

PROCEEDINGS

OF THE MARINE SAFETY COUNCIL



DEPARTMENT OF TRANSPORTATION

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Chronicle of Disaster . . .

International Ice Patrol 1972 . . .

Public Hearing Proposals . . .

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COVERS

FRONT COVER: A crewmember of the SS *Badger State* stood on the port side of that vessel and took this photograph of the ship's bow area as she took a roll to nearly 35° on Christmas Day in 1969. The very next day, the photographer and the rest of the personnel aboard the *Badger State* were forced to abandon ship. See the dramatic story of the *Badger State* in this month's feature.

BACK COVER: The hazards of improper ammunition cargo stowage. Stow it properly!

CENTER FOLD: The readers' questionnaire, found between pages 32 and 37, is concerned with the "Traverse Table," in the current (1958) edition and later printings (1962 and 1966) of the American Practical Navigator (Bowditch), H.O. Pub. No. 9. It would be appreciated if you would fill out the questionnaire, detach, fold, and staple. The address is printed on the form, and no postage is necessary.

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OF THE

MARINE SAFETY COUNCIL

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T. A. DeNardo, Acting Editor

CHRONICLE OF DISASTER

THE WEATHER, cargo stowage, and fate joined forces during the voyage of the SS *Badger State* in December of 1969 to cause a disaster. From the National Transportation Safety Board and Coast Guard Marine Board of Investigation reports, this is a chronicle of that disaster.

December 8, 1969: The SS *Badger State*, a 441-foot, single engine, C-2 type cargo vessel under charter to the Military Sea Transportation Service arrived at Pier 91, Seattle, Wash. for purposes of beginning a Coast Guard mid-period inspection, voyage repairs and preparations for a trip to Viet Nam carrying ammunition. The U.S. Coast Guard Captain of the Port, Seattle, issued a permit for loading of 500-, 750-, and 2,000-pound bombs on the *Badger State* under the supervision of the U.S. Navy at the Naval Ammunition Depot, Bangor, Wash. The vessel took on fuel and fresh water.

December 9: The *Badger State* shifted berth to the Naval Ammunition Depot where voyage repairs, Coast Guard reinspection and other preparations continued. Loading of the explosive cargo was commenced and continued on a two-shift basis for 6 days of damp and rainy weather. Partially loaded hatches were left open during graveyard shifts to facilitate changing of batteries in electric forklifts. Hatch tents were not used during loading.

December 10: The planning department at the Naval Ammunition Depot changed the loading plans in order to improve the fore and aft trim of the vessel. The master of the *Badger State* learned that his vessel was scheduled for only 5,000 long tons of cargo, and he requested that



*The Greek merchant ship Khian Star is shown in a photograph taken on December 26, 1969. The heroic efforts of the master and crew of this vessel succeeded in rescuing fourteen of the *Badger State*'s personnel.*

additional cargo be assigned to his vessel, hoping that the deeper load would give her an easier ride. When he was advised that no more cargo was available, he requested and obtained better vertical distribution of his cargo—in effect moving 398 short tons up one deck level.

December 11-14: Loading the vessel continued without major problems. Some differences of opinion between ship's officers and Naval Ammunition Depot supervisory personnel regarding blocking and brac-

ing the cargo were resolved.

The Coast Guard inspectors finished their mid-period reinspection noting no outstanding requirements.

Most of the cargo consisted of palletized, unfuzed aerial bombs and associated crated hardware. The 2,000-pound bombs were crated in 100 metal pallets of two bombs each. Steel bands held the pallet halves and the bombs intact in each unit. The loaders stowed the pallets in a single layer which covered most of the deck area of the No. 5 upper 'tween deck.

All but two rows of pallets in the center of the raised hatch square were stowed in the athwartships direction. The hatch square caused some of the pallets to be about four inches higher than the adjacent pallets. Void areas between the pallets were blocked out with wooden shoring, but it is doubtful that any type of wooden separation was used between the rows of unequal heights. The master of the *Badger State* requested that this cargo be tommed (held down with bracing from the overhead), but at a conference with depot personnel, it was concluded that this would be unnecessary in view of the great weight of the bombs.

Also during this period, the master requested that spare dunnage be brought aboard in case underway repairs to the cargo stowage should become necessary. The dunnage was provided. The master also requested that access to all cargo holds be provided for underway inspection of the stowage. His request was honored for all hatches except in the No. 3 lower hold where it was apparently not practical.

During the loading operations, the steel banding which held the bomb pallets sometimes broke on the dock or in the holds and had to be replaced.

Loading of the last hatch was completed and signed off by the ship's officers on December 14, and the vessel departed the Ammunition Depot for anchorage in nearby Thorndike Bay. At the anchorage, radar repairs were completed, and the ship was made ready for sea. The vessel now had on board 5,336 long tons of cargo, 10,640 barrels of fuel oil, and 600 tons of water. Mean sailing draft was about 23 feet with a 5½-foot trim by the stern. The metacentric height (GM) was calculated to be between 5 and 6 feet.

In the early evening of December 14, the *Badger State* departed her anchorage with the master and 39 crewmembers aboard, bound for Da Nang, Republic of Viet Nam. The Naval Control of Shipping Organiza-

tion (NCSORG) controlled the routing for the voyage with the advice of the Navy's Fleet Weather Central, Alameda, California. The vessel's exact routing was under a confidential security classification due to the nature of her cargo. NCSORG's original plans called for the *Badger State* to sail westward across the North Pacific along latitude 51° N. to longitude 162° W. and then south-southwest to latitude 30° N. and toward the Luzon Straits.

December 15: Early in the morning, the *Badger State* entered the Pacific Ocean on her intended westerly course at 14.8 knots. She immediately encountered heavy weather. The ship was uncomfortable in the heavy west to southwest seas, with "stiff" riding characteristics and a "snap roll" due to her large GM. The master instructed the engineer to slack all the fuel tanks, hoping that the additional free surface would improve his ship's riding characteristics.

Later that day, Commander Task Force 31 (CTF 31) sent a diversion order to the *Badger State*, directing her to a more southerly route to permit a more rapid transit to low latitudes and to avoid heavier weather.

December 16: The vessel, having complied with the diversion order, reported on course and speed with following winds and seas, confused swells, and rolling to 40°. Her rolling period was 11 seconds. Some shifting of cargo occurred, and the crew made repairs to the stowage as required.

December 17: The vessel was stopped for about an hour and a half while engineers repacked the after starboard steering engine ram which had been leaking hydraulic fluid. During these repairs the vessel was maneuvered with her engine, but that maneuvering could not avoid several 40° rolls.

A second diversion order was received directing the vessel almost due south to avoid severe weather. The ship reported its inability to comply completely due to rolling to 45°.

During the evening, the cargo of palletized, 500-pound bombs in the

No. 3 lower 'tween deck shifted. Some of the dunnage had splintered, and one bomb was steel on steel with the ship. The ship submitted a casualty report regarding this incident to CTF 31, estimating two hours for re-securing. Crewmembers removed the bomb which was resting against frame 72, made a special pallet to contain it, and resecured the cargo by using some of the spare dunnage.

Within hours, the cargo had shifted in four other holds.

December 18: Cargo was now adrift in No. 1 upper 'tween deck, No. 4 upper and lower 'tween decks, and No. 5 upper 'tween deck. The ship was in confused swells to 20 feet. Yet the crew worked strenuously, and by mid-morning they had completed resecuring. The *Badger State* requested new routing since she could not comply with the previous diversion order. A diversion order rerouting the vessel in a generally westerly direction was received.

December 19: The *Badger State* was able to comply with the latest routing until mid-afternoon when a small wasted area was discovered in the port shell plating in the shaft alley about 5 feet below the propeller shaft level. The area was leaking water moderately through several small holes. The ship was slowed while crewmembers placed a cement patch over the area. The ship reported an intended reduction of speed to 13 knots to prevent the temporary repair from vibrating loose while the cement hardened. Once the repair had properly set, it was of no further concern during the voyage.

December 20-23: During this period continuous inspection and frequent repairs to the cargo stowage were required in most of the holds. Dunnage was being broken by shifting cargo as the rough weather continued.

The *Badger State* turned southwest at longitude 170° W. and requested weather forecasts from Fleet Weather Central. On December 22 at 0218 G.m.t., a new diversion order directed the ship on a west-south-

westerly course. The ship reported that she had been hove to for 6 hours because of extreme rolling to 35°. By now shoring material was becoming scarce.

By 1900 G.m.t. on December 23, the *Badger State* was 315 miles south of Adak Island. She reported that she was unable to hold the recommended course due to 35° rolls and that she was running out of shoring material. The master radioed "request urgently that you get me south to good weather as soon as possible." The crew was almost continuously reshoring and resecuring cargo, and off-watch personnel from several other departments were turned to, assisting the deck gang. Fleet Weather Central began sending periodic specific weather forecasts for her area. This service continued for the remainder of the voyage.

The vessel received another diversion order for a southwesterly course, with the provision to adjust course and speed for the best ride of the ship until weather conditions permitted full compliance with the diversion order.

At about this time the crew reported hearing heavy banging noises from within the No. 3 lower hold which had no access for inspection or resecuring. All cargo holds needed reshoring.

December 24: The master requested diversion to a safe port for

resecuring. He received a diversion order to proceed to Pearl Harbor, 1,600 miles southeast of the vessel's position. The weather forecast indicated that more favorable weather conditions could be expected south of 35° N. latitude.

At 2300 G.m.t. the *Badger State* acknowledged the order diverting her to Pearl Harbor and reported the situation under control. However, she also advised that she had been forced to heave to several times to keep from rolling, as cargo was coming adrift in rolls of 20° or more.

December 25: Shortly after 0200 G.m.t., the vessel encountered a severe, unpredicted storm with winds of hurricane force and large, confused seas. The ship took at least one roll to 50°. Cargo was loose in all holds.

By 2000 G.m.t. the ship was experiencing 45° rolls and was unable to heave to because of confused swells. Sleep was nearly impossible because of the ship's stiff riding characteristics. The master had been on the bridge almost continuously since December 22, and the crew was working nearly around the clock trying to secure the cargo. Gear that had been secured in place for years, such as spare engine room equipment and saloon pantry refrigerators, was coming adrift.

At 2230 G.m.t. the vessel corrected her previous position report and re-

quested an escort and shoring materials as soon as possible.

December 26: At 0430 G.m.t. the *Badger State* received an order to divert toward Midway Island, the closest safe port. The SS *Flying Dragon* (enroute from Sasebo, Japan to Long Beach, California) had been requested to rendezvous with the *Badger State*. The *Flying Dragon* was some 500 miles southwest of the *Badger State* at this time, and by 1100 G.m.t. she was on a course to intercept the endangered vessel.

At about 1300, G.m.t. (0200 local time) a second unpredicted storm hit the *Badger State*. She was running before a westerly gale and feared that any diversion toward Midway would cause serious consequences to the cargo which had been temporarily resecured a few hours before. The *Badger State* was hove to when she encountered a mountainous sea and took a 50° roll to starboard followed by an immediate roll to port of 52°. During this roll, the turnbuckle which dead ended the after falls of the port lifeboat carried away. The after arm of the gravity davit rolled down its track to the extended position. The securing gripes also carried away, and the after falls payed out until the broken turnbuckle jammed in one of the fairlead sheaves. Thus, the stern of the No. 2 lifeboat hung down over the ship's side at an awkward angle, the forward davit arm remaining in its stowed position. This boat was now useless, and efforts to resecure it were abandoned due to the heavy weather and the severe rolling.

A check of the holds revealed that the cargo in No. 5 upper 'tween deck was adrift; some of the 2,000-pound bombs had broken loose from their pallets. The entire crew that was off watch was turned to, to secure the bombs or to stop them from rolling and sliding. They saw sparks in the darkness as the bombs struck each other and slid into the ship's structure. All hands were advised to don their lifejackets or to have them close at hand.



The SS Badger State, abandoned and derelict, drifts aimlessly in the North Pacific on 31 December 1969. The blackened portion of her hull on the starboard quarter is a hole caused by a low order detonation of a 2,000-pound bomb in the No. 5 upper 'tween deck.

After using winch power to raise the forward hatch pontoon to a 45° angle, crewmembers began throwing all available items including mattresses, linens, and reefer stores into the hold. The after end of the after pontoon was also raised, and the crew threw mooring lines, rags, asbestos packing, and other available materials into the hatch in an attempt to prevent the sliding and rolling of the bombs. These efforts succeeded for the area immediately under the hatch square, but by this time most bombs were completely out of their pallets and there was no way to get material on top of those forward of the hatch square. Some of the wooden decking and hatch boards had carried away in the No. 5 upper's 'tween deck, and crewmembers saw at least two of the bombs fall into the No. 5 hold below. In a further effort to contain the bombs, one end of the No. 2 steel hatch pontoon was lowered into the No. 5 upper 'tween deck on top of the material already thrown into the space. Yet loose bombs continued to roll around in the hold, generating sparks and heat in their collisions.

Upon first being notified that the 2,000-pound bombs were loose, the master broadcast a distress message which activated the autoalarm on the *Khian Star*, a Greek merchant ship 40 miles west of the *Badger State* position. The *Khian Star* radioed the *Badger State* that she was coming to assist. The distress message was also received by the U.S. Navy's search and rescue coordinator at Midway. Although the Coast Guard has primary control over SAR within the maritime region, the particular sector in which the *Badger State* found herself is under the immediate control of Midway SAR Sector Coordinator, Commanding Officer, U.S. Naval Station, Midway.

Knowing that the *Khian Star* was enroute to assist, the *Badger State's* master considered the possibility of removing part of his crew to her, with the remainder staying aboard and attempting to get the vessel to a safe

port. He had already given orders for the starboard lifeboat (No. 1) to be made ready for launching. Every crewmember who was asked volunteered to remain aboard.

The master tried to keep his vessel hove to on the best heading using 50 to 60 propeller R.P.M.'s ahead during the darkness. But large swells from the west-northwest and others out of the west-southwest negated his efforts, and heavy rolling continued.

By shortly after daylight the rolling and sliding 2,000-pound bombs had struck the starboard side of the ship with such force that they had punched several small holes in the shell plating.

Daylight made it easier for the master to conn the vessel in the confused swells, but she was still rolling to 20°. By now even frozen meats and stores had been placed in the No. 5 upper 'tween deck, yet the bombs continued to roll around violently.

When the master sighted the *Khian Star* visually, he decided to come about in an attempt to head

for Midway Island. All personnel were ordered off the weather decks and full speed ahead was ordered. As the *Badger State* came around, she rolled heavily; and it became apparent that she would be unable to hold a course for Midway with the largest swells on her starboard beam. The master brought the vessel farther about to 135° T where she rode better with swells on the stern.

Suddenly an explosion occurred in the No. 5 upper 'tween deck, blowing off the remaining hatch pontoons, setting the No. 5 booms askew, and scattering small amounts of burning mattress and linen pieces about the deck. Observers on the *Khian Star*, about 4 miles away by now, saw the flash and smoke of the explosion.

Aboard the *Badger State*, the master sounded the abandon ship signal on the whistle and on the general alarm immediately after the explosion. The engineers checked with the bridge by telephone and then closed the throttle and secured all fires in the boilers. They abandoned



The starboard lifeboat of the *Badger State* capsized when a 2,000-pound bomb fell onto it from a gaping hole in the ship's side. The arrow points to one of the 40 personnel from the *Badger State* who abandoned ship. Even capsized, the boat aided rescuers in finding survivors in the icy water.

the engineroom, leaving the shaft alley door open. By the time the last man to leave the engineroom was on deck, the starboard lifeboat had been lowered to the boat deck and was embarking personnel.

The ship's two inflatable liferafts were located on the port and starboard sides of the flying bridge deck. The port liferaft, its tripping line (which also served as its painter) secured to the ship, was thrown over the side. It inflated, but drifted rapidly away from the ship. The starboard liferaft was prepared in a similar manner, but it was not definitely seen to inflate from the ship.

Meanwhile, the master was supervising the launching of the lifeboat. The *Badger State* was stern to the sea and losing her forward momentum. The master decided to lower the boat with 35 crewmembers aboard immediately—before the elements would force the ship broadside to the seas. All personnel in the lifeboat wore lifejackets. As the boat became waterborne, two or three large swells carried it back up to the boat deck level before the falls could be released. The painter then either parted or came loose from the ship, the falls were released; and, despite the fact that men were strenuously working the hand propelling mechanism, the boat drifted aft. The men in the boat saw a large jagged hole in the starboard side of the *Badger State* at the forward end of No. 5 hold at the upper 'tween deck level. The hole was irregularly shaped with a maximum length of about 12 feet and about 8 feet in height. When one wave threw the boat up against this jagged area, the metal protruding from the ship's side gashed the head of one of the men in the boat. Prior to the launching of the lifeboat, one crewmember had seen at least one bomb fall through this hole into the water. But, in the anxiety and haste of the abandon ship, he failed to report what he had seen.

The boat drifted farther aft, and when it drew abeam of the No. 5 hold, a 2,000-pound bomb came out

through the hole in the ship, falling into the midship section of the lifeboat. Several men jumped or fell out of the boat as it capsized.

The master and four of the crew had remained aboard the *Badger State*. Since no actual muster of the crew had been taken prior to the launching of the lifeboat, those who remained aboard ran shouting through the passageways in the midship house to see if anyone else remained aboard. Though the master was unaware of the lifeboat's fate, some men were seen in the water from the ship and liferings were thrown to them. The five aboard the ship assembled on the main deck port side. At the master's direction they obtained liferings for use in addition to the life preservers they were wearing. They went over the side into the rough, cold water. Most personnel left the vicinity of the *Badger State* as quickly as practicable, fearing that the vessel might blow up at any moment. Some men remained with the overturned lifeboat as it drifted away from the now abandoned vessel; others became separated from it or struck out on their own for the approaching *Khian Star*.

Survival was made difficult by the cold water and by the large waves which crested and broke, driving the men deeply under the water. Hanging onto the lifeboat was also difficult, because it, too, was submerged deeply by the breaking waves; and it pulled the men clinging to it down with it. Albatross attacked the men in the water, but none of the survivors was injured by the birds.

The *Khian Star* approached the area of the *Badger State* and personnel aboard her sighted the overturned lifeboat and a number of persons in the water. Captain Niro of the *Khian Star* ordered Jacob's ladders rigged over the side and stationed most of his nineteen-man crew on the main deck with lifelines, life preservers, and liferings. The *Khian Star's* freeboard was about 11 feet, and she was rolling 30 to 50 degrees as large swells swept over her main deck. The *Khian Star*

was able to pick up five or six survivors on its first approach to the capsized lifeboat. Two more passes were made near the boat, and two or three survivors were rescued each time. When no more survivors were seen near the lifeboat, Captain Niro began maneuvering to pick up individual survivors who were scattered about in the area.

Shortly after the *Khian Star* approached the lifeboat for the first time a U.S. Air Force rescue plane arrived on scene from Hickam Air Force Base and dropped several liferaft kits in the vicinity of the survivors. After inflating, these were seen flipping over and over as they were driven before the gale force winds. A line from one of the air-dropped liferafts fell into the hands of a man in the water near the lifeboat. He and five others were able to board the raft which was filled with water. One of the men aboard was too weak to hold his head up. Another crewmember hung on alongside the raft, the others too exhausted to bring him aboard. When the *Khian Star* approached, the liferaft was almost washed aboard her by the heavy seas. Three men from the raft were hauled aboard the rescuing vessel.

During the rescue efforts, some of the crewmembers who made their way to the *Khian Star* were washed from her ladders by seas which swept the deck of the vessel, soaking the rescuers who at times were waist deep in sea water. Those who managed to be hauled aboard had to be carried below, where they were stripped of their wet clothes and given rub-downs and other first aid measures.

The master and two of the crewmembers who left the *Badger State* with him plus 11 others—a total of 14 survivors—were rescued in any manner possible. One man was hauled aboard the *Khian Star* upside down by a lifeline which had tangled around his leg. Another was hauled aboard, tangled in a cargo net. Injuries to the survivors were remarkably minor in light of the conditions.

Several survivors complained that their life jackets rode up under their arms and failed to keep their heads out of the water. They reported seeing other crewmembers floating face down in the water.

By local noon all 14 survivors had been picked up, and the *Khian Star* had begun a search which lasted through the night and most of the next day, joined later by the SS *Flying Dragon* and Air Force and U.S.

Coast Guard planes which arrived on scene at various times. The *Flying Dragon* sighted the overturned lifeboat and several bodies only one of which she was able to recover. The two inflatable liferafts from the *Badger State* and several other inflated liferafts were located empty of survivors.

December 27: The *Khian Star*, her fuel supply low, departed the scene for Yokohama, Japan with all 14 sur-

vivors aboard. A Coast Guard aircraft making a night search reported seeing an orange glow coming from the abandoned *Badger State*, but observed no actual flames.

December 28-29: The search for survivors was continued by the *Flying Dragon* and other vessels passing through the general search area. Results were negative.

December 30: The USS *Abnaki*, a Navy salvage tug with a Navy Ordnance team aboard, relieved the *Flying Dragon*.

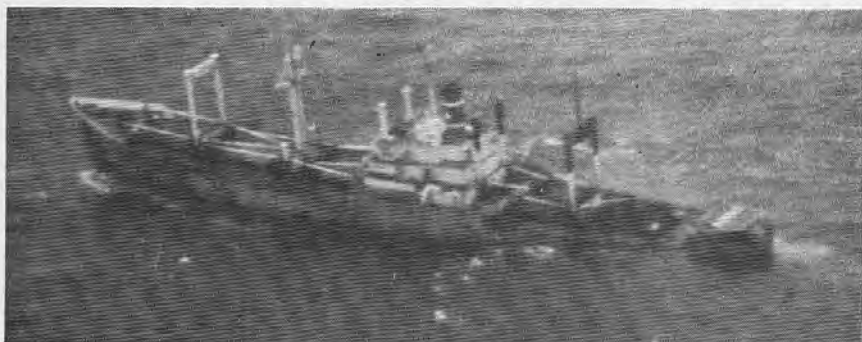
December 31: Personnel aboard the *Abnaki* observed intermittent white, red, and orange flashes aboard the *Badger State*. It was determined that boarding the derelict would present an unwarranted risk and that further salvage attempts would not be made.

January 2-5: The *Abnaki* remained in the vicinity of the derelict to warn approaching traffic of the danger. By January 2 the vessel had drifted to a position 39°06.5' N., 168°12' W. She was settling slowly by the stern with seas washing into the hole in her starboard side. Radar contact with the vessel was lost on 5 January; the *Badger State* had sunk.

January 10: The *Khian Star* arrived late in the evening at Yokohama and disembarked the 14 survivors of the disaster who reported receiving excellent treatment aboard the Greek vessel and had highest praise for its crew.

The *Badger State* was gone, but not forgotten. The U.S. Coast Guard Marine Board of Investigation studied the disaster and concluded as follows:

1. The casualty was caused by a combination of factors. After a shift of cargo the 2,000-pound bombs came adrift from their palletized stowage. A low order detonation of one of the bombs occurred as a result of impact or heat generated as the bombs slid and rolled in number five upper 'tween deck. The detonation resulted in a hole in the starboard shell plating and



The above series of photographs shows the *Badger State* on (from top to bottom) December 27 and 31, 1969 and on January 5, 1970. Once the vessel was abandoned, she drifted with water washing into her through the hole in her starboard side (upper photograph). Boarding the derelict for salvage purposes would have presented an unwarranted hazard to personnel. On January 5, 1970, she sank by the stern.

possibly additional damage to the forward bulkhead of number five hold. This would allow progressive flooding as water entered number five hold through the holed starboard side and possibly through the underwater shell plating damaged by the explosion or fire, causing the abandoned derelict to eventually sink.

2. Most of the loss of life occurred as the result of a 2,000-pound bomb falling through the hole in the starboard shell plating into the lifeboat containing the crewmembers who had abandoned ship. The capsizing of the lifeboat by the bomb threw the occupants into the water and rendered the lifeboat useless for rescue work. It could not be determined whether or not the lifeboat sea painter parted, came unsecured from the vessel, or was released prematurely. Neither could it be determined if the sea painter was firmly attached to the ship before the lifeboat was launched.

3. There is evidence that the painters on both the port and starboard inflatable liferafts failed, however this could not be verified as the failure was not observed nor were the liferafts recovered to permit examination.

4. Contributory factors were the heavy rolling of the vessel (up to 52°) induced by the extreme weather conditions, and the increased dynamic forces on the cargo resulting from the vessel's stiffness and short period of roll. The large metacentric height (GM) of the vessel, which was substantially dependent on the vertical distribution of cargo contributed directly to the vessel's undesirable rolling characteristics. Bilge keels would have moderated, to a limited extent, the rolling motion of the vessel.

5. The repairs made to the port boiler, steering gear, and the hole in the shell plating in way of the shaft alley were adequate. The vessel had full power and steering capability up to the time she was abandoned.

6. The *Badger State* was loaded in the customary manner with substantially the same type of blocking, bracing, sheathing and dunnaging as other ammunition carrying vessels.

7. No specific fault could be found in the routing of the vessel in view of the generally bad weather prevailing across the North Pacific Ocean.

8. Although the lifejackets in use were approved for vessels on international voyages, the number of complaints received indicates a lack of efficiency under prolonged use or adverse sea conditions.

9. The casualty may have been prevented or its effects minimized if the Master had returned to port or sought shelter as soon as the cargo started to shift after leaving port. The course of action followed under the circumstances was reasonable, however, in view of the initial success of the crew in re-blocking and bracing the cargo.

10. Throughout this ordeal the actions of the Master and crewmembers of the *Badger State* were in the best traditions of the sea. Although their untiring efforts failed to save the vessel, the calmness and devotion to duty which they exhibited undoubtedly prevented an even more extensive loss of life.

11. Rescue efforts by all participating units were timely and exhaustive considering the remote area in which the casualty occurred. The prompt response of the *Khian Star* and subsequent rescue efforts of her crew undoubtedly saved the lives of the fourteen survivors. Able Seaman Ioannis Kantziakis of the *Khian Star*, made a heroic, although unsuccessful, attempt to rescue Able Seaman Nelson Fabre.

The Marine Board recommended further study of the stowage, blocking and bracing of explosives aboard ship to determine if there are means to prevent shifting of cargo on vessels rolling to 52°. It also recommended further study to determine if life jackets might be improved and further consideration of requirements concerning length, breaking strength, and methods of rigging inflatable life-raft painters. Efforts to implement this recommendation are currently underway.

The Commandant, U.S. Coast Guard, remarked as follows concern-

ing the Marine Board of Investigation's conclusions:

1. In concurrence with the Board's Conclusion No. 1, it is considered that a combination of factors caused the casualty. The evidence of cargo coming adrift in all cargo holds attests to the severe forces imposed on the blocking and bracing by the extreme rolling in the heavy weather. The shifting and movement of cargo was localized and resecured by the ship's crew until the 2,000-pound bombs began to move.

2. The record of the investigation supports the fact that the 2,000-pound bombs located in number five upper 'tween deck were stowed athwartship-aisle. Wooden wedges were used to secure the cargo because of the broken stow of the pallets supporting the 2,000-pound bombs. There is evidence that the wedges used were wet from the rainfall that occurred during the loading of the cargo. The use of wet wedges and wedges without nails may have also contributed to the initial movement of the cargo.

3. It is evident from the record that the deck under the 2,000-pound bomb pallets in No. 5 'tween deck was covered with deck stripping only, in place of a full layer of dunnage. Due to the extreme rolls of the vessel it is possible that the pallets were able to move more easily on the stripped deck. Once the pallets started to move it was only a question of time until the steel bands holding the bombs to the pallets broke and the bombs were adrift.

4. The 2,000-pound bomb pallets in No. 5 upper 'tween deck were stowed so that the noses of bombs on one pallet were bearing against the noses of bombs on the adjacent pallet, without dunnage or nose boards placed between the bombs. Upon encountering rough weather, the pallets could have shifted enough so that the 5-inch diameter nose plates no longer bore against each other, and the noses of bombs on adjacent pallets were able to override each other. It is probable that further vessel motion supplied enough force to allow the noses to wedge apart the bombs. It is possible that this action re-



During a 52° roll to port a mountainous wave swept the deck on the port side of the Badger State, washing away a turnbuckle securing the port lifeboat. The after arm of the gravity davit rolled down the track to the extended position and the after falls payed out, leaving the lifeboat in the position pictured above. Heavy weather prevented resecuring the lifeboat.

sulted in the loosening or breaking of the bands tying the bombs to the pallets.

5. In concurrence with the Board's Conclusion No. 4 it is considered that the vertical placement of the cargo gave the vessel a large metacentric height, and therefore stiff riding features with a quick roll. If bilge keels had been installed it is possible the rolling effect would have been dampened.

The National Transportation Safety Board determined that the probable cause of this casualty was the failing of the bomb stowage and packaging system to restrain the cargo under the ship motions that occurred during the adverse weather encountered on this voyage, particularly on the morning of December 26, 1969.

The NTSB went on.

The following are considered to be contributing causal factors:

1. The lack of a stowage design criteria that could be correlated with environmental conditions, ship motions, or force loadings, which could then be implemented by engineering design or tests.

2. Utilization of stowage practices which create "chain series" of potential failure points, de-

pendent on custom-made supports that are sensitive to workmanship quality variations. In the method used, a break in the "chain" also caused all the other "connections" in the chain to fail. On the *Badger State*, the sides of the vessel were used as fixed boundaries between which the cargo was wedged with blocking. With no intermediate boundaries, the loosening or failure of a single block or wedge released the whole row of pallets.

3. The vulnerability of the pallet band design to external impact forces which caused the banding to fail and to release the bombs.

4. The undesirable ship response characteristics caused largely by the relatively high metacentric height (GM), resulting from the manner of vertical distribution of cargo and fuel. This increased the acceleration forces at the ends of the rolls, causing increased side loads on the stowage. The lack of a full load of cargo and the fact that bilge keels were not reinstalled on the vessel after their removal in 1966 rendered the ship more responsive to wave forces.

5. The unusual severity of the storm which struck on December 26 and caused the ship to

roll to 52°. The occurrence of the storm during darkness also made it difficult to see the direction of the oncoming waves and prevented conning the vessel to meet the waves head on.

6. The inability of Fleet Weather Central to forecast the storms of December 25 and 26.

The following contributed to the loss of life subsequent to abandoning ship:

1. The failure of the ship's and air-dropped liferafts to remain in the vicinity of the accident where the crewmembers could board them.

2. The failure of the lifeboat painter which deprived the crew of a means to shear the lifeboat away from the ship.

3. The falling of a 2,000-pound bomb into the lifeboat, killing or injuring some crewmembers and overturning the lifeboat.

4. The lack of better techniques to detect a person in stormy seas and to retrieve him.

5. The characteristic which allowed the lifejackets to slide upward and to push the head forward, tending to drown exhausted or unconscious survivors.

The chronicle of the disaster which befell the SS *Badger State* leaves one with mixed feelings. It is a compelling and dramatic story of men's untiring efforts to defeat the raging seas, the forces of fate—forces stronger than themselves—in order to survive. It is a story of superhuman effort, heroism and rescue. In short, it is a story of the valor and unselfishness of seafaring men. And yet, it is the story of death and presumed death that is felt most strongly. Only the hope that the deaths of the crewmembers aboard the *Badger State* will show the way to avoiding such casualties in the future can mitigate the sheer tragedy of this chronicle.

NOTE: The above article is based upon the Marine Casualty Report of the incident, comprised of the U.S. Coast Guard Marine Board of Investigation Report and Commandant's Action and the Action by National Transportation Safety Board released December 7, 1971. Copies of the Marine Casualty Report may be obtained by writing U.S. Coast Guard (MVI-3/83), 400 Seventh Street SW., Washington, D.C. 20590.



U.S. NAVAL OCEANOGRAPHIC OFFICE
WASHINGTON, D.C. 20390

TO ALL READERS OF THE PROCEEDINGS OF
THE MARINE SAFETY COUNCIL

Many licensed deck officers of the merchant marine have expressed strong criticism of the design of the Traverse Table in the current (1958) edition and later printings (1962 and 1966) of the **American Practical Navigator (Bowditch)**, H.O. Pub. No. 9. In response to this criticism, we produced and distributed several formats of the Traverse Table, including the 1943 Bowditch format, to maritime training activities for comments. Our evaluation of the comments received indicated that there is no single format favored by any great majority of training activities. However, the responses of the training activities have enabled us to reduce the number of formats being considered. To insure making the best possible selection of the Traverse Table for the next edition of Bowditch, we are soliciting comments from all active licensed deck officers.

The following pages contain two sample formats of the Traverse Table which we selected for your review from among the several formats initially reviewed by maritime training activities. Also, there are several questions pertaining to your *use* of the Traverse Table *at sea* and space for your comments. Additional pages may be stapled within this questionnaire for other comments on the Traverse Table, or other parts of Bowditch.

By answering these questions and writing your comments, you will be making an important contribution to the next edition of Bowditch.

F.L. SLATTERY
Captain, U.S. Navy
Commander
U.S. Naval Oceanographic Office

TABLE 3 Traverse Table													326° 214°	337°-9.82078 9.82099 - / tan 34°0	034° 146°
<	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.
	DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m
Ca	Dist.	DLat.	Dep.	Dist.	DLat.	Dep.	Dist.	DLat.	Dep.	Dist.	DLat.	Dep.	Dist.	DLat.	Dep.
1	0.8	0.6	51	42.3	28.5	101	82.7	58.5	151	125.2	84.4	201	168.6	112.4	
2	1.7	1.1	52	43.1	29.1	102	83.6	59.0	152	126.0	85.0	202	169.5	113.5	
3	2.5	1.7	53	43.9	29.6	103	84.4	59.6	153	126.8	85.6	203	170.3	114.5	
4	3.3	2.2	54	44.8	30.2	104	85.2	60.2	154	127.6	86.1	204	171.1	115.5	
5	4.1	2.8	55	45.6	30.6	105	85.9	60.7	155	128.4	86.6	205	171.9	116.5	
6	4.9	3.4	56	46.4	31.1	106	86.7	61.3	156	129.2	87.2	206	172.7	117.5	
7	5.8	3.9	57	47.3	31.5	107	87.5	61.8	157	130.0	87.8	207	173.5	118.5	
8	6.6	4.5	58	48.1	32.4	108	88.5	62.4	158	130.8	88.4	208	174.3	119.5	
9	7.5	5.0	59	48.9	33.0	109	89.4	63.0	159	131.6	88.9	209	175.1	120.5	
10	8.3	5.6	60	49.7	33.8	110	90.2	63.5	160	132.4	89.5	210	175.9	121.5	
11	9.1	6.2	61	50.6	34.1	111	92.0	62.1	161	133.5	90.0	211	176.9	118.0	
12	9.9	6.7	62	51.4	34.7	112	92.9	62.6	162	134.5	90.6	212	177.8	118.5	
13	10.8	7.3	63	52.2	35.2	113	93.7	63.2	163	135.1	91.1	213	178.8	119.5	
14	11.6	7.8	64	53.1	35.8	114	94.5	63.7	164	136.0	91.7	214	179.7	119.7	
15	12.4	8.4	65	53.9	36.3	115	95.3	64.3	165	136.8	92.3	215	180.7	120.2	
16	13.3	8.9	66	54.7	36.9	116	96.2	64.9	166	137.6	92.8	216	181.7	120.5	
17	14.1	9.5	67	55.5	37.5	117	97.0	65.4	167	138.4	93.3	217	182.7	121.0	
18	14.9	10.1	68	56.4	38.0	118	97.8	66.0	168	139.3	93.9	218	183.7	121.9	
19	15.8	10.6	69	57.2	38.6	119	98.7	66.5	169	140.1	94.5	219	184.7	122.5	
20	16.6	11.2	70	58.0	39.1	120	99.5	67.1	170	140.9	95.1	220	185.7	123.0	
21	17.4	11.7	71	58.9	39.7	121	100.3	67.7	171	141.8	95.6	221	186.7	123.6	
22	18.2	12.3	72	59.7	40.3	122	101.1	68.2	172	142.6	96.2	222	187.6	124.1	
23	19.1	12.9	73	60.5	40.8	123	102.0	68.8	173	143.4	96.7	223	188.6	124.7	
24	19.9	13.4	74	61.3	41.4	124	102.8	69.3	174	144.3	97.3	224	189.5	125.3	
25	20.7	14.0	75	62.2	42.1	125	103.6	69.9	175	145.1	97.9	225	190.5	125.8	
26	21.6	14.5	76	63.0	42.5	126	104.5	70.5	176	145.9	98.4	226	191.4	126.4	
27	22.4	15.1	77	63.8	43.1	127	105.3	71.0	177	146.7	99.0	227	192.4	126.9	
28	23.2	15.7	78	64.7	43.6	128	106.1	71.6	178	147.6	99.5	228	193.3	127.5	
29	24.0	16.2	79	65.5	44.2	129	106.9	72.1	179	148.4	100.1	229	194.3	128.1	
30	24.9	16.8	80	66.3	44.7	130	107.8	72.7	180	149.2	100.7	230	195.2	128.6	
31	25.7	17.3	81	67.2	45.3	131	108.6	73.3	181	150.1	101.2	231	196.1	129.2	
32	26.5	17.9	82	68.0	45.9	132	109.4	73.8	182	150.9	101.8	232	197.0	129.7	
33	27.4	18.5	83	68.8	46.4	133	110.3	74.4	183	151.7	102.3	233	197.9	130.3	
34	28.2	19.0	84	69.6	47.0	134	111.1	74.9	184	152.5	102.9	234	198.8	130.9	
35	29.0	19.6	85	70.5	47.5	135	111.9	75.5	185	153.4	103.5	235	199.7	131.4	
36	29.8	20.1	86	71.3	48.1	136	112.7	76.1	186	154.2	104.0	236	200.6	132.0	
37	30.7	20.7	87	72.1	48.6	137	113.6	76.6	187	155.0	104.6	237	201.5	132.5	
38	31.5	21.2	88	73.0	49.2	138	114.4	77.2	188	155.9	105.1	238	202.4	133.1	
39	32.3	21.8	89	73.8	49.8	139	115.2	77.7	189	156.7	105.7	239	203.3	133.6	
40	33.2	22.4	90	74.6	50.3	140	116.1	78.3	190	157.5	106.2	240	204.2	134.2	
41	34.0	22.9	91	75.4	50.9	141	116.9	78.8	191	158.3	106.8	241	205.1	134.8	
42	34.8	23.5	92	76.2	51.4	142	117.7	79.4	192	159.2	107.4	242	206.0	135.3	
43	35.6	24.0	93	77.1	52.0	143	118.6	80.0	193	160.0	107.9	243	206.9	135.9	
44	36.5	24.6	94	77.9	52.6	144	119.4	80.5	194	160.8	108.5	244	207.8	136.4	
45	37.3	25.2	95	78.8	53.1	145	120.2	81.1	195	161.7	109.0	245	208.7	137.0	
46	38.1	25.7	96	79.6	53.7	146	121.0	81.6	196	162.5	109.6	246	209.6	137.6	
47	39.0	26.3	97	80.4	54.2	147	121.9	82.2	197	163.3	110.2	247	210.5	138.1	
48	39.8	26.8	98	81.2	54.8	148	122.7	82.8	198	164.1	110.7	248	211.4	138.7	
49	40.6	27.4	99	82.1	55.4	149	123.5	83.3	199	165.0	111.3	249	212.3	139.2	
50	41.5	28.0	100	82.9	55.9	150	124.4	83.9	200	165.8	111.8	250	213.2	139.8	
Dist.	Dep.	DLat.	Dist.	Dep.	DLat.	Dist.	Dep.	DLat.	Dist.	Dep.	DLat.	Dist.	Dep.	DLat.	Dist.
Lat.	Dep.	DLo.	Lat.	Dep.	DLo.	Lat.	Dep.	DLo.	Lat.	Dep.	DLo.	Lat.	Dep.	DLo.	Lat.
<	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.
304° 236°	0.17101 - / tan 36°0													056° 124°	337°-0.16287 367°-0.17922

TABLE 3													326° 214°	337°-9.82078 9.82099 - / tan 34°0	034° 146°
Traverse Table															
Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	Hyp.	Adj.	Opp.	<
DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m	DLo.	Dep.	m	Lat.
Dist.	DLat.	DLo.	Dist.	DLat.	DLo.	Dist.	DLat.	DLo.	Dist.	DLat.	DLo.	Dist.	DLat.	DLo.	Cn
251	208.1	140.4	301	249.5	168.3	351	291.0	196.3	401	332.4	224.2	451	373.9	252.2	
52	208.9	140.9	302	250.4	168.9	352	291.8	196.8	402	333.3	224.8	452	374.7	252.8	
53	209.7	141.5	303	251.2	169.4	353	292.7	197.4	403	334.1	225.4	453	375.6	253.3	
54	210.6	142.0	304	252.0	170.0	354	293.5	198.0	404	334.9	226.0	454	376.4	253.9	
55	211.4	142.6	305	252.9	170.6	355	294.3	198.5	405	335.8	226.5	455	377.2	254.4	
56	212.2	143.2	306	253.7	171.1	356	295.1	199.1	406	336.6	227.0	456	378.0	255.0	
57	213.1	143.7	307	254.5	171.7	357	295.9	199.6	407	337.4	227.6	457	378.9	255.6	
58	213.9	144.3	308	255.3	172.2	358	296.7	200.2	408	338.2	228.2	458	379.7	256.1	
59	214.7	144.8	309	256.2	172.8	359	297.5	200.8	409	339.1	228.7	459	380.5	256.7	
60	215.5	145.4	310	257.0	173.3	360	298.3	201.3	410	339.9	229.3	460	381.4	257.2	
261	216.4	145.9	311	257.8	173.9	361	299.2	201.9	411	340.7	229.8	461	382.2	257.8	
62	217.2	146.5	312	258.7	174.5	362	300.0	202.4	412	341.6	230.4	462	383.0	258.3	
63	218.0	147.1	313	259.5	175.0	363	300.9	203.0	413	342.4	231.0	463	383.8	258.9	
64	218.9	147.6	314	260.3	175.6	364	301.8	203.5	414	343.2	231.6	464	384.7	259.5	
65	219.7	148.2	315	261.1	176.1	365	302.6	204.1	415	344.1	232.1	465	385.5	260.0	
66	220.5	148.7	316	262.0	176.7	366	303.4	204.7	416	344.9	232.6	466	386.3	260.6	
67	221.3	149.3	317	262.8	177.3	367	304.3	205.2	417	345.7	233.2	467	387.2	261.1	
68	222.2	149.9	318	263.6	177.8	368	305.1	205.8	418	346.5	233.7	468	388.0	261.7	
69	223.0	150.4	319	264.5	178.4	369	305.9	206.3	419	347.4	234.3	469	388.8	262.3	
70	223.8	151.0	320	265.3	178.9	370	306.7	206.9	420	348.2	234.9	470	389.6	262.8	
271	224.7	151.5	321	266.1	179.5	371	307.5	207.5	421	349.0	235.4	471	390.5	263.4	
72	225.5	152.1	322	267.0	180.1	372	308.4	208.0	422	349.9	236.0	472	391.3	263.9	
73	226.3	152.7	323	267.8	180.6	373	309.2	208.6	423	350.7	236.5	473	392.1	264.5	
74	227.2	153.2	324	268.6	181.2	374	310.1	209.1	424	351.6	237.1	474	393.0	265.1	
75	228.0	153.8	325	269.4	181.7	375	310.9	209.7	425	352.5	237.6	475	393.8	265.6	
76	228.9	154.3	326	270.3	182.3	376	311.7	210.3	426	353.4	238.2	476	394.6	266.2	
77	229.6	154.9	327	271.1	182.9	377	312.5	210.9	427	354.3	238.7	477	395.5	266.7	
78	230.5	155.4	328	271.9	183.4	378	313.4	211.5	428	355.2	239.3	478	396.3	267.3	
79	231.3	155.9	329	272.8	184.0	379	314.2	212.0	429	356.0	239.9	479	397.1	267.9	
80	232.1	156.6	330	273.6	184.5	380	315.0	212.5	430	356.9	240.5	480	397.9	268.4	
281	233.0	157.1	331	274.4	185.1	381	315.9	213.1	431	357.8	241.0	481	398.8	269.0	
82	233.8	157.7	332	275.2	185.7	382	316.7	213.6	432	358.7	241.6	482	399.6	269.5	
83	234.6	158.3	333	276.1	186.2	383	317.5	214.2	433	359.6	242.1	483	400.4	270.1	
84	235.4	158.8	334	277.0	186.8	384	318.4	214.7	434	360.5	242.7	484	401.2	270.7	
85	236.3	159.4	335	277.7	187.3	385	319.2	215.3	435	361.5	243.2	485	402.1	271.2	
86	237.1	159.9	336	278.6	187.9	386	320.0	215.8	436	362.5	243.8	486	402.9	271.8	
87	237.9	160.5	337	279.5	188.4	387	320.9	216.4	437	363.4	244.3	487	403.7	272.3	
88	238.8	161.0	338	280.2	189.0	388	321.7	217.0	438	364.3	244.8	488	404.6	272.9	
89	239.6	161.6	339	281.0	189.5	389	322.5	217.5	439	365.2	245.3	489	405.4	273.4	
90	240.4	162.2	340	281.9	190.1	390	323.3	218.1	440	366.1	245.8	490	406.2	274.0	
291	241.2	162.7	341	282.7	190.7	391	324.2	218.6	441	367.0	246.3	491	407.1	274.6	
92	242.1	163.3	342	283.5	191.2	392	325.0	219.2	442	368.0	246.8	492	407.9	275.1	
93	242.9	163.8	343	284.4	191.8	393	325.9	219.7	443	368.9	247.3	493	408.8	275.7	
94	243.7	164.4	344	285.2	192.4	394	326.6	220.3	444	369.8	247.8	494	409.6	276.2	
95	244.6	165.0	345	286.1	192.9	395	327.5	220.9	445	370.8	248.3	495	410.4	276.8	
96	245.4	165.5	346	287.0	193.5	396	328.3	221.4	446	371.7	248.8	496	411.2	277.3	
97	246.3	166.1	347	287.7	194.0	397	329.1	222.0	447	372.6	249.3	497	412.0	277.9	
98	247.1	166.6	348	288.5	194.6	398	330.0	222.6	448	373.5	249.8	498	412.9	278.5	
99	247.9	167.1	349	289.3	195.2	399	330.9	223.1	449	374.4	250.3	499	413.7	279.0	
100	248.7	167.7	350	290.2	195.7	400	331.8	223.7	450	375.3	250.8	500	414.5	279.6	
Dist.	DLo.	Dep.	Dist.	DLo.	Dep.	Dist.	DLo.	Dep.	Dist.	DLo.	Dep.	Dist.	DLo.	Dep.	Cn
Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	Hyp.	Opp.	Adj.	<

304° 236°		0.11101 - / tan 56°0		/ tan 56°0 - 1.17222		056° 124°	
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Normally, I do not use the Traverse Tables for distances in excess of _____
nautical miles. My area of operations is primarily:

Deep sea []

Coastal []

Inland []

Navigational experience _____ years

Additional Comments:

.....
FOLD ALONG DOTTED LINES

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OTHER COMMENTS ON THE TRAVERSE TABLE OR OTHER PARTS OF BOWDITCH

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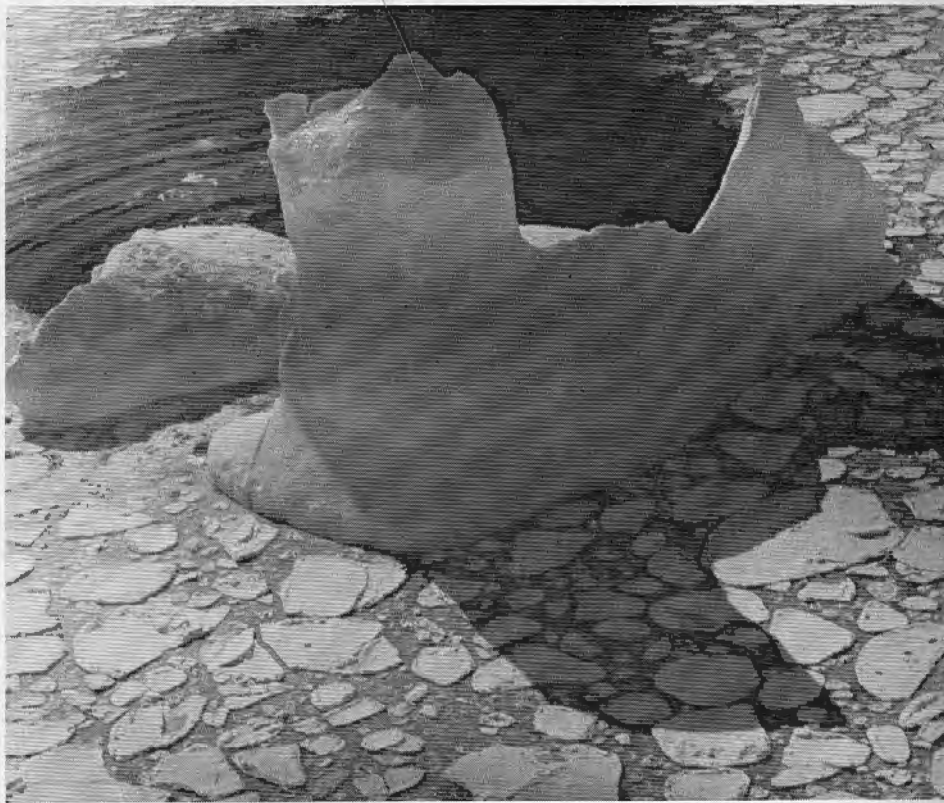
INTERNATIONAL ICE PATROL 1972

IN FEBRUARY or March 1972, depending upon iceberg conditions, the International Ice Patrol will commence its annual service of guarding the southeastern, southern, and southwestern limits of the regions of icebergs in the vicinity of the Grand Banks of Newfoundland for the purpose of informing passing ships of the extent of this dangerous region. Reports of ice in this area will be collected from passing ships and from flights by Ice Patrol aircraft. Should severe ice conditions be encountered, the Coast Guard will deploy a surface patrol ship to conduct ice observations and to originate special ice broadcasts. Information on ice conditions is provided by the Ice Patrol at 0000 G.m.t. and 1200 G.m.t. each day in an Ice Patrol Bulletin which is sent out by radio and landline circuits.

All shipping is requested to assist in the operation of International Ice Patrol by reporting all sighting of ice at once to COMINTICEPAT via the radio stations listed in the following section. When reporting ice please include the following information:

1. Position of ice.
2. Size of ice (for icebergs).
3. Concentration of ice (for sea ice, in eighths).
4. Thickness of ice (for sea ice, in feet).
5. Other information requested for sea surface temperatures.

In addition to ice reports, sea surface temperature and weather reports are of importance to the Ice Patrol in predicting the drift and de-



MARINERS HAVE GROWN to appreciate the many dangers lurking in the frigid shadows of dry dock icebergs such as the one above. Over the next several months, the International Ice Patrol will be tracking these icy giants and providing valuable information to protect Atlantic shipping.

terioration of ice and in planning aerial patrols. Shipping is urged to make sea surface temperature and weather reports to the Ice Patrol every 6 hours when within latitudes 40° to 50° N. and longitudes 42° to 60° W. Ships with but one radio operator should prepare the reports every 6 hours as requested and hold them for transmission when the radio operator

is on watch. When reporting, please include the following:

1. Ship position.
2. Course and speed.
3. Visibility.
4. Air and sea surface temperature.
5. Wind direction and speed.

It is not necessary to make the above report if the ship is making routine weather reports to METEO WASHINGTON.

ICEBERG IDENTIFICATION

SIZE	HEIGHT		LENGTH	
	Feet	Meters	Feet	Meters
Growler	Less than 4	Less than 1	Less than 20	Less than 6
Bergy Bit	4-20	1-6	20-50	6-15
Small Iceberg	20-50	6-15	50-200	15-61
Medium Iceberg	50-150	15-46	200-400	61-122
Large Iceberg	150-250	46-76	400-700	122-213
Very Large Iceberg	More than 250	More than 76	More than 700	More than 213
Shape	Description			
Blocky	Steep sides with flat top. Very solid. Length-Height ratio less than 5-1.			
Drydock	Eroded such that a Large U-shaped slot is formed with twin columns. Slot extends into or near waterline.			
Dome	Large round smooth top. Solid type iceberg.			
Pinnacled	Large central spire(s) or pyramid(s) dominating shape.			
Tilted-Blocky	Blocky iceberg which has tilted to present a triangular shape from the side.			
Tabular	Flat topped iceberg with length-height ratio greater than 5-1.			

CALLING AND TRANSMISSION OF TRAFFIC

Purpose	Frequencies which should be used
Calling	500 kHz (If 500 kHz is being used for distress traffic then 512 kHz may be used as supplementary calling frequency) 2182 kHz (voice) Assigned HF (CW) calling frequencies
Transmission of traffic by merchant vessels	Ocean Station Vessels MF (CW), 2 MHz (voice) AMVER Radio Stations MF (CW), 2 MHz (voice) Coastal Radio HF (CW) Maritime Mobile St. John's MF (CW)
Transmission of traffic by the following Coast Guard Stations: Ocean Station Vessels 4YB, 4YC, 4YD, 4YE, 4YH AMVER Radio Stations NMF (BOSTON) NMY (NEW YORK) NMN (NORFOLK-PORTS-MOUTH)	466 kHz (CW), 2670 kHz (voice) 472, 8465 kHz (CW) 486, 2670 kHz (CW) 466, 2670, 8465, 12718.5, 17002.4 kHz (CW)
Transmission of Traffic by Canadian Coastal Radio Station St. Johns-VON	478 kHz (CW)

Ice sightings, weather, and sea surface temperature should be reported to COMINTICEPAT through Coast Guard Ocean Station vessels, Coast Guard east coast AMVER Radio Stations, and, if unable to work U.S. Coast Guard Stations, Canadian Coastal Radio St. Johns/VON on the frequencies indicated below. Merchant ships calling to transmit Ice Patrol traffic are requested to use the regularly assigned international call sign of the station being called; however, Coast Guard stations will be alert to answer NIK, NIDK, or NJN calls if used.

Gulf of St. Lawrence Information

Ice information services for the Gulf of St. Lawrence, as well as the approaches and coastal waters of Newfoundland and Labrador, are provided by the Canadian Department of the Environment during the approximate period December to late June. Ships may obtain ice information by contacting Ice Operations Officer, Sydney, Nova Scotia via Sydney Marine Radio (VCO) or Halifax Marine Radio (VCS). Details of the service are available in "Guidance to Merchant Shipping Navigating in Ice in Canadian Waters," published by the Marine Operations Branch, Ministry of Transport, Ottawa, Canada.

Search and Rescue

Aircraft and ships assigned to duty with the International Ice Patrol will render assistance to persons and property within the limits of their capability.

Ice Patrol Office

The International Ice Patrol Office is located at the U.S. Coast Guard Base, Governors Island, New York, N.Y., in Building 110 adjacent to the AMVER Center. Telephone number (Area Code 212) 264-4798 or 264-4799.

BROADCASTS OF THE ICE PATROL BULLETIN

RADIO STATION	TIME OF BROADCAST (GMT)	FREQUENCIES (kHz)
CW Broadcasts Coast Guard Radio Boston/NIK Coastal Radio St. Johns/ VON Maritime Command Radio Mill Cove/CFH Naval Radio Washing- ton/NSS	0018 1218 0000 and 1330 0130 and 1330 0430 and 1700	5320, 8502 8502, 12750 478 115.3 (except Tuesday 1330) 133.5 (Tuesday 1330 only) 4356.5, 6449.5, 8662, 12984, 17218.4, 22587. 88.0 (0430 only), 185.0, 5870, 8090, 12135, 16180.
Voice Broadcasts Coast Guard Radio Boston/NMF (On U.S. Marine Info. Bost.)	0130, 1330 0200, 1400	8765.4 (8764.0) USB 8764.0 DSB
Radio facsimile Broadcasts Coast Guard Radio Boston/NIK Maritime Command Radio Mill Cove/CFH Radio Bracknell/GFE Radio Quickborn/DGC Radio Quickborn/DGN	1600 0300 and 1500 1400 C905 (Repeated at 2145) (Weekdays only) 0905 (Repeated at 2145) (Weekdays only)	8502, 12750 (drum speed 120). 133.15, 4271, 9890, 13510, 17560 (drum speed 120). (Primarily sea ice in Gulf of St. Lawrence and North. Limits of icebergs some- times given.) 4782, 9203, 14436, or 18261 (drum speed 120) (N. Atlantic Ice Obs.) 3695.8 (drum speed 120) (W. Atlantic Ice Chart) 13627.1 (drum speed 120) (W. Atlantic Ice Chart)
Special Broadcasts Coastal Radio St. Johns/ VON	As required, when icebergs are sighted outside the limits of ice between regularly scheduled broad- casts.	Preceded by International Safety Signal (ITT) on 500 kHz.

WARNINGS

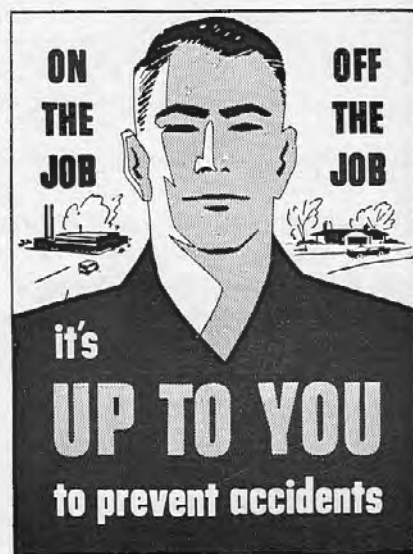
Shipping is reminded that in spite of the best efforts of the Ice Patrol

to prevent such occurrences, icebergs have and will drift unnoticed into the usual shipping routes in the area of the Grand Banks. The positions of

icebergs in the Ice Bulletin are updated for drift at 12 hour intervals. However, it is stressed that after about 5 days the positions estimated by drifting are very unreliable. Date of an iceberg sighting is indicated in the Ice Bulletin.

In general, only icebergs south of about 48° N. are included in the Ice Bulletin. In the event there are large numbers of icebergs south of 48° N., the Ice Bulletin will carry the positions of only those icebergs near the limits of ice and isolated icebergs or iceberg groups.

Carefully conducted tests by the Ice Patrol have proven that radar cannot provide positive assurance of iceberg detection. Since sea water is a better reflector of radar signals than ice, an iceberg or growler inside the area of sea return on the radar scope may not be detected. The *average* range of radar detection of a dangerous growler, if detected at all, is only 4 miles. While radar remains a valuable aid for ice detection, its use cannot replace the traditional caution exercised in a passage across the Grand Banks during the ice season. ‡



Public Hearing

1972 Proposals

THE MARINE SAFETY COUNCIL will hold a hearing on Monday, March 27, 1972, commencing at 9:30 a.m. in Conference Room 2230, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, D.C., for the purpose of receiving comments, views, and data on the proposed changes in the navigation and vessel inspection rules and regulations.

These proposals are set forth in the Marine Safety Council Public Hearing Agenda, CG-249, dated March 27, 1972. The agenda contains the specific changes being proposed to the navigation and vessel inspection regulations, and for certain items the present and proposed regulations are set forth in comparison forms, together with reasons for the changes.

These proposals are set forth officially in the Federal Register, which contains general descriptions of the proposed changes in the regulations, together with appropriate references to statutes authorizing such requirements.

Copies of the Agenda have been mailed to persons and organizations who have expressed a continued interest in the subjects under consideration and have requested that copies be furnished them. Copies of the Agenda will be furnished upon request to the U.S. Coast Guard (CMC/82), 400 Seventh Street SW., Washington, D.C. 20590, so long as they are available. After the supply of extra copies is exhausted, copies will be available for reading purposes in Room 8234, Coast Guard Headquarters, or at the offices of the various Coast Guard District Commanders.

Comments on the proposed regulations are invited. Written comments containing constructive criticism, suggestions, or views are welcomed. However, acknowledgement of the comments received, or reasons why the suggested changes were or were not adopted, will not be furnished since personnel are not available to handle the necessary correspondence involved. The public hearing held by the Marine Safety Council is informal and intended to obtain views and information from those who will be directly affected by the proposals under consideration. Each oral and written comment submitted on time will be fully considered and evaluated. The proposals may be changed as a result of these comments.

Each person or organization who desires to submit comments, data, or views in connection with the proposed regulations set forth in the Marine Safety Coun-

cil Public Hearing Agenda should submit them in duplicate so that they will be received by the U.S. Coast Guard (CMC/82), 400 Seventh Street SW., Washington, D.C. 20590, prior to April 6, 1972. Comments, data, or views may be presented orally or in writing at the Public Hearing before the Marine Safety Council on March 27, 1972. In order to insure consideration of written comments and to facilitate checking and recording, it is requested that each comment regarding a section or paragraph of the proposed regulations be submitted on Form CG3287, showing the section number (if any), the subject, the proposed change, the reason or basis, and the name, business firm, or organization (if any), and the address of the submitter. A small quantity of Form CG-3287 is attached to the Agenda. Additional copies may be reproduced by typewriter or otherwise.

Each item in the Agenda has been given a general title, intended to encompass the specific proposals presented thereunder. It is urged that each item be read completely, because of the application of proposals to specific employment or types of vessels may be found in more than one item.

On the following pages the PROCEEDINGS presents only the most succinct synopses of the proposed items of revision approved for consideration at the hearing. The Agenda must be consulted for full particulars.

SYNTHETIC FIBER ROPE FOR LINE THROWING APPLIANCES (35-70, 27-71)

The present regulations do not allow the use of synthetic fiber rope for line throwing appliances. It is proposed to amend the regulations to establish minimum standards for and to permit the use of such rope for line throwing appliances on tank vessels, cargo, and miscellaneous vessels, passenger vessels, and oceanographic vessels.

TAILSHAFT INSPECTION AND DRAWING (67-71, 4-71)

Under present regulations, oil lubricated tailshafts on vessels must be drawn every 4 years. Since this requires the seals for the bearing to be dismantled and the tailshaft to be drawn, exposing highly machined parts to possible damage, and since experience has shown that the oil lubricated bearings provide longer service than water lubricated bearings, it is proposed to allow the OCMI, at the 4-year interval, after evaluating the bearing's condition, to decide whether the period between tailshaft drawings may be extended another 2 years. Thus, when permitted by the OCMI, tailshafts having oil lubricated bearings and meeting certain other requirements may be drawn every 6 years in lieu of the presently required 4-year interval.

The U.S. Coast Guard has been using the weather criteria contained in the passenger vessel regulations to evaluate the stability of cargo and miscellaneous vessels as the best available standard. This standard has been accepted as the result of 20 years' usage. It is, therefore, proposed to incorporate these stability criteria as a new regulation within the cargo and miscellaneous vessels regulations. Vessels of unique designs, however, will continue to be evaluated for stability on an individual basis.

DEFINITION OF INTERNATIONAL VOYAGE (12-70)

References to the term "international voyage" in the existing regulations have been a source of occasional confusion in that the various application sections (46 CFR 30.01-6, 70.05-10, 90.05-10, and 188.05-10) of Subchapters D, H, I, and U specify types of vessels which are required to meet the standards of the International Convention for the Safety of Life at Sea, 1960, while the definition sections in each Subchapter (46 CFR 30.10-36, 70.10-21, 90.10-17, and 188.10-35) describe the type of voyage which would be an international voyage. In order to remove this source of confusion, the definition sections will be incorporated in the application sections so that both the type of vessel and type of voyage covered by requirements for vessels on an international voyage will be found in one location within each subchapter.

PORTABLE FOAM FIREFIGHTING EQUIPMENT TANK VESSELS (17-71)

In order to amplify the present regulations with regard to the quantity and stowage of portable foam firefighting equipment, it is proposed to amend the regulations of Subchapter D to require at least one handheld appliance at firefighting stations.

SUBCHAPTERS D, H, AND I, SAFETY FACTORS FOR CARGO GEAR (20-71)

In the design of cargo gear, it is proposed to allow alternate methods of using factors of safety by allowing computation based on yield point as an alternate to computation based on ultimate strength. In addition, it is proposed to add factors of safety for stayed masts, pins and connections to the safety factor tables.

VISUAL ACUITY REQUIREMENTS, ORIGINAL LICENSES (23-71)

In consideration of technological changes in the marine industry and in view of the number of relaxations from present visual acuity requirements already granted by the Commandant, U.S. Coast Guard on an individual basis, it is proposed to relax the visual

acuity requirements for original licenses for licensed Merchant Marine officers and operators of mechanically-propelled vessels, provided the applicant meets more stringent requirements for corrected vision.

FLASHING NAVIGATION LIGHTS ON BARGES (33-71)

During the past several years, collisions between pleasure craft and pushed barges which resulted in multiple deaths were at least partially attributed to inadequacy of lighting on the lead barge. It is proposed to require a 20-point quickflashing amber light on the lead barge in a tow in lieu of the steady amber light now required, since a flashing amber light has been generally accepted by the public to denote danger ahead.

LIFE PRESERVER RESCUE LIGHTS (68-71)

Several major casualties have demonstrated the need for a light by a person in the water during darkness if search efforts are to be successful. The proposed new regulation, which would apply to all inspected vessels and to uninspected vessels (except yachts) over 65 feet in length operating offshore or on the Great Lakes, would require that a small battery powered light be attached to the life preservers carried. The Commandant would have the power to exempt certain vessels having a low probability of being involved in a night search and rescue case from this requirement.

TWO AVENUES OF ESCAPE—TANK, CARGO, AND OCEANOGRAPHIC VESSELS (45-71)

This proposed regulation would require two avenues of escape from each berthing compartment aboard certain vessels, in addition to the presently required two avenues of escape from each general area in which persons sleep or work. The proposal recognizes that the second avenue will normally be an airport, so long as it can be opened by hand and provides a clear opening of 16 inches diameter.

INSPECTION OF BOTTOM BEARING MOBILE OFFSHORE DRILLING AND WORKOVER UNITS (87-71)

Under present regulations, vessels involved in the exploration, production, stowage, drilling, and testing of natural resources of the subsoil and seabed of the Outer Continental Shelf, are subject only to 33 CFR Subchapter N, Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf. Based on a 1953 administrative decision concerning the earliest offshore structures having limited mobility, these vessels have been excluded from regulations while in an in-transit phase. Such vessels are now more mobile, have increased in physical size, have changed in character, have become more numerous,

and have suffered serious casualties during transit to their drilling sites. To provide a minimum standard of safety for the mobile drilling rig during transit, this proposed change would incorporate industrial vessels involved in exploration, production, stowage, drilling,

and testing of natural resources into Subchapter I of Title 46 CFR. In effect, the proposed change would establish the same safety standards required of any United States flag vessel for the vessels contemplated. ‡

AMENDMENTS TO REGULATIONS

Title 46 Changes

Chapter I—Coast Guard, Department of Transportation

SUBCHAPTER N—DANGEROUS CARGOES

PART 146—TRANSPORTATION OR STORAGE OF EXPLOSIVES OR OTHER DANGEROUS ARTICLES OR SUBSTANCES, AND COM- BUSTIBLE LIQUIDS ON BOARD VESSELS

Dangerous Cargo Containers

On pages 5246 and 5247 of the Federal Register (36 F.R. 5246) which appeared March 18, 1971, a notice of proposed rule making was published which proposed an amendment to the Dangerous Cargo Regulations. A public hearing was held on May 4, 1971, and interested persons were given 65 days in which to submit written comments regarding the proposed regulations.

No objections have been received and the proposed regulations are hereby adopted without change and are set forth below.

(R.S. 472 as amended, sec. 1, 19 Stat. 252, sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 170, 49 U.S.C. 1655(b)(1); 49 CFR 1.46(b))

Effective date. This amendment shall become effective on March 6, 1972.

Dated: November 29, 1971.

C. R. BENDER,
Admiral, U.S. Coast Guard,
Commandant.

Subpart 146.05—Shipper's Re- quirements Regarding Packing, Marking, Labeling and Shipping Papers

1. Subpart 146.05 is amended by revoking § 146.05-15(h).

Subpart 146.07—Railroad Vehi- cles, Highway Vehicles, Contain- ers or Portable Tanks Loaded With Explosives or Other Dan- gerous Articles and Transported on Board Ocean Vessels

1a. Section 146.07-25(b) is amended by revoking the last sentence.

Subpart 146.08—Railroad or High- way Vehicles Loaded With Dangerous Substances and Transported on Board Ferry Vessels

2. Subpart 146.08 is amended by adding § 146.08-31 to read as follows:

§ 146.08-31 Exemptions Concerning Labeling Requirements

Labels are not required on packages containing explosives or other dangerous articles or substances when the packages are:

(a) Loaded and unloaded under the supervision of Department of Defense personnel and are under escort by Department of Defense personnel in a separate vehicle.

(b) Cylinders containing compressed gases classed as nonflammable, provided that the cylinders are carried by private or contract motor carriers and are not overpacked.

Subpart 146.21—Detailed Regula- tions Governing Inflammable Liquids

3. Subpart 146.21 is amended for the article "Acrolein (inhibited)" by adding in the 4th column ("Required conditions for transportation—Cargo vessel"), of § 146.21-100 the words reading as follows:

Cylinders (DOT-4B240, 4BA240, or 4BW240) complying with DOT regulations.

Portable tanks (DOT-51) not over 20,000 lbs. gr. wt.

Tank cars complying with DOT regulations (trainship only).

Subpart 146.25—Detailed Regula- tions Governing Poisonous Articles

4. Subpart 146.25 is amended by revising the 4th column of § 146.25-100 for the articles:

- (a) Cyanogen chloride containing less than 0.9 percent water;
- (b) Cyanogen gas;
- (c) Ethyldichloroarsine;
- (d) Lewisite;
- (e) Methyldichloroarsine;
- (f) Mustard gas;
- (g) Phenylcarbylamine chloride; and
- (h) Poisonous liquid or gas, N.O.S.

to read as follows

Required conditions for transportation	
***	***
Cargo vessel	
***	***
Stowage:	
"On deck under cover."	
Outside containers:	
Steel cylinders (DOT-33, 3D) with valve protection cap or when without cap in nonspecification strong wooden boxes marked with prescribed name of contents, prescribed label and the words "This side up" and the notation "Inside packages comply with prescribed specifications."	***
Cylinders (DOT-3A1800, 3AA1800, or 3E1800). Spec. 3A and 3AA cylinders must not exceed 125 pound water capacity (nominal) and must have valve protection or be packed in strong wooden or metal boxes as described in 49 CFR	

173.327(a)(2). Spec.
3E1800 cylinders must
be packed in strong
wooden or metal boxes.

* * *

[FR Doc.71-17831 Filed 12-6-71;8:49
am]

(Federal Register of December 7, 1971)

Chapter I—Coast Guard, Department of Transportation

PART 10—LICENSING OF OFFICERS AND MOTORBOAT OPERATORS AND REGISTRATION OF STAFF OFFICERS

PART 12—CERTIFICATION OF SEAMEN

Professional Requirements for En- gineer Officers' Licenses on Inspected Vessels

The purpose of these amendments to the merchant marine officers and seamen regulations is (1) to qualify an applicant to be licensed as third assistant engineer of motor vessels upon completion of a 3-year apprentice engineering training program, and (2) to require the payment of fees for duplicate seaman's papers or a reissue service record to be made at the time of application. These amendments were proposed in a notice of proposed rule making published in the Federal Register of February 24, 1971 (36 F.R. 3425), and in the Merchant Marine Council Public Hearing Agenda dated March 29, 1971 (CG-249). These proposed amendments were identified as Items PH 1b-71, PH 1c-71, and PH 1d-71 in the notice and agenda.

A public hearing was held on March 29, 1971, in Washington, D.C. Interested persons were given the opportunity to submit written comments both before and at the public hearing and to make oral comments concerning all the proposed amendments at the public hearing.

Item PH 1b-71 proposed an amendment to 46 CFR 10.10-23(a) to allow an applicant to be licensed as third assistant engineer of motor vessels upon completion of a 3-year apprentice engineer training program

approved by the Commandant. No comments were received on this proposal. The Coast Guard has adopted the proposal with a minor editorial change that provides the reader with an address to obtain the names of training facilities that conduct recognized training programs.

Item PH 1c-71 proposed an amendment to 46 CFR 12.02-12 to provide for collection of the fees at the time application is made by a seaman for a duplicate document or service record. Only one comment was received and it supported the proposal. The proposal is adopted with the following minor editorial changes:

(1) The word "document" is changed to "seaman's papers" to correspond to its designation in form CG-4363;

(2) The procedure for obtaining the records is detailed and includes the form to be completed and the fees from Table 1.25-40(b) to be paid.

Item PH 1d-71 proposed amendments to 46 CFR Parts 12 and 157 to establish a special category of able seamen on mineral and oil vessels equipped with and without lifeboats. Fifteen written comments were received, five of which were opposed to the proposal. One of the comments opposing the proposal did so on the basis of a current surplus of available, qualified able seamen and the reduction in qualification requirements. Another comment in opposition to the proposal did so on the basis that the proposal should be extended to the entire industry with a further reduction of sea experience for qualification as able seamen. The Coast Guard, in view of the controversy, has determined that the proposal should be given further study. Accordingly, Item PH 1d-71 is being withdrawn until further study is made.

In consideration of the foregoing, Subchapter B of Title 46, Code of Federal Regulations is amended as follows:

1. By amending § 10.10-23(a) by adding "; or," after the words "steam

vessels" in subparagraph (7) and adding subparagraph (8) to read as follows:

§ 10.10-23 Third Assistant Engineer; Motor Vessels

(a) * * *

(8) Passed a 3-year apprentice engineer training program. The names of training facilities conducting recognized training programs may be obtained from the Commandant (MVP), U.S. Coast Guard, Washington, D.C. 20590.

2. By revising paragraph (c) of § 12.02-23 to read as follows:

§ 12.02-23 Issuance of Duplicate Document

* * * * *

(c) A person entitled to duplicate seaman's papers or a reissue service record may obtain the document by applying at the nearest office of the Officer in Charge, Marine Inspection, by—

(1) Completing form CG-4363; and

(2) Paying—

(i) The fee prescribed by Table 1.25-40(b)(4) of Title 33, Code of Federal Regulations, at the time of application for duplicate seaman's papers; or

(ii) The fee prescribed by Table 1.25-40(b)(2)(i) of Title 33, Code of Federal Regulations, at the time of application for the first page of a reissue service record, and the fee prescribed by Table 1.25-40(b)(2)(ii) at the time of issuance for each additional page.

* * * * *

(R.S. 4405, as amended, R.S. 4462, as amended, sec. 6(b)(1), 80 Stat. 937; 46 U.S.C. 375, 416, 49 U.S.C. 1655(b)(1); 49 CFR 1.46(b))

Effective date. These regulations shall become effective on January 10, 1972.

Dated: November 30, 1971.

T. R. SARGENT,
Vice Admiral, U.S. Coast
Guard, Acting Comman-
dant.

[FR Doc.71-17919 Filed 12-7-71;
8:50am]

(Federal Register of December 8, 1971.)

POLLUTION PREVENTION REGULATIONS GO TO PUBLIC HEARING FEBRUARY 15

The Coast Guard will hold a public hearing on Tuesday, February 15, 1972 at 9:30 a.m. in Conference Room 2230, Department of Transportation, Nassif Building, 400 Seventh Street SW., Washington, D.C. Proposed regulations for the prevention of oil pollution will be discussed. The hearing was announced and the proposed regulations were published in the Federal Register of December 24, 1971, Part II. Copies of these proposals may be obtained from the local Coast Guard marine inspection office, or by writing U.S. Coast Guard (CMC/82), 400 Seventh Street SW., Washington, D.C. 20590.

All communications regarding the proposals received before February 22, 1972 will be fully considered by the Coast Guard before action is taken on the proposed regulations.

Interested persons are invited to attend the public hearing and to present oral or written statements on these proposals. ‡

REPORTS ON RELEASE OF CONTENTS FROM PACKAGED HAZARDOUS MATERIALS

On 31 October 1971 the regulations in 46 CFR 146 were amended to require a written report in any instance wherein there occurred an unintentional release of hazardous materials from a package regardless of the amount. The applicable regulation is 46 CFR 146.02-35.

This reporting system was instituted to gather information on the ability of packages to contain hazardous materials. Remedial action could be taken if a situation occurred where numerous reports were received on a given package.

As of 30 November 1971 the Department of Transportation had received a total of only 10 reports from

the marine mode. There is some concern that this is not representative of the true picture of package failures in the marine mode.

Owners, Masters, Agents, or persons in charge of vessels should consult the applicable regulations to insure they are in compliance. ‡

Approved Equipment

Commandant Issues Equipment Approvals; Terminates Others

U.S. Coast Guard approval was granted to certain items of lifesaving, and other miscellaneous equipment and materials. At the same time the Coast Guard terminated certain items of lifesaving, and other miscellaneous equipment and materials.

Those interested in these approvals and terminations should consult the Federal Register of December 2, 1971, for detailed itemization and identification.

WHY STRAIN YOUR BACK?

Safe lifting is something everyone has heard about—you have been told to bend your knees and lift with your legs. Never bend your back or stoop when lifting. In general, muscle strain due to lifting occurs when an object is raised incorrectly, usually because the weak back muscles were used instead of the stronger leg muscles.

The weight of the load or object to be moved should be considered first. Know your limitations and don't try to show off your strength.

Size and shape make some objects awkward to handle. Sometimes a proper hand grip is not possible, visibility may be limited, clearance in carrying past other objects may be close, or other conditions may make handling difficult and may be possible



—National Safety Council

causes of dropping the load accidentally. Under such conditions, the help of a fellow worker is necessary.

When an object is heavy or has to be moved a great distance, be sure that your grip is secure and comfortable to handle.

All lifting injuries are preventable. To lift with the least possibility of injury to the body, proper safe rules for lifting must be followed.

Remember these lifting points:

- Be sure of a good footing.
- Legs bent, back straight.
- Grasp the load firmly.
- Keep load close to you.
- Get help with heavy, awkward loads. ‡

—Lykes Line Safety Bulletin

MERCHANT MARINE SAFETY PUBLICATIONS

The following publications of marine safety rules and regulations may be obtained from the nearest marine inspection office of the U.S. Coast Guard. Because changes to the rules and regulations are made from time to time, these publications, between revisions, must be kept current by the individual consulting the latest applicable Federal Register. (Official changes to all Federal rules and regulations are published in the Federal Register, printed daily except Sunday, Monday, and days following holidays.) The date of each Coast Guard publication in the table below is indicated in parentheses following its title. The dates of the Federal Registers affecting each publication are noted after the date of each edition.

The Federal Register will be furnished by mail to subscribers, free of postage, for \$2.50 per month or \$25 per year, payable in advance. The charge for individual copies is 20 cents for each issue, or 20 cents for each group of pages as actually bound. Remit check or money order, made payable to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Regulations for Dangerous Cargoes, 46 CFR 146 and 147 (Subchapter N), dated January 1, 1971 are now available from the Superintendent of Documents price: \$3.75.

CG No.	TITLE OF PUBLICATION
101	Specimen Examination for Merchant Marine Deck Officers (7-1-63).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (5-1-68). F.R. 6-7-68, 2-12-69, 10-29-69.
115	Marine Engineering Regulations (7-1-70). F.R. 12-30-70.
123	Rules and Regulations for Tank Vessels (5-1-69). F.R. 10-29-69, 2-25-70, 6-17-70, 10-31-70, 12-30-70.
129	Proceedings of the Marine Safety Council (Monthly).
169	Rules of the Road—International—Inland (9-1-65). F.R. 12-8-65, 12-22-65, 2-5-66, 3-15-66, 7-30-66, 8-2-66, 9-7-66, 10-22-66, 5-11-67, 12-23-67, 6-4-68, 10-29-69, 11-29-69, 4-3-71.
172	Rules of the Road—Great Lakes (9-1-66). F.R. 2-18-67, 7-4-69, 8-4-70.
174	A Manual for the Safe Handling of Inflammable and Combustible Liquids (3-2-64).
175	Manual for Lifeboatmen, Able Seamen, and Qualified Members of Engine Department (3-1-65).
176	Load Line Regulations (2-1-71) F.R. 10-1-71.
182	Specimen Examinations for Merchant Marine Engineer Licenses (7-1-63).
184	Rules of the Road—Western Rivers (9-1-66). F.R. 9-7-66, 2-18-67, 5-11-67, 12-23-67, 6-4-68, 11-29-69, 4-3-71.
190	Equipment Lists (8-1-70). F.R. 8-15-70, 9-29-70, 9-24-71, 9-30-71, 10-7-71, 10-14-71, 10-19-71, 10-30-71, 11-3-71, 11-6-71, 11-10-71, 11-23-71, 12-2-71.
191	Rules and Regulations for Licensing and Certifying of Merchant Marine Personnel (5-1-68). F.R. 11-28-68, 4-30-70, 6-17-70, 12-30-70, 6-17-71, 12-8-71.
200	Marine Investigation Regulations and Suspension and Revocation Proceedings (5-1-67). F.R. 3-30-68, 4-30-70, 10-20-70.
220	Specimen Examination Questions for Licenses as Master, Mate, and Pilot of Central Western Rivers Vessels (4-1-57).
227	Laws Governing Marine Inspection (3-1-65).
239	Security of Vessels and Waterfront Facilities (5-1-68). F.R. 10-29-69, 5-15-70, 9-11-70, 1-20-71, 4-1-71, 8-24-71.
249	Marine Safety Council Public Hearing Agenda (Annually).
256	Rules and Regulations for Passenger Vessels (5-1-69). F.R. 10-29-69, 2-25-70, 4-30-70, 6-17-70, 10-31-70, 12-30-70.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (8-1-69). F.R. 10-29-69, 2-25-70, 4-22-70, 4-30-70, 6-17-70, 10-31-70, 12-30-70, 9-30-71.
258	Rules and Regulations for Uninspected Vessels (5-1-70).
259	Electrical Engineering Regulations (6-1-71).
266	Rules and Regulations for Bulk Grain Cargoes (5-1-68). F.R. 12-4-69.
268	Rules and Regulations for Manning of Vessels (10-1-71).
293	Miscellaneous Electrical Equipment List (9-3-68).
320	Rules and Regulations for Artificial Islands and Fixed Structures on the Outer Continental Shelf (11-1-68). F.R. 12-17-68, 10-29-69, 1-20-71, 8-24-71, 10-7-71.
323	Rules and Regulations for Small Passenger Vessels (Under 100 Gross Tons) (7-1-69). F.R. 10-29-69, 2-25-70, 4-30-70, 10-31-70, 12-30-70.
329	Fire Fighting Manual for Tank Vessels (7-1-68).

CHANGES PUBLISHED DURING DECEMBER 1971

The following have been modified by Federal Registers:

CG-190, Federal Register December 2, 1971.

Subchapter N of Title 46 CFR, Federal Register December 7, 1971.

CG-191, Federal Register December 8, 1971.

Pictured below are the results of a sea voyage with improperly stowed ammunition. These photos were taken in the holds of a ship—not the *Badger State*—which survived the improper stowage. Perhaps this is the sort of sight which greeted the crewmembers aboard the *Badger State* day after day. The hazards of improper cargo stowage need not be emphasized further. The message? Be safe; stow it properly!

