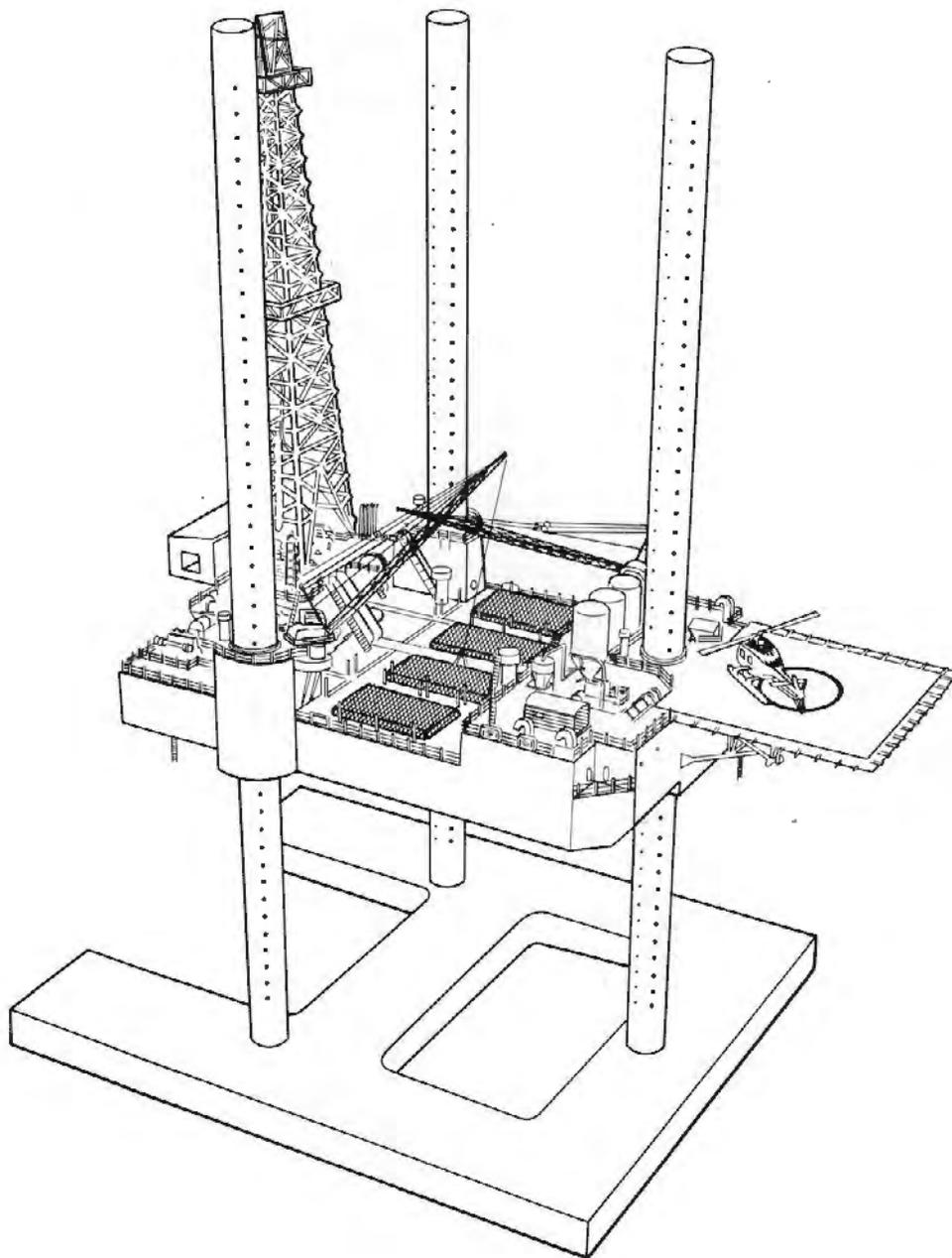


***PROCEEDINGS***  
OF THE MARINE SAFETY COUNCIL

Vol. 35, No. 8

November 1978



# PROCEEDINGS

## OF THE MARINE SAFETY COUNCIL

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### Cover

This month's cover picture is an illustration of the self-elevating mobile drilling unit OCEAN EXPRESS, which capsized and was lost during stormy weather in the Gulf of Mexico over two years ago. Thirteen men died as a result of this incident. The Coast Guard assembled the Marine Board of Investigation, and an official report was prepared. A recap of the casualty begins on page 115.

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# BENZENE: A PROGRESS REPORT

by Lieutenant Commander John E. Lindak and Lieutenant Thomas J. Haas

Cargo and Hazardous Materials Division, Office of Merchant Marine Safety

Our last two articles dealt with the issues surrounding the development of Coast Guard benzene regulations. "New Developments in Benzene Regulations" (August 1977) described the physical properties, acute hazards and chronic hazards associated with benzene and discussed both the Occupational Safety and Health Administration (OSHA) and Coast Guard efforts in regulating personnel exposure to the vapors of this hazardous chemical. "Benzene Regulations - An Update" (February 1978) discussed the status of both OSHA's and the Coast Guard's benzene regulations and provided useful basic information on monitoring and respiratory protection equipment which is commercially available.

This article continues the update on OSHA's and Coast Guard's development of benzene regulations and also describes other projects recently initiated which are corollaries to overall health questions raised during the benzene regulatory effort.

## OSHA: Update

OSHA's permanent benzene standard was published in its final form in the Federal Register on February 10, 1978. The standard was to become effective on March 13, 1978. However, American Petroleum Institute (API), Manufacturing Chemists Association (MCA) and American Iron and Steel Institute (AISI) petitioned and were granted a "temporary" stay by the Fifth Circuit Judge, Lewis R. Morgan, in New Orleans pending a hearing to permanently stay the standard which in turn was dependent upon a complete

judicial review (a hearing on the merits). The hearing to decide whether the standard should be permanently stayed was held on April 18 before a three-judge panel in Atlanta.

API, MCA and AISI, joined by Rubber Manufacturers Association, National Paint and Coatings Association and the DuPont Company, raised the points of excessive costs and infeasibility of compliance in asking for a permanent stay. The excessive costs could not be recouped if upon judicial review in mid-June the standard was found to be invalid. These costs would then have to be passed on to the consumer as useless and unnecessary price increases.

Included in the standard was an amendment providing an exemption from labeling requirements for liquid mixtures containing 0.1 percent or less of benzene by volume. Many industries such as paint and rubber manufacturers, oil companies, etc. stated that the 0.1 percent limit would place an unnecessary burden on them and a reasonable limit would be between one and two percent. The court decision was to "permanently" continue the stay.

On June 22 a complete judicial review of the benzene standard was begun in New Orleans. Due to the problems associated with benzene mixtures, and other points raised by API et al. (inability to meet deadlines, infeasibility of compliance for labeling, medical monitoring, engineering controls, etc.), the judges decided to consider the proposed level of permissible benzene vapor exposure limits separately from the matter of exemption for benzene-containing mixtures. The ultimate result of this decision to divide the

OSHA benzene standard into two separate areas of review was that the full stay of the standard remained in effect.

OSHA's standard for employee exposure to benzene of one part benzene per million parts of air was struck down October 5 by the U.S. Court of Appeals for the Fifth Circuit. The court also set aside the dermal contact prohibition.

The court held that "OSHA is unable to justify a finding that the benefits to be realized from the standard bear a reasonable relationship to its one-half billion dollar price tag." In throwing out the provision prohibiting dermal contact with liquid benzene, the court noted OSHA's reliance on "old and inconclusive evidence that there is a possibility of absorption of benzene through the skin which might cause cancer."

The reduction of permissible exposure limit and the prohibition of dermal contact are the provisions of the benzene standard to which all the standard's other requirements are tied. Noting that it would uphold neither of these provisions, the court stated that the standard as a whole must be set aside.

Two additional federal agencies are attempting to regulate benzene. The Consumer Product Safety Commission (CPSC) has announced (43 FR 98, May 19, 1978) a proposal to ban benzene from all consumer products, except gasoline or laboratory reagents in which benzene is an unintentional additive at a level of 0.1 percent or greater by volume, or in which benzene is an intentional additive at any concentration. The CPSC is evaluating the comments received, but has not decided if or when to publish a final rule.

The Environmental Protection Agency (EPA) is preparing regulations to control the emission of benzene from gasoline-distribution systems and maleic anhydride plants. The Coast Guard is closely monitoring this regulatory effort since barges and tankships carrying gasoline may need alteration to comply with these regulations when they are effective (i.e. vapor recovery, return vapors to shore, closed gauging). In addition, other facilities for ethylbenzene, styrene, nitrobenzene, chlorobenzene, and ethylene may be regulated by EPA to control the fugitive vapor emissions of benzene during manufacturing processes. EPA is basing their efforts on an assessment that benzene is a hazardous air polluting substance and that control of its emission from certain sources would decrease its overall concentration in the ambient atmosphere. Present EPA plans are for publication of an Environmental Impact Statement in 1979 and subsequent rulemaking through 1980.

#### Coast Guard: Update

In our last article (February 1978) we discussed the regulatory approach which the Coast Guard was taking toward the "benzene problem." We stated that:

"A notice of proposed rulemaking for benzene carriage requirements may be released early in 1978. This proposed rule would apply the current OSHA benzene exposure level and call for a 10 ppm, 8-hour time-weighted average. . . .

The rationale was to track with the current, legally effective OSHA standard of 10 parts per million (ppm), monitor the efforts of OSHA in its development of the 1 ppm standard, and evaluate its applicability to the maritime industry. (This notice was cleared through the Marine Safety Council and signed by the Vice Commandant in March 1978. It was held from publication pending the judicial review of the OSHA 1 ppm standard and, finally, after an informal request by OSHA's administrators, withdrawn).

Subsequently, it was decided to modify this regulation, originally prepared at the 10 ppm level, to reflect a 1 ppm level as an exposure standard in order to be consistent with the proposed permanent standard published by OSHA. A policy decision had been made to parallel OSHA's recommendations on exposure limits.

This Coast Guard notice of proposed rulemaking, published in the August 21, 1978 Federal Register, Vol. 43, No. 162, P. 37149, is entitled, "Benzene Carriage Requirements." It proposes to amend Parts 151 and 153 of 46 CFR:

"to provide protection to maritime personnel from hazardous exposure to benzene vapor. The probable danger to tankermen, ships' personnel and towboat personnel necessitates proposing benzene exposure limits (and this action) should protect maritime personnel from the hazards of chronic exposure to benzene."

The notice of proposed rulemaking states:

"(a) No person is exposed to an airborne concentration of benzene in excess of:

- (1) one part per million (1 ppm) as an 8-hour time-weighted average; and
- (2) five (5ppm) as a time-weighted average over any 15-minute period;

(b) No person is exposed to skin or eye contact with liquid benzene;

(c) Personnel don and use respirators meeting 29 CFR 1910.134 if the benzene exposure limits under paragraph (a) . . . are likely to be exceeded; and

(d) The words "CANCER HAZARD IN THIS AREA - PROTECTIVE EQUIPMENT MAY BE REQUIRED - AUTHORIZED PERSONNEL ONLY" are on the warning signs . . . .

The comment period for the Notice continued to October 5, 1978. A final rule is now being prepared, taking into account the comments received and the court's decision to strike down the OSHA standard. This rule will once again track with the current, legally effective OSHA standard. The Coast Guard will continue to monitor OSHA's future actions in response to the court's decision.

The Coast Guard understands that respiratory protection described in this regulation is not the long-term answer in order to alleviate the health hazards posed by benzene related operation on tank vessels. Engineering controls are the most desirable means. These controls were described in the Coast Guard's Advance Notice of Proposed Rulemaking (41 FR 248, December 23, 1976) as:

- "(1) Requiring cargo tank segregation from the sea.
- (2) Changing present gauging requirements from open to closed.
- (3) Requiring B/3 vent heights, or 6 meters (20 feet), whichever is greater for tankships.
- (4) Requiring 3.6 meter (12 foot) vent heights for tank barges.
- (5) Requiring the use of vapor return lines during the transfer of benzene.
- (6) Purging cargo lines with water or an inert gas prior to disconnecting."

The comments and technical feasibility of these "engineering controls" are still being evaluated and rules regarding their use will be prepared. It is impossible to give a completion date for this project; however, active work is continuing.

#### Coast Guard: Other Occupational Health Projects

Due to the widespread interest and awareness generated by the benzene health standard regula-

tory package, other related projects have been initiated since the fall of 1977 which are directed at protecting marine safety personnel and maritime workers. The projects include:

- A. Medical monitoring.
- B. Personnel protection equipment.
- C. Enclosed space entry and upgrading of the marine chemist qualifications.
- D. National Academy of Sciences--Toxic Interactions Panel.
- E. Health Standards Task Group --OSHA/CG.
- F. Chronic Toxic Agents.

Each of these projects will be described briefly below:

1. The marine safety and environmental protection efforts of the Coast Guard are continuously and rapidly broadening to include consideration of many aspects of occupational health. These efforts encompass both Coast Guard personnel performing inspection, enforcement, and response duties and also regulated industry personnel. Until recent years, the chronic toxicity hazard associated with chemicals was barely appreciated. Science today is closely studying the long-range effect of exposure to relatively low concentrations of chemical vapors. Therefore, we can no longer be concerned only with the acute or immediate effect of a chemical or mixture of chemicals on the individual. Today it is known that some chemicals will cause liver, kidney, or lung diseases many years after the initial exposure and that cancer may be the end result of routine exposure to relatively low concentrations of chemical vapors earlier in one's life. The latency periods for these chronic disorders can range from 20-30 years after exposure.

Therefore, a specific health monitoring plan for Coast Guard Marine Safety personnel is being established. Health standards and monitoring procedures for Coast Guard personnel assigned to field marine safety duties are presently being defined. Additionally, health safety training and educa-

tional information packages are being developed.

The Department of Health, Education and Welfare Public Health Service is examining changes it plans to make in the delivery of health care services to American seamen. A small working conference to share ideas and establish a framework for the development of a Seamen's Health Improvement Program (SHIP) met on August 28, 1978. Medical directors and health and welfare program managers from shipping companies, seamen's unions and related organizations, as well as Federal agency representatives (i.e. U.S. Coast Guard) were represented. Program objectives proposed included:

- improvement of the health status of American seamen;
- improvement of the health and medical care, and safety aboard ship;
- an increase of the number of seamen served by the Public Health Service by facilitating access to health care services;
- and documentation of the long-range health problems of the American seamen.

Another meeting will be held in January 1979 after the smaller working groups assigned to these program objectives meet and report back to the larger committee.

2. Coastguardsmen exposed to potentially hazardous environments require specific protective equipment to safeguard their safety and health. Engineering controls (i.e. work space enclosure, ventilation, etc.) should be the primary means of eliminating the hazards. It is hoped that, in time, transportation and handling of products with hazardous properties (i.e. toxic vapors) will be controlled such that special personnel protective equipment is necessary to prevent unacceptable exposure only in emergency situations. In the past, an evaluation of the work conditions and recommendations for protective equipment was rarely considered for certain duties. Work practices followed 25 years ago are not adequate to-

day. With new awareness of the potential and realized chronic toxicity hazards of certain chemicals comes a new responsibility to provide adequate protection for today's marine safety inspector.

Entry into enclosed spaces, transfer monitoring/boarding and hazardous material spill response are functions performed by coastguardsmen in order to insure the safety of vessel/crew/general environment.

Each of these duties has been examined, and the use of certain protective equipment may be necessary (i.e. respirators, protective clothing and monitoring equipment) to ensure personnel safety. The Offices of Merchant Marine Safety and Marine Environment and Systems have developed certain interim guidelines and recommendations to Coast Guard field units and more extensive instructions and recommendations are being initiated regarding the use of personal protective equipment. The Office of Merchant Marine Safety of the Coast Guard is also charged with evaluating and recommending personal protection equipment for merchant vessels. Consistency of equipment recommendations between industry and "in-house" will be maintained since similar work environments are encountered by both Coast Guard and industry personnel.

3. The overall problem of enclosed space entry has been examined and extends far beyond merely specifying the use of equipment. In previous articles over the past 10 years the marine chemist program has been described (October 1978, April 1976 and July 1967 issues of the Proceedings). This program is currently being upgraded and will result in a revised, more stringent National Fire Protection Association (NFPA) standard No. 306, Control of Gas Hazards on Vessels to be Repaired. An update of this program will be described in more detail in an upcoming article.

4. The National Academy of Sciences has undertaken a panel

dealing with "toxic interaction" under the Committee on Maritime Hazardous Materials. This committee has been established through the auspices of the Cargo and Hazardous Materials Division. The Coast Guard marine safety inspector and marine industry seaman are certain classes of individuals who encounter vapors of different chemicals in the performance of their jobs. This panel is evaluating exposures to multiple substances at low concentrations and will decide if this exposure is a chronic hazard to health. It has been documented that certain chemicals interact together and give a greater than additive effective of two or more substances (synergism).

5. A program to resolve potential interagency regulatory conflicts between OSHA and Coast Guard began on January 31, 1978. The reason for this program is to "maximize the level of occupational safety and health protection, and to increase the effectiveness of allocated Federal resources." Task groups were established to deal with investigations, commercial diving, training, vessel safety standards and vessel health standards. The last task group reviews both agencies' maritime regulations to determine what regulations need to be promulgated by each agency to fill existing gaps in each agency's vessel health regulations.

A Memorandum of Agreement (MOA) was drafted by this task group and submitted on May 30, 1978 to OSHA for comment. On September 6 OSHA returned the draft with certain changes which the Coast Guard is presently evaluating. The completed MOA will be published later this year.

The purpose of this MOA is to acquaint the public with the joint efforts of the two agencies to eliminate possible interagency conflicts and duplication of effort. Because both USCG and OSHA have statutory authority relating to various occupational health aspects within the maritime industry, cooperation between the two agencies is essential in the area of health standards development. The two agencies will, at

a later date, then develop a Memorandum of Understanding (MOU) which will address more specifically the procedures for this cooperation. The MOU would, hopefully, be completed one year after the publication of the MOA.

6. Finally, a long-term project has been started which addresses the engineering controls to be used for chronic toxic agents. This project is in its embryonic stages. Initially, the criteria for chronic toxic agents will be defined and then certain tank vessel designs will be developed to reduce the hazards associated with chronic toxicity.

The benzene standard controversy has generated a new awareness in the overlying problem of maritime worker safety when exposed to a wide variety of concentrations and types of chronic toxic agents. Several new occupational health projects have originated as a result of this new awareness and the resultant moral and legal obligation to reduce or eliminate the problem. Progress, although slow, is discernable.

The Coast Guard has prepared an easy-to-read, illustrated guide for the safe handling and carriage of benzene. Copies are available free of charge through:

Commandant (G-MHM/3)  
U.S. Coast Guard  
Washington, DC 20590



#### LORAN-C DISPLAY SYSTEM TESTED

The U.S. Coast Guard began testing a LORAN-C Display System (LDS) on June 19, 1978 at Vessel Traffic Service (VTS) San Francisco to study the feasibility of using LORAN-C as a sensor in the VTS system. The technical objectives of the test are: To look at a LORAN-C surveillance sensor system for VTS; to look at the data communication link required for such a system; and to assess both the positional accuracy of the display system and its suitability for maintaining vessel separation. The LDS is designed to track any vessel that transmits its position, in terms of time differences of two specified LORAN-C pairs, over a VHF-FM communication link. The system is unique in that it stores positional data for playback in either a static or dynamic mode. Other LDS features include measuring range and bearing between two objects, continuous zoom in/out of a stored, digitized map display and the capability to make hard copy of anything shown on the display. The initial test was carried out at the Research and Development Sensor Tracking Test System located at VTS San Francisco. The design, implementation, and test of the system is a combined effort of the Coast Guard and the Transportation System Center. Analysis of the test is still in progress.

The above note, taken from the Commandant's Bulletin, Issue 42-78, 16 October 78, is not intended as a comprehensive U.S. Coast Guard Policy statement, and is non-record material.

# "ABANDON RIG!"

## the loss of the Ocean Express

The OCEAN EXPRESS, a self-elevating mobile drilling unit constructed of welded steel, was owned by Odeco Drilling, Inc. of New Orleans, Louisiana. The platform hull measured 166 feet in length, 109 feet wide and 16 feet deep, and consisted of two separate levels. The upper level of the platform contained a 147-foot-high derrick and an 83- by 83-foot helicopter pad. The lower level contained the machinery spaces, mud room, storage rooms, and living quarters. There was a total of 24 watertight doors within the lower level separating the 20 compartments.

The bottom mat on the OCEAN EXPRESS was equipped with a 2-foot scour skirt designed to rest on the marine bottom. The mat was composed of 14 tanks, 6 of which were permanently flooded, 6 permanently buoyant, and 2 were keel-cooling tanks. The bottom mat was connected to a barge-like platform

by three cylindrical legs, 12 feet in diameter and 312 feet in height. These legs were permanently attached to the mat. The distance between the mat and the barge was controlled by raising or lowering the legs by means of a jacking mechanism, located at each of the three podhouses through which the legs extend. The legs were constructed of 1 and 1/4- to 3-inch-thick structural steel. One leg was located at the bow, one the centerline of the barge, and one at the port and starboard stern corners.

### Preparation to Move

On Monday, April 11, 1976 at 0900 the barge mover made preparations to move the OCEAN EXPRESS. His responsibilities included obtaining and directing the operations of towing vessels necessary for the move, insuring that the rig was secure for sea,

On April 15, 1976, the self-elevating mobile drilling unit OCEAN EXPRESS capsized and sank while it was being towed by three tugs from one drilling site to another in the Gulf of Mexico. The crew, except for the barge mover, abandoned the rig in two survival capsules. The barge mover was evacuated by a Coast Guard helicopter just seconds before the OCEAN EXPRESS capsized. All of the crew members in one of the capsules safely transferred to an attending vessel. The other capsule capsized in the vicinity of one of the tugs due to wave action and shifting weight. Seven men escaped from the overturned capsule and safely boarded the tugs; thirteen other persons were trapped inside and drowned.

obtaining weather forecasts to insure that weather conditions were favorable for the move and making certain calculations as to the amounts and locations of various equipment and supplies aboard the vessel so that prescribed conditions of draft, trim and stability were maintained.

By 0700 on April 14, the barge mover had completed the preparations and the OCEAN EXPRESS began jacking down. The location of the rig at this time was in Block 803, Mustang Island area, off the Texas coast. The water depth at this location was 124 feet. The OCEAN EXPRESS was to be relocated to Block A-57, which was about 33 miles east-northeast (062°T) of Block 803.

On April 13, three tugs which had been ordered by the barge mover to assist the move arrived. The tugs were made up with the GULF EXPLORER on the starboard bow, the GULF VIKING on the port

bow, and the GULF KNIGHT on the starboard stern. The GULF EXPLORER was designated the "lead tug," which meant that it would set the course and speed for all tugs during the move. The towing configuration was based on the experience of the barge mover. It was his opinion that one 3,600 horsepower (HP) tug could keep the rig headed into the seas.

On the morning of April 14 the seas were 4 to 6 feet and the winds about 10 knots, both out of the southeast. The National Weather Service was forecasting similar conditions in that area of the Gulf of Mexico for the next 24 hours.

The barge platform was in the water at 0830 as a result of the jacking down operation. The mat, however, was still on the bottom and it took approximately 1 1/2 hours to break loose the mat suction. After the suction was broken, the trim and stability were checked and evaluated as satisfactory by the barge mover before the mat was raised to a depth of 80 feet. The platform draft and freeboard were calculated by the barge mover as being 8 feet 9 inches and 7 feet 3 inches, respectively.

#### OCEAN EXPRESS in Transit

The OCEAN EXPRESS departed Block 803 at 1100 on April 14. The course of the OCEAN EXPRESS was 062° true and the estimated speed over the ground was about 3.0 knots for the 33-mile voyage. The tug GULF KNIGHT was relocated to the port bow alongside the GULF VIKING, while the other two tugs remained as previously described. At this time the seas were generally from the northeast at 5 to 7 feet. The winds were from the same direction, estimated at about 15 knots with some higher gusts. There was little change in this weather from the old location until arriving at Block A-57.

When the rig was approximately one mile from the new location, the barge mover commenced jacking down the mat from the 80-foot draft. The tugs were repositioned with the GULF KNIGHT on the port stern and the GULF EXPLORER on the starboard stern. The GULF VIKING remained secured to the port bow.

Its tow lines were shortened to facilitate managing the rig. On this configuration, the rig was swung around toward the location, keyway first, with the bow headed into the seas. At approximately 0100 April 15, it was noted that the winds were increasing and the seas had exceeded the recommended height for jacking operations. The barge mover then closed the jacking operation at 148 feet of draft and ordered the single tug on the bow, GULF VIKING, to pull into the seas to hold the rig on location. Neither of the other tugs was repositioned at that time.

#### Events on Location

There was a gradual increase in wind and seas throughout the rest of the night. At 0600 the seas were estimated at 8 to 10 feet in height, although some rig personnel believed the seas were actually closer to 10 to 12 feet in height. While the morning area forecast indicated southeasterly winds 15 to 25 knots and 5- to 8-foot seas, the OCEAN EXPRESS was experiencing elements that exceeded those conditions. As the morning progressed, the on-scene weather continued to worsen and the OCEAN EXPRESS was receiving National Weather Service forecasts which did not match the projected predictions. At 0900, the drilling foreman contacted his employer, Marathon Oil Company, located in Rockport, Texas, who advised him that Universal, a private weather service, had forecasted southeasterly winds from 40 to 45 miles per hour, with 12- to 15-foot waves for the area around the OCEAN EXPRESS. The drilling foreman indicated that he passed the forecast to the barge mover; however, the barge mover and toolpusher denied knowledge of this information.

At approximately 1000 hours, as the winds and seas continued to mount, the barge mover ordered the two tugs at the stern of the rig to swing around toward the bow to help hold the rig on location. All three towlines were lengthened at this time.

Heavy spray and an occasional sea crossed the barge deck as the rig rocked in the seaway during

the forenoon. During the early afternoon, the sea and swells continued to build with heavy spray and water routinely passing over the main deck. The crew had to resecure some drill collars and tighten chains located on the port side of the rig. Some water had been entering the vent system to the quarters during the entire day and the crew was constantly mopping up water in the living quarters. By mid-afternoon water had accumulated in the vent system and was leaking from the overhead, through the eight fixture openings.

At about 1510 on April 15, the GULF KNIGHT experienced a material failure that rendered one engine inoperative. This failure later was found to be the result of a bolt from a cracked housing of the clutch gears falling into the gears. Repairs could not be made, so the tug's home office in Harvey, Louisiana was advised and arrangements were made for a relief tug to arrive on scene at 0700 on April 16. The barge mover asked the tug operator of the GULF KNIGHT if he wanted to take their towline off and return to shore. The operator responded that he would remain until the relief boat came and do the best he could with one engine. However, after a time, the GULF KNIGHT could not hold its heading into the heavy seas and dropped back into a trailing position.

At about 1930 on April 15 the towing line on the GULF VIKING broke. The GULF VIKING had been made up to the port bow of the OCEAN EXPRESS and had been holding the 20- to 25-foot seas and 50- to 55-knot winds at that time. When the towline parted, personnel aboard the OCEAN EXPRESS were dispatched to the port bow triangular deck to retrieve the parted towline and stand by to receive another line. This attempt was not successful due to heavy boarding seas. Another attempt to retrieve the towline was made from the heliport area without success.

The OCEAN EXPRESS was equipped with one 10,000-pound anchor and about 1,000 feet of 2 1/8-inch cable on a winch. Sometime after the GULF VIKING towline broke, the barge mover asked the toolpusher

to drop the anchor. The toolpusher thought the anchor would fall on the mat. Two men were sent to check on the anchor but no reports were received by the barge mover or toolpusher concerning this. No further attempt was made to drop the anchor.

At 1930, shortly after the GULF VIKING towline parted, some of the pipe in the racks on deck shifted. When the number one driller learned of this situation he immediately sounded the general alarm, indicating abandon rig, without consulting anyone. The number one driller stated he sounded the alarm to get everyone up and about and to attract their attention. The toolpusher indicated that when he heard the alarm, he was just preparing to sound it. The barge mover questioned the sounding of the alarm, feeling that the OCEAN EXPRESS was not in danger of sinking. There were attempts made to tighten the securing devices holding the shifted pipe, but this was abandoned as being too dangerous. At this time most personnel aboard the OCEAN EXPRESS were standing on the weather deck with lifejackets on waiting for further orders.

At 2000 the drill foreman contacted his shoreside supervisor and requested Coast Guard assistance. The Coast Guard Air Station at Corpus Christi, Texas received a report at 2010 from a Marathon Oil representative that an oil rig was sinking. By 2018 the first Coast Guard helicopter was underway to the scene. The barge mover was not aware that the Coast Guard had been called. When communications were established between the OCEAN EXPRESS and the Coast Guard aircraft at 2035, the barge mover reported that the rig was not sinking but that some pipe shifted when they took a large wave, and that the tugs were holding the rig into the seas. He did indicate he wanted the helicopter to take most of the personnel off the OCEAN EXPRESS.

At 2115 on April 15, the derrick on the OCEAN EXPRESS shifted to the starboard and the rig immediately took an increased starboard list. The toolpusher overheard the Marathon Oil representative say: "Well, let's all get in the capsules." The toolpusher, without consulting the barge mover, then gave the order to the crew to abandon the OCEAN

EXPRESS. Everyone on board, except the barge mover, entered the two capsules on the starboard side. The toolpusher made an attempt to talk the barge mover into leaving in one of the capsules but the barge mover declined, indicating that he thought he could save the rig. However, about 15 minutes later the barge mover was rescued from the OCEAN EXPRESS by a Coast Guard helicopter just seconds before the rig capsized and sank.

Shortly before he left the rig, the barge mover had ordered the GULF KNIGHT and GULF EXPLORER to let go their towlines. Both captains put this time at 2130 and both described the rig as capsizing to starboard while sinking by the starboard quarter. The OCEAN EXPRESS turned her port side broadside into the seas just before capsizing, with the port leg the last part of the rig visible before sinking out of sight at about 2135. The depth of water was estimated to be about 155 feet. At 2130 the GULF KNIGHT took a LORAN fix which showed the position of the OCEAN EXPRESS at 27 degrees 52'N; 96 degrees 16.5' W in Block A-9.

Survival Capsule #2, inverted.



#### Rescue

At about 2130 the H-52 helicopter CG-1444 arrived on scene. The pilot described the rig at that time as generally headed into the wind and seas. The seas were breaking over the port bow and the rig listing by the starboard quarter at 20 to 25 degrees. The pilot could see two survival capsules in the water along the starboard, lee side of the rig. The barge mover requested to be taken off and he proceeded to the forward port corner of the helipad. The pilot found it difficult to maintain a hover with the aircraft and also noticed that the rig was now listing 25 or 30 degrees to the starboard quarter. On the second approach to pick up the barge mover, which was also unsuccessful, the pilot noticed an even greater list, estimated at 45 degrees, with spray actually coming into the helicopter. On the third approach the barge mover was able to climb into the lowered personnel basket. At this time the

pilot first thought the helicopter was rapidly losing altitude, but later realized the rig was capsizing and the helipad was coming up toward him. Seconds after the barge mover was rescued, the rig capsized.

Capsule #1 was the forward-most capsule on the starboard bow. It was suspended from a framework with a power winch for raising and lowering it outboard of the hull of the OCEAN EXPRESS. At 2115, when the decision was made to abandon the rig, 14 men entered capsule #1. All men were wearing lifejackets. The capsule was lowered without incident and the engine started without difficulty. The lights of a vessel standing off in the distance were seen and the capsule was steered in that direction. Upon approaching, capsule #1 and survey vessel NICOLE MARTIN came together heavily. The NICOLE MARTIN then made preparations to transfer personnel from the capsule. There was no panic or confusion by the capsule personnel before or during the transfer. All agreed to abandon the capsule, and all agreed that the capsule handled and rode well for the conditions. There were no equipment failures within the capsule, other than what was thought to be an overheated engine.

The NICOLE MARTIN attempted to recover the capsule that night, but it slipped its lines and accumulated water through open doors. It was later recovered at rest the following day in an inverted position.

Capsule #2 was located in the port bow of the OCEAN EXPRESS just aft of the helipad deck. The barge mover states that capsule #2 was struck by a large wave and lost from the rig at approximately 2015. This capsule was recovered after it washed up on a Texas beach approximately five days after the casualty.

Capsule #3 was lowered from the OCEAN EXPRESS with 20 men on board. The capsule experienced problems with the releasing gear while in the water. One of the men opened the top hatch and unsuccessfully attempted to release the capsule by manipulating the releasing gear from the outside handle.

Apparently, there was approximately three turns of cable with an eye in it around the hook and releasing mechanism. Attempts were made to uncoil the cable from the hook. Failing this, one of the men used a hatchet from the capsule equipment supply and beat on the releasing mechanism and the hook and finally attempted to chop the lowering cable. At this time additional slack appeared in the cable, permitting it to be detached from the releasing mechanism. The motor was then started without difficulty and the capsule moved away from the rig.

The capsule continued away from the rig for 15 to 20 minutes with its stern to the seas. During the transit the engine appeared to overheat, producing exhaust and diesel fumes which caused headaches and seasickness among several of the crewmembers. At approximately 400 yards from the rig several men saw the lights of the GULF VIKING and warned the capsule operator of the impending collision. The capsule operator applied right rudder and the GULF VIKING followed. The GULF VIKING had been at the port bow area of the heavily listing drill rig. The tug took approximately six minutes to reach the capsule after leaving the port bow area of the rig. The tug operator circled the capsule, put the stern of the tug to the seas, and placed the engines in neutral with the capsule on the port side. An attempt was made to pass a line from the capsule to the tug but it fell short in the water. At this time a large wave came from the stern of the capsule and slammed it into the side of the tug. The capsule was about 15 feet from the tug prior to the collision. More than half of the men in the capsule had their seat belts off at this time and were thrown about violently.

After a short period of time, tow lines were attached to the capsule leading from the tug. The lines allowed the capsule to move a maximum of five feet off the tug. A discussion ensued between the tug and capsule crewmembers concerning the need for the tug to tow the capsule into shallow and calm water. There is some controversy as to whether the tug

crewmembers understood the intent of the capsule crew. At the same time, capsule personnel threw off the line attached to the release hook at the top of the capsule. When this 1 1/4-inch line was thrown off, the capsule, with the sea painter still attached to the releasing hook, immediately drifted aft of the tug. The tug operator shifted his maneuvering controls on the stern and attempted to maneuver the tug closer to the drifting capsule by reversing the engines. There was a heavy strain on the line and it was jerking as it played out from the bitt on the rig. The operator of the capsule, meanwhile, was backing the capsule with the engine to get away from the tug. One member of the capsule crew was still partially outside of the capsule hatch. A tipping motion started and one of the capsule crewmembers saw the slack in the line between the two vessels being taken up. He then felt a jerk and the capsule flipped in the direction of the tug while at the crest of a breaking wave.

As the capsule tilted on edge, the men who were not strapped in fell to the bow side of the capsule and on top of the men who were seated by the doors. When the capsule flipped, it started taking on water through the doors. One of the men yelled: "hold the doors tighter!" In a short time the capsule filled half full. The men were urged to remain calm and to remove their boots to facilitate swimming. All of the men still had on their life jackets. Some crewmembers began to express fear, which led to praying and crying. Someone wanted to open the doors, others disagreed. An air pocket formed in the top of the inverted capsule. It was very hot and the odor of diesel oil was prevalent. The water seemed to stop once reaching the half-full point. The men did not immediately attempt to evacuate the capsule, since they expected it to be righted by the tug very shortly.

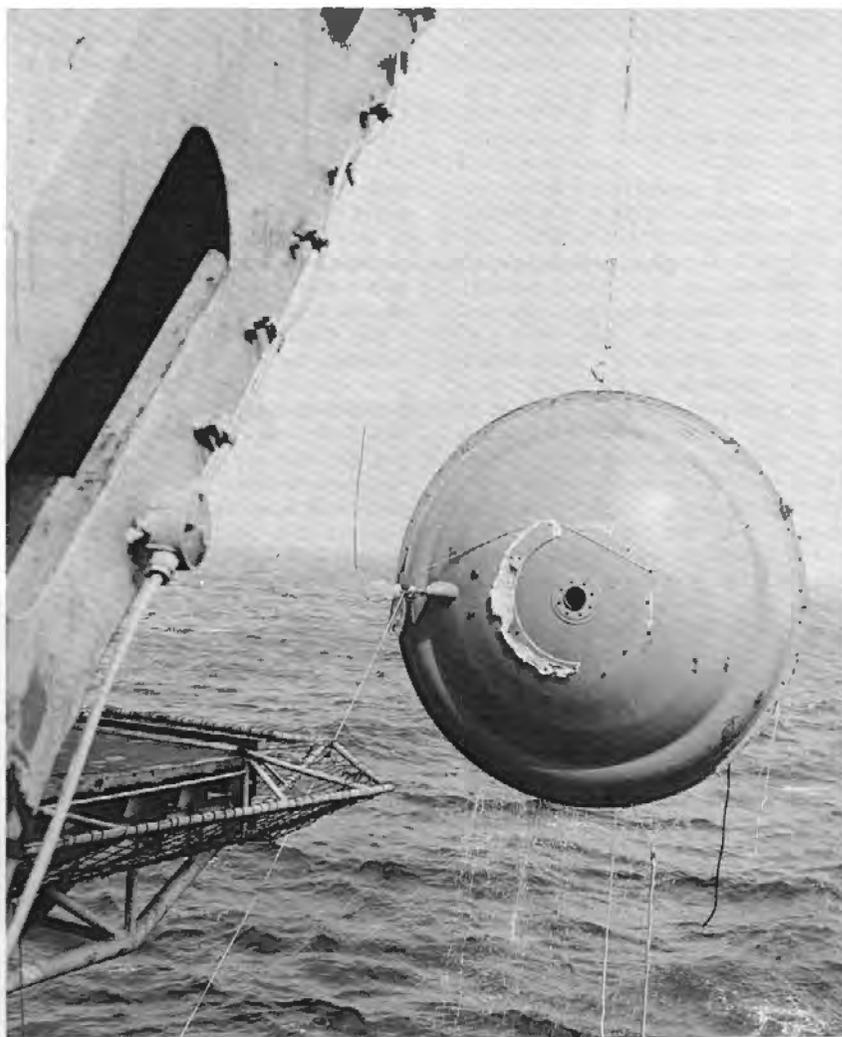
The operator of the GULF VIKING maneuvered his vessel astern and came alongside the capsized capsule. The capsule was approximately 10 feet from the tug when the line was retrieved by a tug crewmember who made it fast to

the stern bit and attempted to right the capsule. Three other men joined in this effort. They pulled on the line by hand and the 1/2-inch nylon line parted close to where it was still tied off to the releasing hook. The line was pulled back aboard, a lasso was made and placed around the capsule skirt. The line broke again at the point where the bow-line was tied to make the loop for the lasso.

The efforts to right the capsule seemingly caused the water level to rise in the capsule. The men began to panic. The capsule doors were held shut by two men. The jerking motion of the capsule caused disorientation of the capsule personnel. One hard jerk caused the men in the capsule to fall on top of the two men holding the door shut. One of the men holding the door shut, along with another man, was forced out of the capsule door. These men swam to the surface and were rescued by the crew of the GULF VIKING. It was estimated that they had spent 20 to 25 minutes in the inverted capsule. Meanwhile, an attempt was made to put a line around the capsule skirt, which resulted in the skirt being pulled off. The crew again tried to right the capsule by tying a line to the propeller area of the capsule, but it was cut by the propeller blades.

After these two men escaped from the capsule, the tug operator got on the radio and asked the other vessels to assist with the men in the water. In response, the GULF KNIGHT arrived and picked up two more survivors. Three other men escaped the capsule. One escaped by diving down and out through a hatch with his life jacket on. Another man dove out of an opening while wearing a life jacket. The last man found the top hatch of the inverted capsule with his feet while in the dark. Air was getting short and it was very hot in the air pocket. He told the others to leave. One man said "no" and so he went out feet first through the hatch to the surface.

A total of seven men managed to escape the capsized capsule. Thirteen men drowned. The capsule was recovered the following day by the USS LEXINGTON, assisted by the M. L. LEVY and the GULF KNIGHT.



Capsule #3 is retrieved by the USS LEXINGTON

When retrieved, it was intact and all 13 bodies were still inside.

#### Marine Board of Investigation

The U.S. Coast Guard Marine Board of Investigation met to determine the cause of the casualty, thereby hoping to prevent recurrence. The Board concluded "that the primary cause of the capsizing of the OCEAN EXPRESS was the loss of directional control resulting from the loss of the GULF KNIGHT's engine and the breaking of the GULF VIKING's towline at a time when the weather conditions were worsening." It was decided that the capsizing of capsule #3 was attributable to

wave action and shift of weights when persons not using seat belts fell to the low side. Lack of knowledge, training and discipline reduced the likelihood of an orderly evacuation of capsule #3. The Board stated that the lack of a self-righting feature in the inverted position contributed to the loss of life; however, the Whittaker Survival Capsules remain an effective means of escape and survival for use on offshore drilling units and platforms. Also, the Board concluded that there is an apparent need for increasing the scope of weather services for marine users, and an apparent lack of weather observation stations in the Gulf of Mexico.

Resulting Board recommendations included expediting proposed regulations which would bring vessels as the OCEAN EXPRESS under the Inspection Laws of the United States, and that these regulations contain a list of items required to be in the operating booklet for self-elevating units. The Board recommended that leadership responsibilities should eventually be vested in the toolpusher, through a long-range program involving industry training and government licensing. This would put the barge mover in an advisory role, similar to the pilot/master concept. Also, it was suggested that the licensing exemption for tow boats operating in the offshore oil and mineral industry be deleted (46 USC 405b(3)). The Board recommended that the National Weather Service and U.S. Coast Guard consider jointly ways to better disseminate weather information to marine industry users, assess the need for improvements to the overall system and consider the merit of establishing a formalized network of "Marine Service Stations" similar to the Flight Service Station System currently available to the aviation community.

#### Commandant's Action

The Commandant concurs with the Board on the primary cause of the capsizing of the OCEAN EXPRESS. The need for formal training and licensing of persons in charge of moving mobile drilling units is recognized. Also, the need for better crew training in the operation of survival capsules is evident.

The Coast Guard published a Notice of Proposed Rulemaking (NPRM) for the inspection and certification of offshore drilling units, including self-elevating units, on May 2, 1977. It is anticipated that the final regulations will be published by the end of 1978. This same NPRM proposed requirements for a Coast Guard approved operating manual and lists some of the information required to be contained in it. In addition, it contains proposed requirements that drilling units be outfitted with a line-throwing device and emergency flares.

In response to further Board recommendations, the Coast Guard has contracted the services of an independent research firm to conduct a survey of industrial/maritime mobile drill unit personnel training and qualification requirements. This research will assist in developing regulations to assure that commercial vessel personnel have the skill and knowledge necessary for safe operation of these units.

The Coast Guard is examining the statute relative to the exemption of offshore oil and mineral industry tugs. Also, the National Weather Service has been contacted for consideration of Board recommendations concerning improved dissemination of weather reports for marine industry use.

One of the reasons the Coast Guard conducts casualty investigations is to determine if modifications to approved equipment are necessary in order to prevent recurrence of casualties. Therefore, regulations currently applicable to survival craft, including covered craft, are being looked into for possible change.

Other Board recommendations pertaining to training mobile drill unit crewmembers have been concurred in with the Commandant. Persons interested in reviewing the entire official report may order the document from the National Technical Information Service, Springfield, Virginia 22151. Request U.S. Coast Guard Marine Board of Investigation Report No. USCG 16732/61865, OCEAN EXPRESS (Drilling Unit).



# *"What the hell is going on in Yorktown?"*

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"What the hell is going on in Yorktown?" Commander Sam Cavallaro, chief of the Coast Guard's new Marine Safety School, has been addressing that question a lot lately. After only one year of operation, the new school has surpassed even the highest expectations of everyone involved. In that short time it has achieved international recognition as an idea whose time has come.

A visit with the Commander and his staff revealed that the Marine Safety School (MSS) was not an overnight inspiration, but a natural result of a reorganization which has affected the Coast Guard as a whole. The school, as it is, was formally established in October 1977. It is housed on the first floor of a new training building, Hamilton Hall, at the Coast Guard Reserve Training Center in Yorktown, Virginia. Two existing schools were combined to form the MSS--the Merchant Marine Safety School and the Marine Environment and Systems School. The latter was itself a composite of two earlier courses, Port Safety Law Enforcement and Marine and Environmental Protection.

Once upon a time ports, vessels and waterways were looked upon as separate entities. These three fields developed independently, each gaining importance in the public eye as various marine incidents occurred which highlighted the roles they played in world commerce and safety. The Coast Guard became involved as necessary to protect national interests and security. During the First World War, U.S. provision of wartime supplies to the Allied Forces aroused the threat of sabotage to our ports. Therefore, in 1917 the Coast Guard was temporarily assigned the responsibility for port safety and security. This became a permanent assignment in the 1950's when the world political climate, under the influence of the cold war, required that ports and waterways be protected

through continuous surveillance. Commercial vessel safety began to attract public attention before the advent of World War II. The responsibility for merchant marine safety was transferred from the Department of Commerce to the Coast Guard in 1942. By 1946 the Coast Guard was well into marine inspection, and was training its officers to inspect commercial vessels. Concern over marine environmental protection began in the late sixties when the Torrey Canyon incident, the first large supertanker accident, focused world-wide attention on the hazards of oil spills. Today, pollution response is a growing international concern, monitored in U.S. waters via the Coast Guard.

Eventually it became evident that, in reality, the safety of ports, vessels, and the marine environment is interconnected and should be considered jointly. New legislation reflected this realization; existing statutes were combined and amended to suit changing ideas and interests. As laws were affecting the jurisdiction of these areas, the Coast Guard began reorganizing by combining certain functions to parallel new legislative developments and to insure proper, efficient enforcement of changing laws. Two major laws promoting this reorganization trend were the Ports and Waterways Safety Act of 1972 and the Federal Water Pollution Control Act.

To accommodate these conceptual changes, the Coast Guard began combining its responsibilities for ports, vessels and waterways. The duties of Captains of the Port and Marine Inspection Offices were brought together in Marine Safety Offices (MSO's). The schools at Yorktown underwent a corresponding modification in order to train marine safety officers and petty officers. On July 1, 1976 the schools began the necessary transformation by combining the Port Safety Law Enforcement

School and the Marine Environmental Protection School into the Marine Environment and Systems School. One year and three months later this school was merged with the Merchant Marine Safety School, producing a series of courses for the new Marine Safety School (MSS).

The MSS has a singular goal: to train marine safety officers and petty officers for the Coast Guard's commercial vessel safety, marine environmental protection and port safety and security programs. All courses offered by the school are related in subject, although the level and method of approach differ to suit student needs. Two basic entry-level training courses are offered, known by staff and students as MSBIC and MESPOC. MSBIC, Marine Safety Basic Indoctrination Course, is a 12-week program for junior officers entering the marine safety field. Most students attend MSBIC after three to six months of familiarization at a post where they are involved in commercial vessel safety, port safety and security, or marine environmental protection. Completion of the MSBIC is not an end to training but a beginning--the majority of students will return to their respective posts in a "training billet," where they will gain experience and further knowledge from more experienced personnel. The administration of the school is aware that classroom study can only be a foundation, an introduction which must be augmented and complemented by that most respected teacher, practical experience.

Students of the MSBIC have varied backgrounds: they come from military academies, state and private marine academies, officer candidate schools, the merchant marine service, etcetera. Occasionally foreign officers apply for training, especially those from developing nations. The students are a serious and dedicated group; they realize that, in most cases, the information they receive is new and that they will be the "experts." Study is intense as information is compacted into as short a time as possible, usually requiring evening assignments after a day of hard work in class. The various subjects offered cover areas such as: federal regulations and their enforcement; ship inspection; vessel construction; life-saving; fire-fighting; licensing and certification of marine personnel; procedures used in conducting marine casualty investigations; procedures for suspension and revocation of licenses and documents; properties and testing of hazardous cargoes--and much, much more.

MESPOC, Marine Environment and Systems Petty Officer Course, is a technical 5-week program which includes both classroom study and "hands-on" training. The course utilizes nearby Wormly Creek for a pollution response drill where students practice firefighting, deployment of boom and skimmers, small boat operation, tracing spill sources, monitoring techniques, and recordkeeping used to justify funding. These petty officer graduates will perform port safetyman, pollution investigator and assistant marine inspector tasks when they return to their respective units.

Student response to both courses has been very favorable, in spite of the strenuous study re-

quirements. For the most part, the classes are reported to be interesting and challenging. Likewise, staff instructors represent a wide range of experience. They are carefully selected for personal qualifications and varied geographical background. There are trained instructors with experience on the East Coast, West Coast, Great Lakes, and major rivers; they include experts in vessel construction, engineering, pollution response, regulations, and more. Guest speakers are invited wherever the input of industries' expertise is appropriate and needed--in ship construction, transportation, marine terminal operations, environmental protection, and other commercial areas.

Aside from these two primary courses, the school now offers 15 other specialized entry-level, mid-level, and advanced courses. Some of these require previous training through MSBIC or MESPOC. They include classes in port safety and security; marine environmental protection; legal functions; pollution response and investigation; executive level seminars for managers of marine safety programs; hearing officer training in the laws, procedures, and case histories of marine incidents and penalty processes; field oil fingerprinting (a functional laboratory technician course); and advanced hazardous materials training (including the CHRIS presentation).

The new Marine Safety School appears to be a long-sought answer to comprehensive training in all aspects of marine safety. The school is equipped with the latest audio-visual and multimedia training equipment. Most importantly, however, it has a well-informed, dedicated staff and enthusiastic, interested students. In striving to accomplish its goal to train efficient marine safety officers and petty officers, the new school is offering a breadth of marine safety training unprecedented in the maritime communities of the world.

Hamilton Hall, home of the Coast Guard's new Marine Safety School in Yorktown, Virginia.



## MERCHANT MARINE SAFETY PUBLICATIONS

The following publications may be obtained from the nearest marine safety office or marine inspection office of U.S. Coast Guard. Because changes to the rules and regulations are made from time to time, these publications can be kept current between revisions only by referring to the Federal Register. (Official changes to all federal regulations are published in the Federal Register, printed daily except Saturday, Sunday, and holidays.) Following the title of each publication in the table below are the date of the most recent edition and the dates of the Federal Registers affecting each.

The Federal Register may be obtained by subscription (\$5 per month or \$50 per year) or by individual copy (75 cents each) from SupDocs, U.S. Government Printing Office, Washington D.C. 20402.

CG No.	TITLE OF PUBLICATION
101-1	Specimen Examinations for Merchant Marine Deck Officers (2d and 3d Mate) (4-1-77).
101-2	Specimen Examinations for Merchant Marine Deck Officers (Master and Chief Mate) (4-1-76).
108	Rules and Regulations for Military Explosives and Hazardous Munitions (4-1-72). F.R. 7-21-72, 12-1-72, 6-18-75.
115	Marine Engineering Regulations (8-1-77). F.R. 9-26-77.
123	Rules and Regulations for Tank Vessels (8-1-77); Ch-1, 4-28-78). F.R. 8-17-77, 9-12-77, 10-25-77, 12-19-77.
169	Navigation Rules - International - Inland (5-1-77). F.R. 7-11-77, 7-14-77, 9-26-77, 10-12-77, 11-3-77, 12-6-77, 12-15-77, 3-16-78.
*172	Rules of the Road - Great Lakes (7-1-72). F.R. 10-6-72, 11-4-72, 1-16-73, 1-29-73, 5-8-73, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 1-13-77, 11-3-77, 12-6-77.
174	A Manual for the Safe Handling of Flammable and Combustible Liquids and Other Hazardous Products (9-1-76).
176	Load Line Regulations (2-1-71). F.R. 10-1-71, 5-10-73, 7-10-74, 10-14-75, 12-8-75, 1-8-76.
182-1	Specimen Examinations for Merchant Marine Engineer Licenses (2d and 3d Assistant) (2-1-78).
182-2	" " " " " " " " (First Assistant) (3-1-78).
182-3	" " " " " " " " (Chief Engineer) (3-1-78).
184	Rules of the Road - Western Rivers (8-1-72). F.R. 9-12-72, 12-28-72, 3-8-74, 3-29-74, 6-3-74, 11-27-74, 4-16-75, 4-28-75, 10-22-75, 2-5-76, 3-1-76, 6-10-76, 7-11-77, 12-6-77, 12-15-77.
*190	Equipment Lists (5-1-75). F.R. 5-7-75, 6-2-75, 6-25-75, 7-22-75, 7-24-75, 8-1-75, 8-20-75, 9-23-75, 10-8-75, 11-21-75, 12-11-75, 12-15-75, 2-5-76, 2-23-76, 3-18-76, 4-5-76, 5-6-76, 6-10-76, 6-21-76, 6-24-76, 9-2-76, 9-13-76, 9-16-76, 10-12-76, 11-1-76, 11-4-76, 11-11-76, 12-2-76, 12-23-77, 4-4-77, 4-11-77, 4-21-77, 5-19-77, 5-26-77, 6-9-77.
191	Rules and Regulations for Licensing and Certification of Merchant Marine Personnel (11-1-76). F.R. 3-3-77, 8-8-77.
227	Laws Governing Marine Inspection (7-1-75).
239	Security of Vessels and Waterfront Facilities (5-1-74). F.R. 5-15-74, 5-24-74, 8-15-74, 9-5-74, 9-9-74, 12-3-74, 1-6-75, 1-29-75, 4-22-75, 7-2-75, 7-7-75, 7-24-75, 10-1-75, 10-8-75, 6-3-76, 9-27-76, 2-3-77, 3-31-77, 7-14-77, 7-28-77, 9-22-77, 9-26-77, 12-19-77, 1-6-78, 1-16-78, 3-2-78.
257	Rules and Regulations for Cargo and Miscellaneous Vessels (9-1-77). F.R. 9-26-77, 9-29-77, 12-19-77.
258	Rules and Regulations for Uninspected Vessels (4-1-77); Ch-1, 3-17-78). F.R. 9-26-77.
259	Electrical Engineering Regulations (7-1-77). F.R. 9-26-77.
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293	Miscellaneous Electrical Equipment List (7-2-73).
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329	Fire Fighting Manual for Tank Vessels (1-1-74).
439	Bridge-to-Bridge Radiotelephone Communications (12-1-72). F.R. 12-28-72, 3-8-74, 5-5-75, 7-11-77.
467	Specimen Examinations for Uninspected Towing Vessel Operators (10-1-74).
497	Rules and Regulations for Recreational Boating (7-1-77). F.R. 7-14-77, 8-18-77, 3-9-78, 4-27-78, 8-17-78.

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