I/A# M-39

National Transportation Safety Board

Washington, D.C. 20594

Safety Recommendation

Date: August 24, 1987

In reply refer to: M-87-28 through - 37

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Commandant
U.S. Coast Guard
Washington, D.C. 20593

About 1030 on October 28, 1986, explosions and fires occurred in the engineroom and starboard fuel oil tanks of the 811-foot-long U.S. tankship OMI YUKON which was en route from Hawaii to South Korea for scheduled vessel repairs and biennial inspection by the U.S. Coast Guard. At the time of the explosions, the tankship was located in the Pacific Ocean about 1,000 miles west of Honolulu, Hawaii, and was not carrying any cargo. There were 24 crewmembers, 2 U.S. welders, and 11 Japanese workers employed in cleaning the cargo tanks aboard the vessel. Four persons were killed; the other 33 persons safely abandoned the vessel and were later rescued by a Japanese fishing vessel. The estimated damage to the OMI YUKON was $40 million. The vessel was towed to Japan and sold for scrap. 1/

The fuel oil sampling and testing procedures as practiced by OMI Corporation (OMI), Hawaiian Independent Refinery, Inc. (HIRI), Caleb Brett, U.S.A., Inc., and the OMI YUKON's two chief engineers were not adequate for preventing fuel oil with a flash point below 140° F from being loaded aboard the OMI YUKON. The Caleb Brett surveyor, who was aboard the OMI YUKON on October 23, testified that neither Caleb Brett nor OMI provided him with any verbal or written instructions regarding the sampling of the fuel oil. The Caleb Brett surveyor took one fuel oil sample at the beginning of the first load of fuel oil on October 23, and a second sample at the beginning of the second load. He did not sample near the end of either load nor was he required to take a sample near the end of each load where the fuel oil was probably contaminated with low flash point oil products. There is a need for standardized sampling procedures of fuel oils loaded aboard vessels that will ensure that the entire load of fuel oil is within required specifications.

1/ For more detailed information, read Marine Accident Report—"Explosions and Fires Aboard U.S. Tankship OMI YUKON in the Pacific Ocean about 1,000 Miles West of Honolulu, Hawaii, on October 28, 1986" (NTSB/MAR-87/06).

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Coast Guard regulations require that the chief engineer of a vessel obtain a half-pint sample of each load of fuel oil, but the regulations do not require that the sample be tested or specify how the fuel oil should be sampled. Coast Guard regulations only state that the chief engineer must obtain the flash point of the fuel oil as certified by the producer. In the case of HIRI, the refinery tested the fuel oil in their storage tank several days before loading of the OMI YUKON began. These test results were then given to the chief engineer as certification of the fuel oil's flash point. The test results of samples of fuel oil taken while it was loaded were normally not forwarded to the chief engineer until after the fuel oil was used. The fuel oil sample retained by the chief engineer and any test results of the fuel oil actually loaded were normally used to settle contract disputes after the fuel oil had been used and not to determine whether the fuel oil had a flash point above 140° F. The OMI superintendent engineer stated it was OMI's policy not to have the fuel oil samples tested before the fuel oil was used aboard its vessels because it took too long to obtain the results. Because of the contaminated fuel oil loaded aboard the OMI YUKON at HIRI in April 1986, the two OMI YUKON chief engineers had changed their practice from loading fuel oil directly into the fuel oil settler tanks to loading fuel oil into empty fuel oil storage tanks before transferring the fuel oil to the settler tanks. However, they still used the fuel oil before obtaining any test results from HIRI of the fuel oil samples taken during loading.

Testing of fuel oil samples for flash point can be done quickly. On December 1, 1986, when the chief engineer of the ASPEN questioned the fuel oil being loaded aboard his vessel at HIRI, HIRI tested samples of the fuel oil in about 4 hours. This accident indicates the need for improved testing practices for boiler fuel oil being loaded aboard vessels. The National Transportation Safety Board believes that the Coast Guard should require not only that samples be taken but also require that the samples be tested to ensure that the fuel oil actually loaded aboard vessels meets Coast Guard safety requirements.

Before the explosions, the OMI YUKON had undergone the required Coast Guard inspections and the American Bureau of Shipping (ABS) surveys for classification. The inspections and surveys covered examination of the tankship's six fuel oil tank vents including the tank vent that was found without a flame screen after the explosions. The last Coast Guard inspection of the tank vents was on December 20, 1985. The last ABS survey was during August and September 1986. Records and witness statements indicate that the Coast Guard inspectors and ABS surveyors reported examinations of the fuel oil tank vents following their respective boardings of the OMI YUKON, and that the vents were in satisfactory condition at the conclusion of the inspections and surveys.

The Coast Guard inspectors, the ABS surveyors, and the crew of the OMI YUKON each had a unique responsibility in the inspection process. The Coast Guard inspector was responsible for enforcing Coast Guard regulations regarding the safe operation of the tankship. The ABS surveyor was responsible for confirming that the vessel was being maintained in accordance with ABS standards. OMI paid ABS for the surveys, and in turn, OMI was kept informed of the level of maintenance of their vessels to meet insurance and other requirements. The responsibility for inspections on the part of the crew was primarily to assess maintenance needs.

The specific tasks of Coast Guard inspectors within their responsibilities for fuel oil vents are to identify all vents for fuel oil tanks on the vessel, and to examine either a sample of one or more of the vents or to examine all vents to determine compliance with the standards in Coast Guard regulations. The tasks for ABS surveyors are similar to those of Coast Guard inspectors. Information for inspection schedules and procedures by

the crew of the OMI YUKON were provided in various sources including machinery and equipment manuals, directives from OMI management, and the experience and training of the individual crewmembers. However, the inspection and replacement of flame screens was not contained in any periodic maintenance program, but was expected to be accomplished during normal periodic maintenance. Engineering crewmembers normally only inspected the fuel oil tank vent flame screens when they became fouled from dirt adhering to the drying residue from oily vapor on the mesh.

Coast Guard inspectors and ABS surveyors have several sources of information for obtaining the identification of all vents on a vessel before their examination. These sources include experience with similar vessels, knowledge of the particular vessel from previous inspections or surveys, labeling of the vents, and guidance from crewmembers. In the case of the OMI YUKON, the absence of labeling on any of the fuel oil vents and the unusual provision for two expansion trunks and two vents on each storage tank indicated the special need for identification. None of the vents were labeled, and it is not known if the after expansion trunks for the fuel oil storage tanks were labeled for fuel oil. After the explosions and fires, Safety Board investigators found that the after trunks for the OMI YUKON fuel oil storage tanks were labeled as ballast tanks rather than fuel oil tanks. Testimony by crewmembers indicated that the labels were painted. Whether the trunks was properly labeled or not, there was a need for the after vents to be labeled so that they would not be mistaken for ballast tank vents (located a few feet aft of the after vents on the fuel oil storage tank) which do not require flame screens.

The thoroughness of the Coast Guard midperiod inspection of the OMI YUKON on December 20, 1985, as testified to by the Coast Guard inspector, exceeded the official expectations of the Coast Guard. Procedures outlined for Safety Board investigators by Coast Guard Headquarters personnel prescribed a step-wise method by which fuel oil vents would be sampled and inspected, that is, one or more vents are selected as a sample of all fuel oil vents on a vessel during a midperiod inspection. If one of these sampled vents is found to be deficient in any way during the inspection, all vents on the vessel would be checked for deficiencies. This method was intended to increase the efficiency of the inspections process and improve use of time for inspectors during boardings. The Coast Guard inspector testified that he did not use the sampling procedure and inspected all the vents on the OMI YUKON. The Coast Guard inspector was well qualified to serve as an inspector for hull and deck items.

The ABS surveyor, who examined the OMI YUKON's fuel oil vents on August 21, 1986, testified that he examined all fuel oil tank vents on the vessel for fouling and wastage without disassembling the vents, that he worked alone, that he was not pressed for time, and that he had nc confusion about the location of the fuel oil vents on the vessel. Despite his testimony, there was no flame screen in the starboard fuel oil storage tank after vent. The ABS surveyor testified that his survey of fuel oil vents sometimes consisted of only sampling the tank vents. Whether he used the sampling procedure or if he correctly identified and checked all fuel oil vents, he remained in compliance with the approved ABS annual survey procedures; he was well-qualified to conduct surveys on tankships.

OMI apparently had made an effort to provide guidance to crews on conventional two-boiler vessels in their fleet for the inspection and maintenance of machinery and equipment. Testimony by crewmembers and by a management representative indicated that OMI was subscribing to blanket preventive maintenance plans marketed by a separate firm offering these programs. According to testimony, the installation of a single main boiler and other unusual features precluded using the blanket program on the OMI YUKON. As a consequence, the crew of the OMI YUKON was dependent on their own

resources for planning inspection and maintenance. In response to the need for a preventative maintenance plan on the OMI YUKON, the crew worked out a plan that addressed the requirements of the plant. However, fuel oil tank vents were not included in the plan.

There are indications that neither OMI management nor the crew considered fuel oil vents a high priority safety item on the vessel since there were no labels on any of the six vents. Crewmembers stated that the expansion trunks were correctly labeled, but none of the expansion trunks were directly adjacent to the vents. Perhaps the more substantial evidence for the lack of priority for the fuel oil tank vents is that the flame cutting was in progress near the starboard storage tank after vent without the chief engineer taking any special precautions to keep hot metal from falling near the vent opening, even though he knew it was a fuel oil vent. Although the chief engineer testified that he checked all flame screens when he resumed his duties aboard the OMI YUKON in September 1986 after his last leave, one of the flame screens was not in place at the time of the accident.

The apparent low priority given to fuel oil tank vents by the crew of the OMI YUKON may be the result of nonchalance often associated with fuel oil volatility. Historically, fuel oils have been characterized by viscosity and flash points that required heating of the fuel before injection into burners. The volatility of these fuels in the past has not necessitated the establishment of special safety precautions other than those used during fuel oil loading operations. All tankships and ships carrying explosives require adherence to hot work procedures and isolation of machinery. On other vessel types, smoking, welding, flame cutting, and other work activities normally occur without restriction; deck machinery on other types of vessels can be mounted directly over fuel oil tanks on the main deck. The Safety Board believes that the Coast Guard should publicize to the maritime industry through such publications as the "Proceedings of the Marine Safety Council" the importance of proper inspection and maintenance of flame screens on vessel fuel oil tank vents.

As a result of its investigation of two recent passenger vessel accidents, the PILGRIM BELLE 2/ and the MISSISSIPPI QUEEN, 3/ the Safety Board found that the location of life preservers in passenger and crew rooms could jeopardize the survival of persons in a rapidly developing emergency.

Life preservers and exposure suits were stowed in each person's stateroom aboard the OMI YUKON. When the explosion occurred on the tankship, most persons aboard were on the main deck and were unable to return to their staterooms to retrieve their life preservers due to the dense smoke in the accommodations house. A few persons, who were in the accommodations house at the time of the explosion, brought their lifejacket or exposure suit with them, but most crewmembers escaped the smoke filled accommodations house without their life preservers. The chief mate testified that there were only four or five life preservers and three exposure suits available when they abandoned the OMI YUKON. The availability of life preservers is paramount to survival during a disaster. The persons aboard the OMI YUKON were fortunate that they had sufficient time to abandon the vessel in a calm orderly manner and that the abandonment

2/ For more detailed information, read Marine Accident Report--"Grounding of the U.S. Passenger Vessel PILGRIM BELLE, at Sow and Pigs Reef, Vineyard Sound, Massachusetts, July 28, 1985" (NTSB/MAR-86/8).

3/ For more detailed information, read Marine Accident Report--"Collision Between U.S. Passenger Vessel MISSISSIPPI QUEEN and U.S. Towboat CRIMSON GLORY in the Mississippi River near Donaldsonville, Louisiana, December 12, 1985" (NTSB/MAR-86/9).

took place during warm, calm weather conditions. The explosion could have occurred in the Gulf of Alaska where the vessel normally operated and the weather conditions are severe and water temperatures are cold during most of the year. The storage of life preservers and exposure suits at muster station locations at or near the exterior of the vessel would improve access to life preservers and exposure suits by all persons aboard in emergency situations and permit life preservers to float free in case of a rapid sinking. The OMI YUKON explosion and fire again demonstrates the need for the Coast Guard to review the stowage requirements of life preservers and exposure suits on all Coast Guard inspected vessels. Contrary to your position that emergency stations are not "the appropriate place" for life preservers, the OMI YUKON accident shows that locating the tankship's life preservers and exposure suits closer to or at emergency stations would have been the most appropriate place on the OMI YUKON. Fire and smoke prevented the crew from entering the accommodations house and retrieving their life preservers and exposure suits. If the life preservers and exposure suits had been stowed at or near the emergency lifeboat stations, the life preservers and exposure suits would have been available to the crew after the explosion.

The successful rescue of all survivors of the OMI YUKON after the explosion without further injury was primarily due to the crew's retrieval of the tankship's emergency position indicating radiobeacon (EPIRB) from the port bridge wing and its activation. The explosion occurred about 1030 and EPIRB distress signals from the general area on 121.5 MHz and 243 MHz were picked by high flying commercial airplanes and the search and rescue satellite-aided tracking (SARSAT) satellite within 4 hours. The antennas for the OMI YUKON's main and emergency radios were destroyed in the explosion and the radio room had to be immediately evacuated because of dense smoke and the threat of further explosions. The lifeboat radio was ineffective in that no distress signal from the lifeboat radio was reported although there was at least one other vessel, the DRESDEN, in the general area while the lifeboat radio was transmitting. However, the lifeboat radio's distress signal on 500 MHz had a range of about only 50 nmi.

The 1974 Safety of Life at Sea Convention (SOLAS 74) requires that all new vessels after July 1, 1986, and all existing vessels after July 1, 1991, carry two lifeboat EPIRB's, one on each side of the vessel, in addition to the vessel EPIRB required by Coast Guard regulations, and three two-way radiotelephones for use in lifeboats. On May 1, 1985, or about 11 months after the amendments were adopted by International Maritime Organization (IMO), the Federal Communications Commission (FCC) issued regulations for a new Class S lifeboat EPIRB and for two-way radiotelephones for use in lifeboats. The regulations require that the Class S EPIRBs be stowed in the lifeboats and the two-way radiotelephones be stowed in the radio room on the bridge or in a location readily accessible for transfer to the lifeboats. Although the international implementation date for the carriage of lifeboat EPIRBs and the two-way radiotelephones was July 1, 1986, the Coast Guard does not intend to publish a NPRM regarding these requirements before the end of 1987. The importance of lifeboat EPIRBs was demonstrated in this accident. If the vessel EPIRB had been stowed on the starboard bridge wing instead of the port bridge wing, it probably would have been destroyed in the explosion and the crew may not have been rescued for several days. All U.S. vessels should be equipped with lifeboat EPIRBs as soon as possible. The master of the OMI YUKON was not able to communicate with the master of the DRESDEN because neither the lifeboat nor the Japanese fishing vessel had international VHF or UHF calling frequencies. The Safety Board believes that all U.S. vessels should be equipped as soon as possible with two-way radiotelephones to provide communication between survivors and rescue vessels in emergencies.

The IMO will hold an international conference in 1988 to update the radio distress equipment required aboard most commercial vessels. The present lifeboat radio will probably be replaced by a VHF radiotelephone capable of transmitting a distress signal on channel 16 and a radar transponder. It is also anticipated that for the first time a vessel EPIRB which transmits not only a distress signal but also the vessel's identification will be required. This type of EPIRB should improve Coast Guard response time and effectiveness by eliminating delays associated with the present high false alarm rate. The Safety Board believes that the new EPIRB will be a significant improvement over the present EPIRB required by Coast Guard regulations. Present EPIRBs and emergency locator transmitters (ELT) both transmit the same distress signal without any identification as to the source of the distress signal. Only the general location of the present EPIRB and ELT distress signals can be determined by commercial aircraft generally requiring an extensive search by rescue units; a ground station within about 2,000 miles of the signal is necessary for satellite detection. When the FCC issues final regulations for the new EPIRB, U.S. vessels should take advantage of this new type of EPIRB as soon as possible. The Safety Board believes that the Coast Guard should promote the use of the new 406 MHz EPIRB as soon as the FCC has issued final rules approving its use.

The SARSAT international search and rescue satellite system has proven effective in providing alert and location data in over 300 aviation and marine distress incidents resulting in the rescue of over 700 persons. However, for locating distress signals from EPIRB's and ELT's the satellite receivers are dependent on local user terminals, which have a normal range of 1,800 to 2,200 miles. The two local user terminals for the Pacific Ocean are located in Kodiak, Alaska, and San Francisco, California, which leaves a large area of the Pacific Ocean to the south and west of the Hawaiian Islands without SARSAT coverage. The distance from San Francisco to Honolulu is about 2,100 miles and the distance from Kodiak to Honolulu is about 2,200 miles. Although there are numerous commercial airplanes which make trans-Pacific flights each day, these airplanes normally take routes to the north of the Hawaiian Islands. However, there are many shipping routes to the south and west of the Hawaiian Islands. Thus, in this large area of nonsatellite coverage, EPIRP and ELT distress signals may not be detected. The Coast Guard has recognized the need for a local user terminal in the central Pacific Ocean, but due to budgetary constraints, it has not yet allocated funds for such a terminal. The satellites are in place and most oceangoing U.S. vessels are required to carry EPIRBs, but for SARSAT to be effective for U.S. shipping to Asia and Australia, the system needs another local user terminal for a large section of the Pacific Ocean.

Since neither the port nor the starboard lifeboat was recovered for examination after the explosions and fire, the Safety Board's analysis of the OMI YUKON's lifeboat engine malfunctions was based primarily on witness testimony. The starboard lifeboat was damaged during the explosions and fell into the Pacific Ocean sometime between the time the crew was rescued on October 29 and when investigators boarded the OMI YUKON on November 7. The port lifeboat was abandoned when the crew was rescued by the Japanese fishi g boat on October 29.

Testimony by the crew indicated that the port lifeboat's engine did not operate except for short periods of time after the boat was launched. It was the opinion of the chief engineer and first assistant engineer that the engine was overheating which prevented continuing operation. While in the lifeboat, the first assistant engineer diagnosed the problem of overheating as the result of inadequate cooling water. He testified that he confirmed that water was available to the pump through the sea valve and that the inadequate cooling water was probably due to air in the system or the pump not taking suction. He also stated that he was unable to vent the system because of the number of people in the lifeboat.

Testimony by the crew indicated that there was no regular inspection or maintenance program for the cooling water pumps for the lifeboat engines. The crew did not determine the condition and integrity of the lifeboat cooling water systems after modifications were made in early 1986. Testimony indicated that neither lifeboat had been run in the water since January 2, 1986, when the port boat was operated as part of the required Coast Guard midperiod inspection.

The crew inspection procedures for the cooling systems on the lifeboat engines were inadequate in two instances. First, the cooling water pumps were not inspected internally. This type of pump required periodic inspection to determine whether the flexible impeller, which is commonly installed in these pumps and has a service life of from one to several years, had deteriorated. Prudent engineering practice suggests regular internal inspections and maintenance of these pumps. The 3- to 4-year shoreside overhaul of lifeboat engines presently practiced by OMI is probably not sufficient. The inspection and regular replacement of flexible impellers is not a major expense or time consuming item. In addition to the normal operational test of lifeboat engines, the Safety Board believes that the Coast Guard should inspect nonmetallic impellers at midperiod and biennial inspections and conduct a design study to determine the life expectancy of nonmetallic impellers in lifeboat engines.

As a result of the explosions on October 28, 1986, the OMI YUKON lost main electrical power and the use of the tankship's main fire system. The emergency electrical system did not activate automatically as it should have when main power was lost, and because of the smoke and fire, the crew was unable to enter the emergency diesel generator compartment, the standby diesel generator compartment, and the foam room. Because of the massive damage to the tankship's engineroom and standby diesel generator compartment due to the explosions and fires and the massive fire damage to the emergency diesel generator and its switchboard, the OMI YUKON had no emergency electrical power after the explosions.

Coast Guard regulations required that the OMI YUKON have an emergency power source outside the engineroom and that the compartment containing the emergency power source should not adjoin the engineroom "except when such an arrangement is not practicable." The OMI YUKON had an emergency diesel generator located in a compartment outside the engineroom on the main deck level; however, the emergency generator compartment's starboard side and deck were common with the engineroom. Coast Guard regulations also required that the cables from the emergency switchboard to emergency systems in the accommodations house not go through the engineroom. The two chief engineers gave conflicting testimony regarding the path of the cables from the emergency switchboard to the accommodations house. The chief engineer, who was aboard at the time of the explosion, stated the cables ran up into the standby diesel generator compartment and then across the passageway between the accommodations house and the engine casing. The alternate chief engineer stated the cables ran down into the engineroom, across the overhead of the engineroom and up into the accommodations house near the elevator trunk. Because of the massive damage, Safety Board investigators could not determine the path of the cables from the emergency generator switchboard to the accommodations house. However, whether the cables ran down into the engineroom or up into the standby diesel generator compartment, the cables were probably destroyed as a result of the engineroom explosion. The 1-inch-thick insulated steel door between the standby generator compartment and the engineroom was blown along with its door frame into the standby generator compartment.

Coast Guard regulations require during engineroom emergencies an emergency source of power to vital systems such as emergency lighting, navigation equipment, and communications equipment in the accommodations house. Just 2 days before the explosions on the OMI YUKON, the tankship's emergency diesel generator activated normally during a temporary shutdown of the tankship's main generators. The Safety Board, therefore, concludes that the emergency electrical system was probably operating properly up to the time of the explosions and the temporary loss of main electrical and propulsive power on October 26 was not related to the explosions on October 28. However, the massive explosions on the OMI YUKON not only destroyed the main power supply but its standby and emergency power sources as well. If the emergency generator and its cables on the OMI YUKON had not been located adjacent to the engineroom as intended by Coast Guard regulations, the vital systems in the accommodations house may have had emergency power for some time after the accident. Although the massive explosion of the OMI YUKON was not a common accident, the Coast Guard should consider the possibility of an explosion in the space containing the main power source when determining the location of the emergency power source. In addition, the Coast Guard should not permit emergency power sources to be located next to the main engineroom unless it is absolutely unavoidable. There was sufficient room to locate the emergency generator in the OMI YUKON's accommodations house where the effects of a fire or explosion in the engineroom would have been minimized.

Coast Guard regulations required that the OMI YUKON have at least two fire pumps and that one be located outside the engineroom with an independent source of power. The OMI YUKON had two fire pumps in the engineroom and one on the main deck, port side on the forward end of the accommodations house. The pump outside the engineroom was powered by the standby diesel generator. The massive engineroom explosion destroyed the fire pumps in the engineroom and the standby diesel generator. Thus, the OMI YUKON was left without a fire pump for the fire main system and its foam firefighting system which was dependent on the same pumps. If the tankship had had firefighting capability after the explosions, the crew may have been able to extinguish the fires or at least limit the spread of the fires and may not have had to abandon the tankship. Under more severe weather conditions, the abandoning of the OMI YUKON may have been very dangerous. The Safety Board believes that the Coast Guard should reevaluate its regulations regarding a second fire pump and the location of foam rooms on vessels similar to the OMI YUKON to ensure that the vessel's fire main and foam system will still be operational in the event of a severe engineroom fire or explosion. After the explosion, the OMI YUKON's deck fire main was still intact and the fire pump outside the accommodations house was probably still operational, but there was no operational power source for the fire pump and the foam room was inaccessible. If the foam room had been located in the accommodations house instead of adjacent to the engineroom it may have been accessible after the initial explosions and during the initial stages of the subsequent fire. If the power source for the fire pump outside the accommodations house had been located away from the engineroom or if a fire pump with its own independent power source had been located forward, the OMI YUKON would probably have had water for the deck fire main system. Although the fire main and foam system met the design requirements of the Coast Guard, the engineroom explosion and subsequent fires made both the fire main and foam systems inoperable.

Therefore, as a result of its investigation, the National Transportation Safety Board recommended that the U.S. Coast Guard:

Require that the fuel oil loaded aboard a vessel be sampled at the beginning and near the end of each load, that each sample be tested for flash point and viscosity, and that the results of the tests be provided to the chief engineer before the fuel oil is used. (Class II, Priority Action) (M-87-28)

Require that the fuel oil tank vents on all U.S. vessels be appropriately labeled. (Class II, Priority Action) (M-87-29)

Publicize to the maritime industry the importance of proper inspection and maintenance of flame screens on vessel fuel oil tank vents. (Class II, Priority Action) (M-87-30)

Require that life preservers and exposure suits be stowed outside of passenger and crew berthing rooms and closer to or at emergency stations. (Class II, Priority Action) (M-87-31)

Implement for all U.S. vessels the second set of amendments to the 1974 Safety of Life at Sea Convention regarding improved lifesaving equipment which became effective internationally on July 1, 1986. (Class II, Priority Action) (M-87-32)

Promote through Coast Guard and marine industry publications the use by U.S. vessels of the new 406 MHz emergency position indicating radiobeacon as soon as the Federal Communications Commission has issued final rules approving its use. (Class II, Priority Action) (M-87-33)

Require the inspection and replacement as necessary of nonmetallic impellers in lifeboat cooling water pumps at midperiod and biennial inspections. (Class II, Priority Action) (M-87-34)

Amend the U.S. Coast Guard regulations regarding the location of an independent emergency power source to include protection from an explosion in the space containing the main power source. (Class I, Priority Action) (M-87-35)

Amend the U.S. Coast Guard regulations regarding the source of power for the second fire pump on vessels to include protection of the power source from an explosion in the space containing the main power source. (Class II, Priority Action) (M-87-36)

Establish a local user terminal for the international search and rescue SARSAT satellite system in the central Pacific Ocean. (Class II, Priority Action) (M-87-37)

Also, as a result of its investigation, the Safety Board issued Safety Recommendation M-87-38 to the American Bureau of Shipping, M-87-39 through -46 to the OMI Corporation, M-87-47 and -48 to the Hawaiian Independent Refinery, Inc., M-87-49 to Caleb Brett U.S.A, Inc., M-87-50 to the American Petroleum Institute, and M-87-51 to the Federal Aviation Administration.

BURNETT, Chairman, GOLDMAN, Vice Chairman, and LAUBER, NALL, and KOLSTAD, Members, concurred in these recommendations.

By: Jim Burnett
Chairman