal marks?

- A. Yellow and black stripes.
- B. White lights.
- C. Square or triangular topmarks.
- D. Directional orientation to a hazard.

**Reference:** Bowditch, *American Practical Navigator*

2. Under the IALA-A and B Buoyage System, a buoy with alternating red and white vertical stripes indicates \_\_\_\_\_.

- A. that there is navigable water all around
- B. an isolated danger exists
- C. that the preferred channel is to port
- D. that the preferred channel is to starboard

**Reference:** Bowditch, *American Practical Navigator, Vol. I*

3. Which of the following shall be conducted during a fire and boat drill?



- A. All watertight doors which are in use while the vessel is underway shall be operated.
- B. All lifeboat equipment shall be examined.
- C. Fire pumps shall be started and all exterior outlets opened.
- D. All of the above.

Reference: 46 CFR 97.15-35

4. Tonnage openings must be closed by means of \_\_\_\_\_

- A. press board
- B. steel hatch covers
- C. steel plates
- D. wooden hatch boards

Reference: 46 CFR 92.07-10(e)

5. The rate of increase in hour angle is the slowest for \_\_\_\_\_.

- A. the Sun
- B. the Moon
- C. Mars
- D. Mercury

Reference: Bowditch, *American Practical Navigator*

## Answers

### Engineer

1-D; 2-B; 3-C; 4-B; 5-C

### Deck

1-C; 2-A; 3-A; 4-C; 5-B

## NOTE CHANGE OF ADDRESS AND TELEPHONE NUMBER :

*If you have any questions concerning "Nautical Queries," please contact U.S. Coast Guard (G-MVP-5), Merchant Marine Examination Staff, 2100 Second St., SW, Washington, DC 20593-0001; telephone (202) 267-2705. ■*

## Keynotes

### Advance Notice of Proposed Rulemaking; Extension of Comment Period

**CGD 86-025; CGD 88-079, Commercial Fishing Industry Vessel Regulations, Extension of Comment Period (March 2)**

This notice extends the comment period of the advance notice of proposed rulemaking to develop the safety regulations for uninspected fishing, fish processing, and fish tender vessels to implement the provisions of the Commercial Fishing Industry Vessel Safety Act of 1988, Pub. L. No. 100-424 (53 FR 52735, Dec. 29, 1988). The extension was requested by numerous concerns in the fishing vessel industry. The time period of the fishing season and the publication date of the advance notice created later receipt of the Advance notice of Proposed Rulemaking. The requesters cited the broad scope of this regulatory initiative and their difficulty in providing meaningful responses within the

original 60-day comment period due their personal involvement with the fishing vessel industry. Because of the requests for additional time to comment on the advance notice of proposed rulemaking, the deadline for receipt of comments was extended to April 15.

For further information, contact Mr. Norman L. Lemley, Office of Marine Safety, Security and Environmental Protection, (202) 267-0001.

### Notice of Proposed Rulemaking

**CGD 88-111, Great Lakes Pilotage (March 22)**

The Coast Guard is proposing to amend the Great Lakes Pilotage Regulations. The Secretary of Transportation approved the Great Lakes Pilotage Study Final Report, which contains recommendations to improve the Great Lakes Pilotage System. Some of the recommendations call for amendments to the Great Lakes Pilotage Regulations. This proposal would implement those

those recommendations by (1) requiring that an unqualified annual audit be submitted by each authorized pilot organization, performed in accordance with Generally Accepted Auditing Standards promulgated by the American Institute of Certified Public Accountants, (2) establishing general guidelines and procedures for ratemaking, (3) requiring that the costs of all support services directly related to the provision of pilotage that pilots require vessels to utilize be included in the rate base, (4) requiring each pilotage pool to certify whether any support service entity is related by beneficial ownership to a pilot, (5) clarifying the regulations to indicate that financial penalties can be applied to pilots as well as vessel operators who are in violation, (6) amending the steps that are to be followed when a pilot is not available within a reasonable period of time, and (7) amending the rate schedule by adding a charge to compensate a registered pilot for "dead heading" across Lake Erie when aboard a vessel whose master uses a "B Certificate" in lieu of the pilot. These changes are proposed in order to increase the efficiency and effectiveness of the Great Lakes Pilotage Systems.

Comments must be received on or before May 22, 1989. Comments should be submitted to the Executive Secretary, Marine Safety Council (G-LRA-2/3600), (CGD 88-111), U.S. Coast Guard, Washington, DC 20593-0001. For further information, contact Mr. John J. Hartke, Merchant Vessel Personnel Division, (202) 267-0217.

#### **CGD 85-099, Navigation Bridge Visibility (March 24)**

The Coast Guard proposes regulations which would establish standards of vessel design and operation to ensure that visibility from the navigation bridge is adequate to provide for safe navigation and operation. This proposal is necessary to address the safety problems created by blind zones due to the configuration and loading of container vessels, large tankers with aft house arrangements, and other large vessels. The Coast Guard has received requests from professional mariners, particularly pilots,

calling for the development of design criteria and visibility guidelines. The intent of this rulemaking is to establish domestic regulations which enhance navigation bridge visibility and are consistent with the international guidelines published by the International Maritime Organization.

Comments must be received on or before July 24, 1989. Send comments to the Executive Secretary, Marine Safety Council (G-LRA-2/3600), (CGD 85-099), U.S. Coast Guard, Washington, DC 20593-0001. Persons desiring to comment on the information collection requirements should submit their comments to the Office of Management and Budget (OMB), 726 Jackson Place, NW, Washington, DC 20593, Attn: Desk Officer, U.S. Coast Guard. For further information, contact Ensign Mont E. McMillen, (202) 267-0357.

### **Final Rule**

#### **CGD 88-105, Mariners/Light Lists (March 28)**

The Coast Guard is making an editorial change to the Marine Information regulations in Part 72 of Title 33 CFR to clarify the description of those aids to navigation contained in the Coast Guard Light Lists. The effective date is March 28, 1989. For further information, contact Mr. Frank Parker, (202) 267-0357.

### **Adoption of Interim Rule**

#### **CGD 81-101, Pollution Rules for Ships Carrying Hazardous Liquids (March 28)**

The Coast Guard is making some changes to its regulations that implement Annex II of the 1978 Protocol to the International Convention for the Prevention of Pollution of Ships, 1973 (MARPOL 73/78). An interim rule was published on August 1, 1988 to correct some errors and discrepancies between the regulations and Annex II of MARPOL 73/78. This document adopts without change the interim rule.

The effective date is April 27, 1989. For further information, contact Thomas J. Felleisen, (202) 267-1217. ■