

DEPARTMENT OF TRANSPORTATION



**COAST GUARD**

# MARINE CASUALTY REPORT

M/V ANGELINA LAURO (ITALIAN);  
FIRE ON BOARD WHILE DOCKED IN  
CHARLOTTE AMALIE HARBOR, ST.  
THOMAS, USVI, ON 30 MARCH 1979  
WITH NO LOSS OF LIFE

U.S. COAST GUARD  
MARINE BOARD OF INVESTIGATION REPORT

AND

COMMANDANT'S ACTION

REPORT NO USCG 16732/01282

TECHNICAL REPORT STANDARD TITLE PAGE

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|  | 15. Supplementary Notes  |  |                                 |
| 16. Abstract<br><p>During the afternoon of 30 March 1979, a fire erupted in the crew galley of the Italian passenger vessel, ANGELINA LAURO, while it was moored at the West India Company Dock, Charlotte Amalie Harbor, St. Thomas, U. S. Virgin Islands. St. Thomas was the ANGELINA LAURO'S last port call for a cruise commenced on 24 March 1979 with 669 passengers and 380 crewmen on board. The fire spread rapidly to a dining room and eventually caused the evacuation of all passengers and crew. Initially the fire was fought on board by crew and shoreside firefighters, however, heavy smoke and flames caused them to evacuate the vessel and fight the fire externally. On 31 March 1979, U. S. Coast Guard and U. S. Navy firefighters joined the firefighting efforts and the vessel was reboarded. These fire teams were eventually able to extinguish the fire on 4 April 1979 but not before the vessel was damaged beyond repair. There was no loss of life as a result of this casualty. Two persons did receive minor injuries.</p> <p>This report contains the U. S. Coast Guard Marine Board of Investigation report and the Action taken by the Commandant to determine the proximate cause of the casualty and the recommendations to prevent recurrence.</p> <p>The Commandant has concurred with the Marine Board that the proximate cause of the casualty was that person(s) unknown turned on the electric skillet located in the crew's galley to its highest setting and thence left it unattended. As a result, the oil in the electric skillet overheated and reached the point of auto-ignition. (cont)</p> |  |  |                                 |
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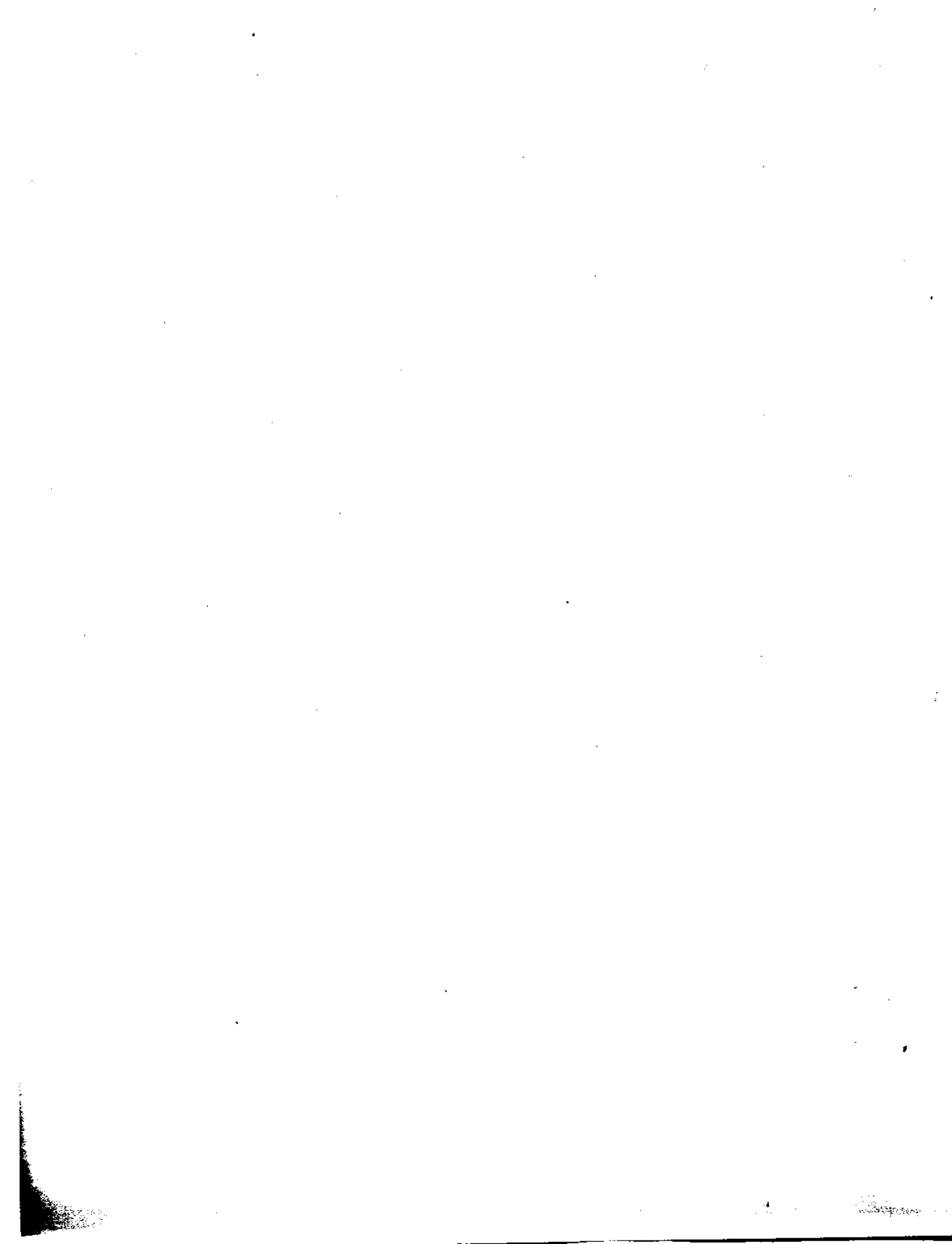
Technical Report, Item 16 (con't)

In addition, a primary contributing cause of the casualty was the unsafe practice of galley personnel using the electric skillet for other than its designed or intended use (i.e., it was not intended to be used as a deep fryer).

M/V ANGELINA LAURO (Italian); FIRE ON BOARD WHILE  
DOCKED IN CHARLOTTE AMALIE HARBOR, ST. THOMAS, USVI  
ON 30 MARCH 1979 WITH NO LOSS OF LIFE

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DEPARTMENT OF TRANSPORTATION  
UNITED STATES COAST GUARD

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16732/ANGELINA LAURO

1 SEP 1981

Commandant's Action

on

The Marine Board of Investigation convened to investigate the circumstances surrounding the fire on board the M/V ANGELINA LAURO (Italian) while docked in Charlotte Amalie Harbor, St. Thomas, USVI on 30 March 1979 with no loss of life

The report of the Marine Board of Investigation convened to investigate the subject casualty has been reviewed; and the record, including the findings of fact, conclusions and recommendations, is approved subject to the following comments.

REMARKS

1. The report refers alternatively to the particular cooking appliance in question as a "fryer/skillet" or "skillet/fryer". It is noted that the manufacturer's literature, exhibit 91, refers to this appliance as an "electric tilting skillet". Exhibit 91 also contains a letter from Zanussi Grande Impianti, S.P.A., the company which acquired Triplex, S.P.A., the original manufacturer of the appliance. In this letter the appliance is described as an "electric tilting braiser".

COMMENTS ON CONCLUSIONS

1. Conclusion 2 is concurred with as being the proximate cause of the casualty. In addition a primary contributing cause of the casualty was the unsafe practice of galley personnel in using the electric skillet for other than its designed or intended purpose. As noted above in my comments on the findings of fact, the appliance in question was a skillet and/or braiser. As a skillet its primary purpose was for the cooking or warming of sauces, gravies, or stews. A braiser, from the definition of the term "braise", is an appliance designed to cook (meat) by browning in fat and then simmering in a covered pan with very little liquid. Used in this manner the appliance can be operated safely and without risk of fire. Although used as a deep fryer aboard the ANGELINA LAURO for a number of years, the appliance was not designed for this purpose. Triplex, S.P.A. manufactured a separate appliance, with thermostatic controls, for deep frying.

## ACTION CONCERNING THE RECOMMENDATIONS

### 1. Recommendation 1:

Action: This recommendation is not concurred with. Regulation 76(b) of the 1966 SOLAS Amendments, Resolution A.108, is embodied in Regulation 70(b) of the 1974 SOLAS Convention, the SOLAS Convention currently in force for the United States. Regulation 70(b) of the SOLAS 1974 is applicable only to Method II ships built prior to 19 November 1952. Method I and Method III ships built prior to 19 November 1952 must respectively comply with Regulation 70(a) and 70(c) of SOLAS 74. Ships built after 19 November 1952 must comply with either the 1948 SOLAS Convention or the 1960 SOLAS Convention plus specific parts of SOLAS 74, as determined by Regulation 65 of SOLAS 74. The overall effect is to provide alternate fire protection measures for all passenger vessels which produce a level of safety equivalent to that intended in Regulation 70(b). Changing Regulation 70(b) would therefore not increase the level of fire safety on new ships or alternate method ships built prior to 19 November 1952.

### 2. Recommendation 2:

Action: This recommendation is not concurred with. Although a requirement to provide A-60 insulation in the exhaust ducts from the galley cooking appliances would add an additional measure of protection, a more positive solution would be to require a fire extinguishing system inside of these ducts (see comments regarding recommendation 15). Regulation 25(g) of SOLAS 1974 requires exhaust ducts from accommodation spaces to be constructed of "A" Class Divisions.

### 3. Recommendation 3:

Action: This recommendation is concurred with. The Coast Guard will make future recommendations in IMCO regarding sprinkler system installations.

### 4. Recommendation 4:

Action: This recommendation is concurred with insofar as it applies to shipboard galley cooking appliances capable of being used for immersion cooking with oil. This report will be widely disseminated within IMCO and to foreign flag administrators operating vessels to the United States to encourage checks of existing galley cooking equipment as well as current procedures.

### 5. Recommendation 5:

Action: This recommendation is concurred with. Although such procedures have previously been unwritten, galley exhaust ducts have long been identified as potentially unsafe areas aboard vessels, requiring the specific attention of both the Coast Guard inspector and the crew of the vessel. A soon to be published amendment to Volume II of the Marine Safety Manual (CG-495) sets forth detailed examination procedures regarding galley exhaust ducts. These procedures are required to be followed during the biennial and mid-period inspection of U. S. vessels and during SOLAS verification examinations of foreign flag vessels. They include the removal of sufficient inspection plates to insure that the duct wall is clean and free of grease and that an operational test of the fire damper is carried out.

6. Recommendation 6:

Action: This recommendation is concurred with in part. The guide used by Coast Guard inspectors for Control Verification Examinations, CG-840F, contains check-off items on fixed fire extinguishing systems. This reminds Coast Guard inspectors to insure that such systems are operational and in good repair. Whether a flow test or an alternate comparable test is required during the examination, would necessarily be dependant upon the inspector's judgement, taking into account the justification versus the practicality of a flow test.

7. Recommendation 7:

Action: This recommendation is concurred with. As noted in the response to recommendation 3 the Coast Guard will make future recommendations in IMCO regarding sprinkler system installations.

8. Recommendation 8:

Action: This recommendation is concurred with. The Coast Guard will require such warning placards to be installed at each elevator aboard passenger vessels subject to Control Verification Examinations.

9. Recommendation 9:

Action: This recommendation is not concurred with. Although having a copy of the vessel's safety plan, general arrangement plan, and damage control and stability plan may have assisted shore personnel in their firefighting efforts, requiring a formal process of making them available as a precautionary measure is impractical. Identification of the "Responsible Port Official" especially in ports without a resident Coast Guard Captain of the Port representative would be confusing. The term "Port Official" could apply to local police, fire departments or port authorities, as well as federal officials. Depending upon the port, the responsible official could be any one of these officials and would more than likely be different for each port. Accountability, record maintenance, and the timely transfer of the documents would present formidable administrative burdens to both vessel and port officials.

The paramount responsibility of the ship's master and its crew in ensuring the security of their ship, whether at sea or in port, cannot be over emphasized. This includes taking such action as appropriate to direct firefighting operations or to ensure a proper relief by local authorities. Providing copies of vessel plans, which would aid local firefighting units in controlling a fire aboard a moored vessel, is an absolute and necessary part of this transfer process.

10. Recommendation 10a :

Action: This recommendation is concurred with. The general provisions of the Ports and Waterways Safety Act of 1972 (33 USC 1221 et seq) gives the Coast Guard, among other authorities, the authority to prevent damage to, or the destruction or loss of any vessel, bridge, or other structure, on or in the navigable waters of the United States. In exercising this authority, the Coast Guard requires district commanders, captains of the port and commanding officers of other units as directed by the district commander, to insure that ports within their jurisdiction have current and effective contingency plans, supported by the port community, to provide adequate response by the available federal, state, municipal and commercial resources to



fires, and other accidents. The Office of Marine Environment and Systems, U. S. Coast Guard Headquarters, is presently developing a format for a multi-jurisdictional contingency plan that will amend existing plans and serve as a guide in formulating new plans.

11. Recommendation 10b:

Action: This recommendation is concurred with. The responsibilities of the on-scene commander and the on-scene coordinator, which develop during a port emergency involving search and rescue, firefighting, and pollution response, are separately defined and addressed within the port safety and search and rescue program elements of the Coast Guard. When these programs are executed individually, conflicts and misunderstandings normally do not occur. However, when these programs are executed simultaneously, conflicts in command, control, and coordination can occur due to the similarity of terms and different policy direction given by the respective program elements of the Coast Guard. District and section contingency plans should spell out the relationship between the on-scene commander and other responsible Coast Guard authorities with sufficient clarity to minimize confusion in cases involving both port safety and search and rescue considerations. In order to ensure Coast Guard field operations do not suffer as a result of narrow program applications, the Coast Guard has encouraged and will continue to encourage close cooperation and interaction between our various operating programs through seminars and coordinated contingency planning. In addition, the Office of Operations, U. S. Coast Guard Headquarters, published an article in ON SCENE magazine, issue number 1-81, based on this case, calling attention to possible problems related to conflicts in responsibilities.

12. Recommendation 11:

Action: This recommendation is concurred with. The Coast Guard has initiated action on this subject at IMCO. A paper regarding this subject was presented to the IMCO Subcommittee on Fire Protection at its Twenty-fifth Session (Nov '80).

13. Recommendation 12:

Action: This recommendation is concurred with. The Coast Guard will pursue this matter with the Association of Port Authorities as a recommended berthing procedure.

14. Recommendation 13:

Action: This recommendation is concurred with. The United States is presently working in conjunction with the international maritime community through the Inter-Governmental Maritime Consultative Organization (IMCO) to develop standards for the training of ships crews in firefighting and emergency procedures. Subsequent to this casualty, on 15 November 1979, the IMCO Assembly adopted Resolution A.437(XI). This Resolution recognizes the essential need for adequate instruction in fire prevention and firefighting for all those engaged in all departments on board ship. In recommending more comprehensive training by member governments, the resolution outlines areas of instructions for both basic training and advanced training of crews in firefighting.

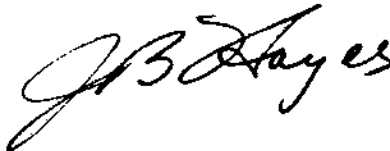
15. Recommendation 14:

Action: This recommendation is concurred with in part. Under the provisions of SOLAS 1974, draft stops are required to be non-combustible. The additional requirement of meeting A-0 class requirements is not concurred with. A and B class bulkheads are required to extend deck to deck (except where continuous B-class ceilings are fitted). Draft stops within these ceiling areas are intended to prevent

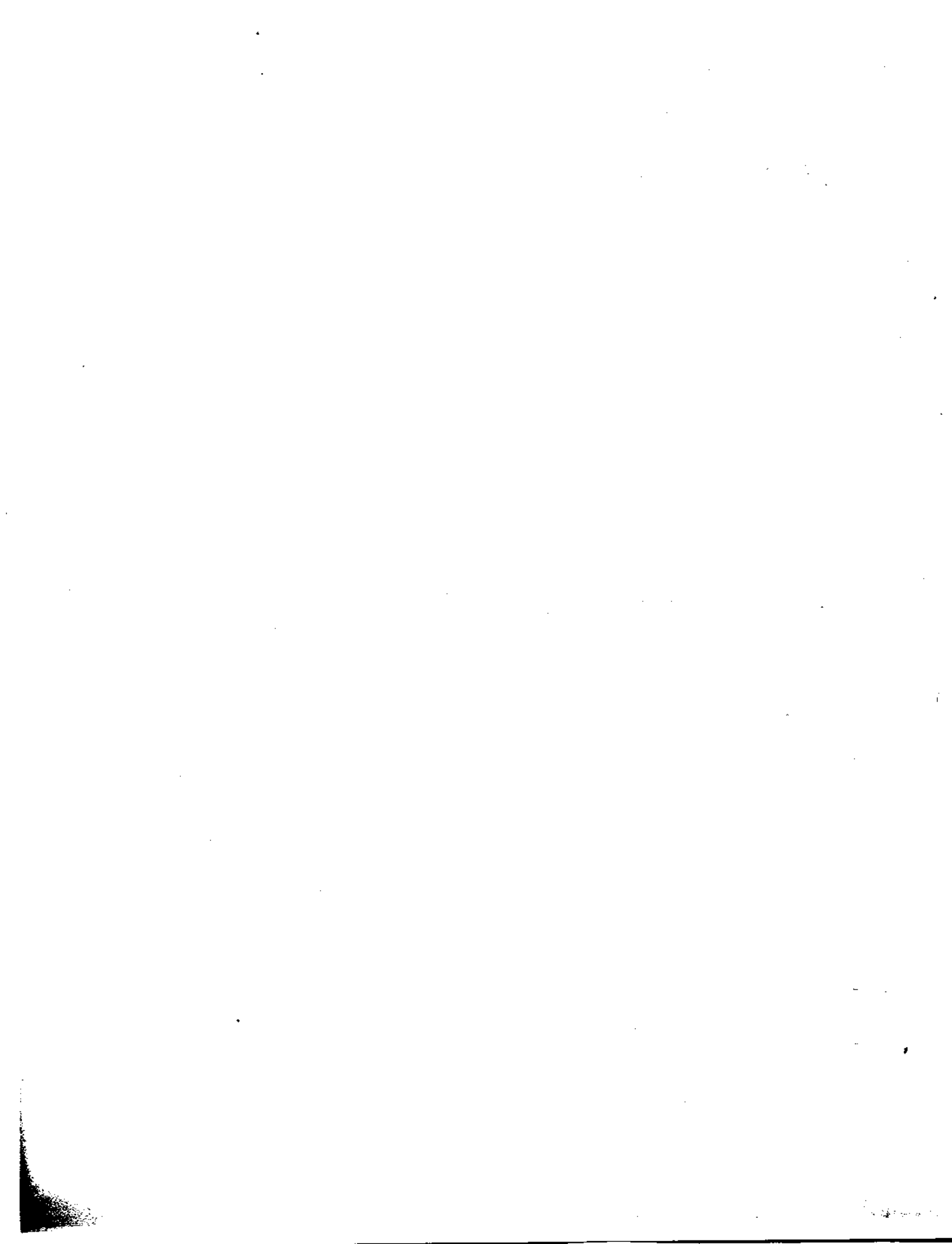
smoke and air movement, while the perimeter bulkheads are intended to act as fire  
riers. A-O class draft stops would be ineffective unless an A-O class ceiling  
is installed. A tight fitting non-combustible draft stop is sufficient for the  
purpose intended.

16. Recommendation 15:

Action: This recommendation is concurred with. Such a system is now required for  
new ships by Regulation 25 of SOLAS 1974.



J. B. HAYES  
Admiral, U.S. Coast Guard  
Commandant





DEPARTMENT OF TRANSPORTATION  
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16732

SEP 1980

From: Marine Board of Investigation  
To: Commandant (G-MMI)  
Subj: MV ANGELINA LAURO, (Italian); Fire onboard while docked in  
Charlotte Amalie Harbor, St Thomas, USVI on 30 March 1979 with no  
loss of life

Findings of Fact

1. On 30 March 1979, a fire originating in the crew galley occurred on board the Italian registered Passenger Vessel ANGELINA LAURO that resulted in the total constructive loss of the vessel. The vessel was moored with its starboard side to berth #4 of the West Indian Co. Dock in Charlotte Amalie Harbor, St. Thomas, USVI. The vessel was owned by Achille LAURO of Naples, Italy and under charter to COSTA Armatore S.P.A Genoa, Italy. There were no serious injuries or loss of life as a result of this casualty. There was minor oil pollution.

Vessel Data

|                                   |  |
|-----------------------------------|--|
| Name:                             | ANGELINA LAURO                               |
| O.N.:                             | 1109   |
| Call Sign:                        | IBHO   |
| Service:                          | Passenger                                    |
| Home Port:                        | Naples, Italy                                |
| G.T.:                             | 24377.03                                     |
| N.T.:                             | 14013.45                                     |
| Length:                           | 205.15m (674 ft)                             |
| Breadth:                          | 25.49m (84 ft)                               |
| Depth:                            | 9.87m  |
| Normal Draft:                     | 29.5' mean                                   |
| Draft on<br>30 March 1979:        | 28'10" fwd 29'0" aft                         |
| Propulsion and<br>No. of Engines: | 3 Sulzer Diesel                              |
| H.P.:                             | 12,500 each engine                           |
| Owners:                           | Achilles Lauro Armatore                      |
| Address:                          | Via Cristoforo Colombo<br>#45, Naples, Italy |

Operators/  
Charterers: Costa Line Inc.

Address: Biscayne Tower  
Miami, Florida

Master: Antonio Scotto Di Carlo

License: Extra Master, any ocean, any gross ton

Passengers: 669

Crew: 380

### 3. Weather:

Wind: Northeast 25 - 30 knots  
Temp: 18 degrees Centigrade  
Skies: Clear  
Seas: Choppy, No Swell  
Depth of water  
pier side: 31 ft

### 4. Radar Data

Make: 2 Decca Model 829  
Year: (1) 1966 - 1968  
(2) 1977  
Scope: 48 mile maximum  
3/4 mile minimum

### 5. Vessel History

The ANGELINA LAURO was built in 1939 in Amsterdam, Holland and sailed as the ORANJE. In 1964 she was purchased by LAURO Line and during the next several years underwent an extensive refit of all accommodation spaces, engineering, and safety equipment. During the refit, the vessel was brought into compliance with SOLAS 1948, and SOLAS 1960 as modified by the 1966 SOLAS fire safety amendments known as Resolution A.108. Particular attention was directed to the establishment of main vertical zones of A-60 class construction (able to withstand the passage of flames and smoke for 1 hour), spaced not more than a distance of 131 ft apart. Where ducts passed through main vertical zone bulkheads, insulation required to preserve the fire resistant integrity of that bulkhead was provided as well as automatic 3mm thick steel fire dampers with access panels. In particular, the crew's galley exhaust duct had the complying damper with inspection opening. This subject will receive detailed examination later on. Openings in the main vertical zone bulkheads were provided with fire screen doors operable locally, and from the bridge and engine room control booth. Watertight doors were fitted below the bulkhead deck. The vessel was reconstructed to comply with SOLAS Method II requirements. As such, a sprinkler system to protect passenger and crew accommodations and public spaces was installed. This system was maintained under constant pressure, activated automatically and provided with an alarm system. The vessel was divided into 28 sprinkler zones with a control valve station located in each zone. Each zone was subject to regular inspection by

the ship and regulatory personnel. Combustible materials of construction were not prohibited on this category of vessel. However, Resolution A.108 called for the reduction of such materials as far as practicable. Although constructed and refitted prior to the issuance of the 1966 fire safety standards, the galley vent ducts were wrapped with non-combustible fiberglass, as it was the intention to meet the fire resistant standards for insulation. Panelling, internal bulkheads, carpeting, and furniture were specially treated with a fire retardant process. In 1971, the ship, after having sailed in the foreign trade, using a Method II fire protection system under SOLAS, received her first U.S. Coast Guard Control Verification Examination for entry into the U.S. passenger trade. After a selective plan review and subsequent onboard Coast Guard inspections, this first Control Verification Certificate was issued in Miami on 13 June 1971.

6. In January of 1977, the ANGELINA LAURO was chartered to COSTA Line of Miami, Florida. In the agreement, LAURO provided the Deck and Engine crew and COSTA, the catering and hotel service crew. Under both the LAURO and COSTA flags, the ANGELINA LAURO has traded continuously in the Caribbean. Typically departing from San Juan P.R. on Saturdays, she made five or six port calls and returned to San Juan early the following Saturday from a previous day's stopover in nearby Charlotte Amalie Harbor, St. Thomas, United States Virgin Islands.

#### 7. Last Voyage

On Saturday 24 March 1979, the ANGELINA LAURO departed San Juan for her weekly cruise carrying 669 passengers and 380 crewmembers. Her last port of call for the week was St. Thomas, USVI on Friday, 30 March 1979. The vessel normally moored at anchorage in the Inner Harbor, and passengers and crew were ferried to and from shore by the ship's launch. On Friday the 30th, however, berth #4 at the West Indian dock was open and the ship arranged to moor pierside. A gangway was provided for the passengers on A Deck at the foyer entrance. A crew gangway was rigged on B Deck outside the engineroom control station. She moored starboard side to at about 0800 (EST), and most of the passengers and roughly fifty percent of the crew went ashore for the day. (All times are local and are based on the best evidence available)

8. By early afternoon, the routine workday had been completed. Those in the crew who had not gone ashore were either performing routine duties, standing watches or had retired to their rooms for a period of relaxation. On watch on the bridge was Second Officer DOMENICO ASSANTI. First and Second Officers POLLIO and MATERA were in their staterooms. Captain DI CARLO and Staff Captain GUISEPPE ORSI left the ship separately shortly after 1500 for business in town. First Engineer, SAVASTANO was working overtime in the engineroom on the A Deck level and another First Engineer, DOMENICO SCALA was on watch in the control booth on A Deck. The weather was clear, with a 25 to 30 knot steady wind, fair on the port bow. Several large sideports or doors were open on the portside as well as were numerous port holes and Promenade Deck windows open on both sides of the vessel.

9. Fireman ARTUCCI, one of the six shipboard professional firemen normally carried, was on duty at the ship's main fire station. Under the direction of the safety officer, Second Officer MATERA, the ship's firemen were responsible for the maintenance of all ship's firefighting and fire safety equipment and stood a rotating watch which required the making of "walking rounds" of ship's spaces. During the hours of 2200 to 0600 two firemen were on duty, with one making rounds every two hours, while the other stood watch at the fire station on the main deck. At other times, one fireman stood watch for a four hour

period, and one round of the vessel was made during the period by him. On this particular day, a total of 5 firemen were onboard.

10. In addition to key watches, various hotel services such as laundry, bakery, and stewards department were in operation. In the crew's galley on B Deck, MATEO IACOMINO, galleyman, had completed serving the noon meal at 1400 and was alone in the galley cleaning up and making it ready for the evening meal cooks who would start at 1600. He stated that there was no one in the galley with him and that after making sure that he had completed his duties, he left the galley at about 1515 to go ashore to make a telephone call to Naples. When he left the galley, IACOMINO stated that all equipment was turned off with the exception of two burners on the range which were routinely left on low heat. The roll down serving window was open halfway, one port hole was open and the only door to the space was closed but not locked.

11. At 1545, ASSANTI received a report on the bridge via telephone from an unidentifiable person that there was smoke coming from the crew's galley. That person is believed to have been the Master-at-Arms, VITIELLO, who was in his cabin on A Deck and had traced the smell to the crew's galley. Prior to this time, however, a number of the crew testified that they too either smelled or saw smoke as early as 1520. Among these were, tailor GUERRIERO, on D Deck forward; passenger cook TACCHINO and bakers SIGNORINI, ARGENIO and PETRIZELLA, on B Deck in the passenger galley; and barman SCAGLIOTTI, on C Deck. The passenger cook and the bakers discovered the smoke to be coming from the overhead, port side forward of the Continental Dining Room. This compartment is separated from the crew's galley by an A-60 bulkhead. Suddenly they observed flames in the overhead. They immediately found several hand portable fire extinguishers and commenced efforts to put the fire out. Despite the fundamental rule, as stated in the Crew Station Bill, to report a fire to the bridge immediately, the cooks did not make a report to any ship's officers until shortly before 1600. While this action was taking place, ASSANTI, who was only made aware of a problem in the crew's galley at 1545, notified Duty Fireman ARTUCCI, Safety Officer MATERA and First Officer POLLIO. ARTUCCI notified Chief Fireman MAGLIULO and the Engineering Watch Officer. Ship's Electrician SOMMA, was ordered to secure power to the galley and ASSANTI then sounded the crew alarm at 1555. This alarm sounds only in the crew accommodation spaces.

12. Within minutes after the initial report at 1545, fireman MAGLIULO and duty fireman ARTUCCI were outside the crew galley entrance. Master-at-Arms VITIELLO, carpenter TUORO and First Officer POLLIO had gathered along with other crew members. MAGLIULO donned a protective suit and a self contained breathing apparatus and prepared to enter the galley. MAGLIULO noted that he felt water like "rain drops" falling on his shoulders which suggested to him that the automatic sprinkler system was operating. While crew members rigged a fire hose from a nearby station, MAGLIULO entered the galley and found an electric fryer ablaze. The fryer was located against the rear bulkhead immediately inside the door. He closed the metal hinged lid on the appliance and discharged one CO<sup>2</sup> extinguisher on the fryer and a second one on an electrical panel immediately adjacent to the left. As this was taking place, MATERA arrived. He saw that the smoke by this time was too thick for a proper evaluation, and went back up to A Deck for a mask. In the vicinity of the pursers' office he was joined by First Officer POLLIO and baker PETRIZELLA. PETRIZELLA informed them of the fire in the Continental Dining Room and the fact that he and several cooks had been fighting a blaze there for some 35 minutes. POLLIO, MATERA, MAGLIULO and carpenter TUORO went there directly and found thick smoke and flames in the overhead near the forward bulkhead where it meets

the port side shell. They took charge of the firefighting effort already started by the bakers. There was no testimony that the sprinkler system was operating in this room. A second call to the electrician requested power be secured to the dining room. Hoses were broken out in the Continental Dining Room as well as being led down from A Deck. MATERA and TUORO removed several overhead panels revealing the crew galley exhaust vent which originated immediately behind the A-60 bulkhead separating the Continental Dining Room and the crew galley located forward of the Dining Room. The duct was found to be "red hot". While water was being directed to the overhead, MATERA forcibly jammed a charged hose nozzle through the vent duct casing. He then ordered Barman SCAGLIOTTI to go ashore at about 1600 to call the local fire department. Dense smoke was building up in the Continental Dining Room and MATERA testified that the lack of visibility seriously hampered his efforts to evaluate the status of the fire as to whether it was spreading in the overhead to nearby combustible materials or traveling through the length of the vent or both.

13. While MATERA continued his effort, Staff Engineer LASCALA, First Officer POLLIO and several other crewmen made their way to the stack deck. As all ventilation had been secured by this time, they rigged three charged hoses and put them into the galley vent in hopes that the flow of water would extinguish the blaze that seemed to them to be traveling up the length of the vent. Temperatures "too hot to the touch" were experienced at the vent terminus. Efforts to extinguish the blaze in the Continental Dining Room continued until around 1625. It was not determined if crew members rechecked the galley after extinguishing the blaze in the fryer. However, on A Deck above the galley and Continental Dining Room, carpeting was beginning to smolder in three staterooms. Crewmembers began hosing down the deck fearing that heat from below might cause ignition of the carpeting.

14. On the bridge, ASSANTI noted that the sprinkler alarm for zone 21 (covering the crew galley) had energized the signal light, but he could not recall hearing the alarm sound. He did not close any fire screen doors as he stated it was the policy of the ship not to do so in case any passengers and crew might be trapped or injured by the fast closing action of the heavy doors. However, various fire screen doors within the main vertical zone near the crew galley were at some time closed locally by the crew. Up to this point, no general announcement had been made for the benefit of the passengers. As previously stated, only the crew alarm had been sounded. The general alarm was eventually sounded at 1615 on orders from Staff Captain ORSI upon his return to the vessel. No effort, however, was initiated to evacuate passengers or to prevent them from boarding. From testimony it was apparent that the fire party considered the blaze to be centralized in the two spaces on B Deck and not out of control. There were no attempts to establish fire boundaries despite the fact that the fire had breached one main vertical zone bulkhead separating the crew galley and the Continental Dining Room. There were no efforts made to establish a central on board command post where a flow of information could be processed and decisions made. Most notably, there was no one person of authority looking after the welfare of the passengers.

15. By 1625 the Continental Dining Room had become filled with thick smoke and the firefighting efforts were discontinued. The firefighting team evacuated without being able to tell how effective their efforts were. Only a few fire party members had self contained breathing apparatus. Others were using a filter type mask which proved totally ineffective. As the last person to leave the Continental Dining Room, MATERA testified that he closed the fire screen doors to the stairwell located on the centerline of the after boundary of the room. He then insured that fire screen doors throughout the affected area were closed locally by hand. Post fire examination, however, revealed the doors in the Continental Dining Room to be open.



16. Shortly after 1600 the Virgin Island Fire Department, with Sergeant BROWN in charge, arrived. They observed passengers and crew coming and going from the ship. There were a number of persons in the lobby area on A Deck but no organized activity was noted. After several minutes, Sergeant BROWN was apparently directed to the Continental Dining Room, where he observed the heavy smoke. Sergeant BROWN was not equipped with a mask or breathing apparatus and proceeded back up to A Deck for a "Scott Air Pac" self contained breathing apparatus. He and several firemen returned to the Continental Dining Room where they observed crew members fighting a blaze in the overhead. Heeding the direction of MATERA, he withdrew with the rest of the crew on scene and returned to A Deck where he met the Chief of the St. Thomas fire department, Chief JENNINGS. Fire Chief JENNINGS had been notified of the fire while at home and arrived on the ship around 1625. He was not told by Sergeant Brown of the activity ongoing in the Continental Dining Room but was directed immediately to the crew galley. He and two assisting Virgin Island firemen observed flames in the overhead. On the deck outside the galley he observed a ship's hose, but little pressure was noted by him. He did not observe any crewmembers engaged in firefighting in this compartment. He had observed on arriving, crewmembers hosing down several stateroom decks above the galley and Continental Dining Room. The pressure in those hoses appeared to be very low also. Chief JENNINGS, therefore, ordered his men to rig hoses from his mobile pumper located shoreside. He made no attempt to rig his pump to the vessel via an international shore connection. These hoses were then led down to the crew galley where his men commenced fighting the fire in the galley. Even after putting the fire out, the density of smoke still appeared to be building up. He ordered Sergeant BROWN to take some men and go through the ship and begin assisting passengers off. When Chief JENNINGS returned to A Deck a short time later, the Continental Dining Room had been evacuated and the doors closed. He was still uninformed of the crew's efforts in fighting a fire in the Continental Dining Room and believed that the crew was not involved in any firefighting activity. At this time he heard the sound of crackling wood and realized that there were more fires on board. He observed heavy smoke in the stair tower leading up from the Continental Dining Room on B Deck. His conclusion was that the fire in the crew galley had spread to other compartments and, having little knowledge of the arrangement of the ship, could not determine to what extent or how rapid. At this time he sought out a ship's officer to have the crew initiate efforts to evacuate all passengers and crew. He saw a number of crewmen near the gangway but did not recognize any person of authority. He wasn't aware that a public announcement at 1615, along with the sounding of the general alarm, had been made. In his evaluation, Chief JENNINGS considered that the fire was out of control from this time on. Chief JENNINGS had little previous verbal contact with the crew and reported that he could only communicate his desire to have the passengers and crew evacuated via animated hand gestures. Relative to the events going on up to this point, was the observation made by the firemen and arriving Virgin Island Civil Defense men, that the continuous foot traffic consisting of passengers and crew boarding and debarking simultaneously, hampered the firemen and shoreside emergency teams in rigging hoses from shore and bringing equipment aboard. Although a crew gangway was stationed at the engineroom hatch on B Deck, the heaviest traffic was concentrated around the central foyer. Finally, all subsequent boarding traffic was stopped and Chief JENNINGS again ordered his men to go throughout the ship looking for passengers and crew who might not yet be aware of the fire, nor able to appreciate the urgent need to get off as soon as possible. The crew by now had recognized the Chief's authority by virtue of his badge and uniform and began to effect evacuation. The extent of the actual fire had not been fully evaluated, however the density of the smoke and developing heat was quickly forcing crew and passengers alike towards the shoreside exits. The firefighting effort onboard had ceased. As smoke and heat became more intense, Chief JENNINGS accelerated his efforts to ensure evacuation before all safe egress from the vessel was cut off. No attempt was made to direct traffic to an alternate exit on B Deck until the last few minutes of the evacuation.

This added to the confusion as uninformed passengers still sought their way to the smoke filled foyer, the only exit they knew about.

17. Engineering personnel became aware of the fire at various times after 1545. First was LAURO SOMA (Chief Electrician) who was requested to secure power to the crew galley and later to the Continental Dining Room. First engineer DOMENICO SCALA, on watch in the control booth on A Deck, was told of smoke coming from the crew galley by fireman ARTUCCI. He in turn notified the Staff Engineer and Chief Engineer who were just arriving at the control booth on routine business. Chief Engineer SESSA dispatched Staff Engineer LA SCALA to the Continental Dining Room and then assumed command of the engine room. After a short briefing, SESSA shut down all ship's ventilation at around 1600. He then ordered the staff engineer to go up to the stack deck and discharge fire hoses into the galley vent.

18. By this time, smoke was starting to accumulate in the engine control room which necessitated evacuation of personnel and securing of the auxillary steam plant. Engineer SAVASTANO was directed to go below and check the status of fire pumps. He was also told that the sprinkler pump had started up but did not verify that it was on until some time later. At 1610 all fire pumps had been energized as well as all ship's service generators. All non-essential electrical power demands were secured. A slow withdrawal of engineroom personnel commenced. Between trips topside for fresh air and down again to the operating machinery, the Chief Engineer and several other officers maintained all emergency service machinery until 1745 when he ordered the final evacuation of the engineroom. As he recalled, all but one generator was secured and all fire and bilge pumps and the sole sprinkler pump was on the line. The chief engineer testified that his final act before departing the ship was to trip the master switch to close all fire screen doors.

19. By 1730 the evacuation efforts initiated by Chief JENNINGS were still proceeding. Despite a severe language difficulty between the firemen and the crew of the ANGELINA LAURO, ship's stewards, Virgin Island Fire Department and Civil Defense personnel made a cabin by cabin search of the ship insuring that everyone onboard, passengers and crew alike, were made aware of the situation and directed or assisted to either the A Deck or B Deck gangway. All internal firefighting efforts either by the ship or Virgin Island Fire Department had ceased due, according to Chief JENNINGS, to the fact that he believed the fire to be out of control and his efforts at this time would be best directed towards saving passengers and crew. Various ship's officers testified they believed the Fire Department to be in charge now and were obligated to follow the Chief's directions to evacuate and to allow him to take charge of the pierside firefighting effort.

20. Between 1630 and 1745 all of the the passengers and crew were disembarked. The Virgin Island fire department had previously established a shore side effort and were pumping water into the open port holes on B Deck where the first outward indication of flames could be seen in the Continental Dining Room. The first offshore vessel capable of fighting a fire was the USCGC POINT WHITE HORN, arriving at 1705. On the ANGELINA LAURO bridge, Second Officer ASSANTI remained at his post with the Deck Cadet GALATI until heat and smoke forced their final evacuation at 1700 via an aerial scope platform operated by the Virgin Island Fire Department. On the B Deck level at the hatch entry to the engineroom, Captain DI CARLO, Staff Captain ORSI and other senior officers remained until 1730 to 1745 monitoring the activities in the engineroom and the evacuation proceedings. At 1710 LT ERIC OLSSON of the Coast Guard Marine Safety Detachment in St. Thomas arrived at the vessel's port side via small boat and entered through an open side port aft on C Deck. He observed the flames and dense smoke above on B Deck. Observing that the firefighting effort had been moved to the pier, he proceeded there to establish

liaison with the fire department and to check on the safety of the other passenger vessels moored at the dock.

21. Incidental to the activity at about this time was a rescue effort ongoing in the elevator, aft of the passenger galley. Virgin Island Civil Defense man JODY DAVIS had entered the elevator believing he had heard a call for help on another deck. As the elevator apparently descended, it stopped midway between decks when the electrical power was cut off. When his absence was discovered, the chief of the civil defense organization, MILTON PENN, and other members started a search of the vessel. A similar effort was being directed by Captain ORSI. DAVIS was eventually located by the crew of the ANGELINA LAURO and instructed by Staff Captain ORSI on emergency procedures for opening the doors to the elevators. After DAVIS was finally removed, suffering from dehydration and smoke inhalation, all parties concerned were notified and final abandonment of the vessel commenced. By 1745 it was believed that no one was left onboard.

22. On the pier, provisions were being made by COSTA Line representatives to account for all passengers and crew. Once the count indicated that no one was missing, arrangements were made to board all passengers on three other cruise ships in the harbor for the return trip to San Juan. Final approval for those emergency measures was given by Commander WEBB, Officer in Charge Marine Inspection, San Juan, Puerto Rico, shortly after his arrival at the scene early that evening. In the meantime, notification of the fire had reached key representatives of various other interested parties in the nearby area. These included the Commander, U.S. Coast Guard Greater Antilles Section, San Juan, P.R., U.S. Navy in Roosevelt Roads, P.R., Virgin Island National Guard in St. Croix, St Thomas Port Authority Operations Officer and the Governor of the Virgin Islands in St. Thomas.

23. While Commander WEBB was preparing to fly over from San Juan via Coast Guard helicopter, the Commander of Naval Forces, Roosevelt Roads, made available to the Virgin Island Fire Department resources and personnel from the USS COREY and USS MCCANDLESS, which were making a port call in St. Thomas at the time. A Navy Tug boat, YTB 811, also in St Thomas, was immediately dispatched to the scene and Navy personnel utilizing portable fire pumps were taking station on the pier near the stern of the ANGELINA LAURO. The U. S. Coast Guard Cutter GALLATIN, on maneuvers in the Caribbean, was directed by Commander, Greater Antilles Section to proceed to St Thomas and to assume On-Scene Commander (OSC) upon arrival.

24. In the initial stages of this phase, the fire was being attacked by pumping water into the vessel through any open porthole or sideport both from the pier and from the water side. As flames could be seen on numerous areas of the superstructure, water was concentrated for the most part on B Deck and above where open ports and hatches provided convenient entry. Chief JENNINGS encountered a serious problem in coordinating efforts as communications with the offshore assisting vessels were virtually nonexistent. The offshore vessels were actually working independently as the Fire Chief concentrated on his direction of the shoreside professionals and volunteers. He assumed the Coast Guard would be responsible for coordinating the offshore efforts, but communications presented the same problem to the On-Scene Commander as it did for the Fire Chief. He was also informed that a privately owned tug boat (the TURQUOISE BAY) from Amerada Hess in St. Croix was being dispatched and that it had superior firefighting capabilities. Its arrival was expected later that evening. Early in the evening, the pier supervisors, Ports Authority, Navy, Coast Guard and Civil Defense personnel had set up a command post nearby. Little or no contact was being made with the crew of the ANGELINA LAURO, as hundreds of

spectators, passengers, and government officials observed the fire from the pier. There was no indication in the testimony of any master plan or coordination of efforts being formulated at this time. Chief JENNINGS did not pursue his earlier attempts to communicate personally with the crew, nor did he engage in any dialogue with the Command Post officials directly. However, the Captain, Chief Engineer and various other members of the crew gave valuable assistance to the firefighters, both civilian and military, during the later days of the continued firefighting effort, as solicited by the OSC and other firefighting personnel. Chief JENNINGS continued as he thought best, by maintaining the steady flow of water into the ship.

25. By 1930, the flames covered the entire superstructure. In the meantime, Chief CANTON of the Virgin Island Police Department had initiated crowd control procedures and cleared the immediate area of spectators. Suddenly, all firefighting shoreside ceased and the fire teams were escorted away from the vessel. At the Command Post several hundred yards up the pier, it was learned that Chief CANTON was told by an unidentified person (he believed was a Coast Guard officer) that the ANGELINA LAURO's fuel tanks were in danger of exploding. In order to protect the personnel in the vicinity of the ship, he ordered an immediate halt to the fire fighting activity and evacuation of the pier. The Virgin Island Fire Department secured all of their equipment and returned to their Headquarters in town. After a hurried conference with key personnel at the Command Post, Commander WEBB (Coast Guard Captain of the Port and designated USCG On Scene Coordinator) who had arrived at 2000, determined the location of the fuel tanks and ordered the military teams and assisting vessels to concentrate water on the tank tops located in the after portion of the vessel. It was not believed by any of the key personnel that the fuel tanks were in immediate danger of exploding and that if the compartments where they were located could be flooded, any possibility could be eliminated. Carrying this thought further, the Virgin Island Port Operation Officer, JACK MONSANTO, conferred with the COSTA Port Engineer about his idea of settling the vessel on the bottom by blowing holes in the hull, thereby more quickly flooding and protecting the spaces in which the fuel tanks were located. The ANGELINA LAURO at this time was already within 1 or 2 feet of the bottom. While he was researching this plan, the Governor had requested him to study the feasibility of towing the vessel out of the harbor. It was determined that neither the tug, YTB 811, nor the USS COREY could succeed in controlling such a large ship in tow. It was then that he and the COSTA Representative approached the Navy with their plan to request a Navy UDT team to blow holes in the hull. However, no suitable explosive was readily available and non-concurrence by Commander WEBB was emphatically stated when he became aware of the plan. It was believed that the vessel was nearly resting on the bottom anyway, so water was continued to be sprayed in the area of the fuel tanks.

26. The problems of coordinating all of the efforts were recognized earlier in the evening by Commander WEBB. His first objective was to offer his assistance to the Fire Chief and then attempt coordination of the afloat vessels. Priority problems surfacing at the Command Post were related to vessel stability and the location of the fuel tanks. Through his influence, the direction of water was concentrated aft in the area where the main fuel tanks were located. This effort served to divert the concentration of water from the upper decks to the lower decks. The results were three fold: the tanks were cooled preventing the possibility of explosion; the probability of creating total instability was reduced; and the vessel eventually settled on the bottom. At 2030 the fire department returned and resumed firefighting efforts. Also, the Hess owned tug, TURQUOISE BAY, arrived and was positioned near the stern. While no one could testify as to who was over all in charge at the scene, Chief JENNINGS stated that he was responsible, but was not always advised of

the various activities and decisions being made by other people. He maintained the Coast Guard was responsible for coordination of the offshore effort, while he was directing the pier side teams, both Navy and Civilian.

27. At around 0500 the following morning, the vessel took a list to port of about 30 degrees. On the offshore side, the Turquoise Bay reported side ports coming open and water gushing out. Onshore, fire parties retreated to safety, fearing the mooring lines might part.

28. In the meantime, the CGC GALLATIN had arrived in the Harbor entrance and Commander MORITZ, Executive Officer, representing the On-Scene Commander, had gone ashore to take charge. The USS COREY, which had assumed On-Scene Commander previously, relinquished and departed, leaving volunteers and equipment onshore. Commander MORITZ had been ashore when the vessel listed. He observed it to partially right itself, after the initial list, to about a 17 degree port list, as the topside weight discharged through open sideports. He tested the lines and determined that the immediate danger had passed and that the vessel apparently was resting steadily on the sandy bottom. Fire fighting efforts once again commenced and continued for the next several days until the fire was completely extinguished on 4 April.

29. Starting with the morning of the second day a more systematic attack of the fire was formulated. Under the direction of Fire Chief JENNINGS and Commander MORITZ from the GALLATIN, St. Thomas firemen and the volunteers from the Navy and the Coast Guard Cutter GALLATIN began to isolate the fires onboard. Eventually, the fire teams were able to reboard the vessel. The GALLATIN crew provided the bulk of the man power and, working around the clock, they succeeded in bringing the fire under control.

30. The question of organization and agency relations was frequently posed during the investigation. Fire Chief JENNINGS stated that he was in overall charge of any firefighting responsibility on the Island. He believed that the Coast Guard was responsible for coordinating, under his direction, any Coast Guard assistance. Commander WEBB stated his responsibility was for the general safety of the port and since he was not designated On-Scene Commander by the Section Commander, he assumed the duties of liaison and advisor in addition to his predesignated duties as On-Scene Coordinator. Under this designation, Commander WEBB saw his objective as containing the fire onboard without allowing the vessel's fuel tanks to burst from the fire's heat and without allowing the vessel to capsize from the application of too much water in the wrong place. He also had two problems to consider regarding the potential for pollution if the tanks exploded, or if the vessel rolled over. Commander MORITZ considered the GALLATIN's duty as On-Scene Commander to be overall in charge of the firefighting effort including the shoreside fireman provided they were a "party to that kind of agreement." However, he conceded "I'm not sure, I wasn't sure then and I'm not sure now where the line of authority with the Virgin Island Fire Department and up was." As the interplay of relations proceeded, Commander MORITZ characterized the activity as a "joint but separate effort" relying discreetly on tactfully presented requests. He knew of no incidents where mutually agreed upon actions were not carried out to their most effective end. His objective was the extinguishment of the blaze.

31. According to Commander WEBB, this unique perspective between the two Coast Guard officials resulted from the Search and Rescue Mission Coordinator in San Juan treating the incident as a Search and Rescue case. Normally, Commander WEBB, as per Part 86-6 of the Coast Guard Marine Safety Manual (CG-495) is prescribed as the On-Scene Coordinator for each incident in which Coast Guard firefighting forces

or equipment are being utilized and that all such Coast Guard forces and equipment would be under the control of the On-Scene Coordinator. In his opinion, this lack of role understanding coupled with the failure to communicate responsibilities via a preestablished contingency plan hindered effective organization at the outset when critical decisions had to be made.

32. The GALLATIN's crew, who had fought the fire for almost 3 days around the clock, finally departed on 5 April. The Virgin Island Fire Department, in addition to many civilian volunteers, remained at the scene off and on as the demands for their services otherwise permitted. The fire was completely extinguished by the 4th of April. A post fire examination was conducted at that time. The vessel was ultimately declared a total constructive loss by her owners and sold for scrap. While in tow to the Far East in July of 1979 the ANGELINA LAURO sank at sea in the Pacific Ocean.

### 33. Galley Operations

The crew galley was located on B Deck port side between frames 166 and 174. The galley was approximately seven meters by eight meters in size. The forward and after bulkhead of this galley were solid steel while the vessel's shell comprised the port side boundary. Three portlights of approximate diameter of .5 meters were equally spaced in the sideshell. The starboard side bulkhead of the galley also formed a small corridor between the galley and an inboard stair tower. The entrance door to the galley opened inward and was at the far aft end of this corridor. A roll down steel serving window of approximate dimension of 1 meter x 1.5 meters was located in the same bulkheads, roughly 1 meter forward of the entrance door. All bulkheads of the galley were said to be certified by Registro Italiano Navale (RINA) and insulated to A-60 class with sprayed on asbestos insulation. A .1x1 meter opening under the serving window compromised the integrity of that bulkhead. The after bulkhead of the galley was formed by the main vertical zone bulkhead at frame 166 and was the division between the galley and the Continental Dining Room.

34. The galley was fitted with typical equipment encountered in quantity food production. An electric fryer/skillet and range were located along the after bulkhead, two large steam kettles were located on the port side, two refrigerators were located along the forward bulkhead, and a slicing/serving table was located on the starboard side. A large preparation table occupied the center of the space. The electric power switches for most of the galley equipment were housed in a switch panel behind and to the left of the entrance door. The power switch to the fryer/skillet was not located in this panel but was located aft, in the passenger galley behind the Continental Dining Room.

35. Above the galley range and fryer/skillet was a steel exhaust hood which collected vapors from these appliances. Exhaust was extracted from the hood through a rectangular exhaust duct wrapped with fiberglass, 750mm x 200 mm in size. The exhaust duct passed horizontally through the main vertical zone at frame 166 and was routed through the Continental Dining Room aft to frame 151 where it turned 90 degrees and ran athwartship to the starboard corridor adjacent to the staintower on the centerline of the after end of the dining room. Here it turned 90 degrees and ran aft to frame 142 where it entered the staintower and was then routed vertically to the vessels forward stack. On the Stack Deck, the duct ran aft to frame 125 and terminated inside the after funnel. It was fitted with an electrically driven exhaust fan and a manually operated, blade type damper at this termination. Two automatic fire dampers were fitted in the hood exhaust duct, one

inside the galley and one inside the Continental Dining Room adjacent to the main vertical zone bulkhead. Both dampers were identical. They were constructed of 5mm thick steel. The blade was held in the open position by a fusible link designed to melt at 72 degrees centigrade and could be manually operated. The portion of the duct in the Continental Dining Room was covered with fiberglass. The ducts along with air conditioning ducts, sprinkler system piping and electrical wiring were hidden from view by a false ceiling composed of fiber panels supported by wood battings.

36. A rectangular ventilation duct also 750mm x 200mm was fitted on the starboard side of the galley. Similar fire damper arrangements were provided for this duct as for the hood exhaust duct and it was also fitted with a manual blade type closure in the stack casing. This duct served as an exhaust duct over the two portside steam kettles, and continued forward through the galley. It was fitted with another fire damper immediately forward of the crew galley.

37. A third duct system served the crew galley to provide air conditioning. A 1000mm x 1250mm rectangular duct was routed aft from frame 185 to the galley. An automatic fire damper was provided in this duct, immediately forward of the galley.

38. A post fire examination of the hood exhaust duct revealed that the damper on the galley side of the hood exhaust duct did not close, although the fusible link had melted. The damper on the dining room side had closed; however, it was severely warped. The inside of the duct had a heavy residue of burned grease, however; Chief Crew Cook CAPRICANO claimed that the vent was frequently cleaned and had been so as a matter of routine for as long as he was on the vessel. The hood was equipped with screens intended to catch and condense the grease vapors from cooking. Several witnesses said they were regularly changed, and CAPRICANO stated that this was a matter taken care of by the engineering department. The vent screens were changed on the 28th of March and normally changed once a week and examined by the ships engineers and by inspectors during Coast Guard examination. Also present in the hood was a steam smothering line. The line was traced where it comes out of the hood at the port side of the ship, down to the decklevel, and then forward to the port corner of the galley, thence vertically where there was a manual valve at ceiling level for activation. This system was not used to fight the fire.

39. The crew galley was one of the busiest operations on the vessel. From here, all meals were prepared and served to the crew. During off hours, the galley was generally left locked when not attended. Crewmembers not able to make certain meal schedules, could come and get what ever was left over or even cook for themselves, provided a galley man was present. The administration of the galley fell under Chief Crew Cook CAPRICANO. He oversaw the routine of the galley, training, policies and cleanliness.

40. The crew galley was equipped with a fryer/skillet standing independently next to the stove. It is identified as a Triplex model 364 Italian made commercial cooking utensil, self contained with two heater elements. Its dimensions are: width in millimeters: 1,170; depth in millimeters: 700; total height in millimeters: 940. The heating element is outside and underneath the pan. The entire pan will rotate forward in an upright position tilting it to allow the pouring out of the pan's contents through a funnel like lip. The instrument is covered by a spring loaded cover. The entire utensil is made of a high carbon steel. From the company who has since absorbed the original manufacturer, it was learned that this instrument was purchased for the ANGELINA LAURO in 1965. Its primary purpose is the cooking or warming of sauces, gravies, and stews. It can also be used for the ordinary frying of foods such as meats and fishes. The temperature control can be set at three



different levels depending on what is being cooked or warmed. Model 364 was not designed to be used specifically to heat oil in such quantities sufficient for deep frying. Cooking in deep oils normally requires a deep-fat fryer with its own wire basket, an immersion type heating element, and appropriate thermostat and/or a high temperature cutout. The model 364 had none of these features. There were two temperature control knobs with 4 positions each: off, 1, 2, 3. An inspection of the unit after the fire revealed that the two temperature controls were set on 3, or the highest setting. Resistance measurement indicated that with the controls in this position, the unit would draw four kilowatts of power. Crew testimony revealed that with this unit operating at full power, it took approximately twenty minutes to heat the oil sufficiently for deep frying. Normal cooking temperatures were considered in the range from 300 to 400 degrees fahrenheit. Most commercial cooking oils when heated will reach their flashpoint at 450-470 degrees fahrenheit, but will not auto-ignite until heated above 600-650 degrees fahrenheit. During a laboratory test conducted on the Triplex Fryer/Skillet, 16 liters of Frymax frying fat were added to the skillet. A comparison of time versus temperature was run for each switch setting. With both switches set on number 3, auto-ignition (fire) occurred at 75 minutes, temperature 695 degrees fahrenheit. From crew testimony, it is evident that this fryer was used for deep fat frying. Chief Cook CAPRICANO recalls that for as long as he had been on the ship the appliance had always been used as a deep-fat fryer and had commonly held eight to ten liters of oil. He recalled having had the oil in the fryer filtered and 6 liters added shortly before the day of the fire. To his knowledge, as well as galley man IACOMINOS', it had not been used on the 30th, but would have been used after 1600 for the evening meal. Testimony of the Chief Cook indicated that the evening meal would include french-fried potatoes. Potatoes were in fact found in the galley; however, IACOMINO could not state that he had taken them out in preparation for the oncoming cooks. It was the policy of the galley to use only the lower or medium setting, 1 or 2, and at that range it was known to take between 25 to 30 minutes to bring the oil to cooking temperature. There were no written instructions regarding the general usage of the fryer/skillet available to the crew. There was apparently only general knowledge by the cooks regarding which switch settings gave the proper temperature for frying. This was either learned or passed on by the Chief Cook. When IACOMINO departed the galley on the 30th of March, he testified that the fryer was not on.

#### 41. Structural Fire Protection

The M/V ANGELINA LAURO (Ex Oranje) was launched for Netherland Line on 8 September 1939 by the Netherlands Shipbuilding Co. in Amsterdam. At that time, there were no applicable international fire safety regulations other than those contained in the 1929 SOLAS Convention. She was completely refitted for her new owner, Achille LAURO, in 1965/1966 at Cantieri del Tirreno dockyards in Genoa, Italy. At the time, the conversion was supervised by Registro Italiano Navale and certified to be in full compliance with the requirements of parts D, E, and F of Chapter II of SOLAS 1960 (Method II) and 1966 SOLAS Amendment, Resolution A. 108. The interior bulkheads were of several basic types: (1) steel main vertical zone said to be (certified by RINA) insulated to A-60 class by the addition of 26mm of sprayed on asbestos insulation identified as "SILBESTOS" F631. The insulation had a specific gravity of 0.12 Kg/CM<sup>3</sup> and was anchored to the steel by a coating of "SILCOAT" commercial cement and steel wire hooks 2.5mm in diameter spaced at the rate of 25 hooks per square meter; (2) steel A-0 class bulkheads for stair towers; and (3) combustible wooden interior bulkheads covered with plastic laminates. These later type bulkheads were used for the majority of passenger and crew accommodation spaces. The entire accommodations and service area were fitted out with combustible materials. All linings, grounds, and draft stop overhead supports were wood. Bulkheads and overhead panels were wood, covered on both sides with a plastic laminate. Stateroom doors were wood covered with plastic laminates or anodized aluminum. Furniture was wood covered with plastic.



Carpeting of undetermined material was also installed throughout the vessel. Some air conditioning duct work was constructed of a PVC type material.

42. A post fire examination revealed that the main vertical zone bulkheads remained intact, and many retained their insulation. The majority of bulkhead and deck penetrations remained sealed. There were, however, a great number of fire screen doors that were found in the open position. It was noted that many doors were distorted and some fire screen doors which had aluminum frames were rendered ineffective as the framing melted or was consumed by the fire, allowing the door to fall or drop. It was also noted that the upper opening to the main stair tower (#3) at the Saloon Deck level was not equipped with any fire screen doors. On the Saloon Deck, accordion metal fire doors were not closed, nor of the self-closing type. These doors were found 30 to 40 feet open and were located at 3 sides of the forward and aft lounge. With the exception of a small area forward of frame 201 on C Deck and the steel bulkheads, decks and structural framing, the internal structure and furnishings of the vessel were consumed. No draft stops were found to be intact on the vessel. Most steel ducts were noted to be intact except those which had fallen from the overhead due to hanger failure. The horizontal run on the stack deck of the crew galley exhaust duct that was routed between the vessel's two stacks was made of aluminum and partially disintegrated.

#### 43. Fire main and hose stations

The M/V ANGELINA LAURO'S fire main system was supplied by three main fire pumps and could be inter-connected to five other pumps with a total flow capacity of 980 m<sup>3</sup>/hr (or 4266 GPM). On B Deck, there were four fire hose stations forward of frame 166. One was located at the starboard side forward corner of the crew's galley outside of the galley at frame 174. One was on the starboard-longitudinal corridor at frame 180 and the remaining two were in the port and starboard corridors at approximately frame 205. In the Continental Dining Room, there were two hydrants at frame 147 on the port and starboard sides of the main staintower. On A Deck there are two hydrants in the port and starboard corridor at frame 140 and two in the corridors at frame 167. Each hose cabinet contained one length of fire hose, a straight bore nozzle, a spanner wrench and a gate valve connection to the fire main.

#### 44. Automatic Sprinkler and Detection System

The M/V ANGELINA LAURO was constructed to SOLAS 1960, Method II, standards. She was also required to meet Regulation 76 of the 1966 SOLAS Amendment, Resolution A. 108 regarding sprinkler systems. The sprinkler installation was supplied by Bronswerk-Saval, Breda, Netherlands. The system was divided into 28 zones, with an alarm panel located in the fire station and a duplicate panel on the bridge. Section 18 of the system covered the Continental Dining Room on B Deck, and consisted of 86 fusible bulb, pendant type sprinkler heads of 12mm diameter orifice, designed to operate at 79 degrees centigrade. All sprinkler heads projected below the false ceiling and pointed downward. Section 21 covered an area including the crew galley and consisted of 102 sprinkler heads on B Deck. The entire system was supplied by an electrically driven sea-water pump capable of a pressure of 7.14 kg/cm<sup>2</sup> (101 psi) at a rate of flow of 594 GPM. The system was kept under pressure by a 4000 liter fresh-water pressure tank, kept at 7.14 kg/cm<sup>2</sup> (101 PSI) by a 15CFM capacity air compressor. The system was designed so that the sea-water pump would start automatically when the pressure in the tank dropped to 5 kg/cm<sup>2</sup> (71.1PSI). Both the pump and the pressure tank fed the sprinkler system through non-return (check) valves. The sprinkler piping consisted of a series of 100mm diameter feed mains to each gate valve.

The sprinkler system was a "wet type", the system being under constant pressure. When one head was fused due to excess heat, and water started flowing, a pressure drop occurred which activated a pressure switch which started the pump. Each cabinet was equipped with a test valve which, when open, simulated fusing one or more heads creating the pressure drop required to activate the pump. The alarm system was only activated when a drop in pressure was experienced in a particular zone. The test method insured the correct automatic operation of the pump and the alarm system. There were no records available as to the results of or when the last flow test took place. The 100mm section valve for zone 21 was located in a cabinet at frame 197 on C Deck starboard side, approximately two meters from the centerline. The section valve for zone 18 was located on B Deck starboard side at frame 147, immediately adjacent to the stairtower.

45. The crew's galley on B Deck was protected by four sprinkler heads fed from a 37.5mm diameter cross main, piped from section valve 21. The port side of the Continental Dining Room was protected by 16 sprinkler heads fed by a 100mm cross main from section valve 18. An engineering analysis of the sprinkler system design for the zone covering the Continental Dining Room and crew's galley (zones 18 and 21) assumed full pump output of 135 m<sup>3</sup>/hr (594 GPM), each 100mm riser should have received 67.5 m<sup>3</sup>/hr. Assuming that each sprinkler had an average K factor of 5.3 and that the pressure at each head was at 15 PSI, the head would flow approximately 4.6 m<sup>3</sup>/hr (20.2 GPM). Each zone could therefore supply 14 sprinkler heads or conservatively 10, for efficient output at full flow. Twenty-nine heads opened any place on the ship would operate within design efficiency criteria. Beyond that, any massive opening of additional heads would result in a drop in pressure and subsequent reduction in flow.

#### 46. Condition of fire extinguishing system after the fire

A post fire examination of the casualty indicated that the 100mm valves for sections 18 and 21 were found to be open only 4-1/2 and 7 turns respectively. It was later determined that 28 turns were required to open the valve fully. Several fire hoses were laid out in the area of the crew's galley. The hose station immediately adjacent to the galley was not utilized. Both hose stations in the Continental Dining Room had been operated. Additionally, a fire hose nozzle was found in the galley hood exhaust duct in the Continental Dining Room. The crew fire team testified they had pierced the duct, and wedged the nozzle in place to provide cooling water inside the duct. Three fire hose nozzles were found in the galley hood exhaust duct terminating in the vessel's stack with the charred remains of the hoses leading to the vent terminus. Two 5kg hand portable carbon dioxide type fire extinguishers were found on the deck in the vicinity of the entrance door to the crew's galley. Several other extinguishers were noted lying in the crew's dining saloon immediately forward of the galley. Five similar portables and one 35kg wheeled semi-portable carbon dioxide extinguisher were found lying in the Continental Dining Room by the forward main vertical zone bulkhead. Due to the flooding of the vessel, examination of the main fire pumps could not be made. The sprinkler tank and associated valves, however, were found to be in apparent operating condition.

## Conclusions

1. That a fire occurred aboard the M/V ANGELINA LAURO on 30 March 1979 which resulted in the total constructive loss of the vessel. There were no serious injuries or deaths connected with this casualty.
2. The proximate cause of the casualty was that person(s) unknown turned on the skillet/fryer located in the crew's galley to its highest setting, position #3, and thence left it unattended. As a result, the oil in the skillet/fryer overheated and reached the point of auto-ignition.
3. It cannot be determined when exactly the fire started in the crew's galley. The fire was first discovered by the cook and bakers on duty when flames reached the overhead in the Continental Dining Room immediately aft of the crew's galley at about 1520. The fire propagated through the exhaust vent hood over the skillet/fryer in the crew's galley and continued through the exhaust duct in the Continental Dining Room. The extreme heat in the vent duct into the Continental Dining Room ignited adjacent combustible material. The fire spread throughout the vessel from that point.
4. It cannot be determined who turned the control switches to the high heat position #3 on the skillet/fryer.
5. Contributing to the start of the fire was the fact that no instructions or warnings with regard to the operation of the skillet/fryer were posted, nor was there any evidence that anyone, besides the galley workers, was aware of the admonition not to use any heating positions except positions 1 or 2.
6. Evidence established disputes the testimony of IACOMINO in that he probably was not in the galley at about 1515 as he so stated.
7. Contributing to the rapid spread of the fire was the accumulation of grease and oil residue in the crew galley exhaust duct.
8. The automatic fire damper in the hood exhaust duct, located in the Continental Dining Room, closed, but was not effective in restricting the passage of flames due to the rapid travel of the initial fire. This could have been due to the fact that heated grease resulted in an accumulation of volatile gasses in the vent in such a concentration as to ignite and spread rapidly before the fusible link closed the vent. A second possibility is a flame impingement on the vent flap was of sufficient intensity to warp the damper which allowed the flame to pass through.
9. Although insulation was provided for the galley exhaust duct melting the requirement of Regulation 82b of the 1966 SOLAS fire safety standards, it was not effective in slowing the rate of heat transfer to nearby combustible materials in the overhead of the Continental Dining Room.
10. Contributing to the immediate spread of the fire was the large amount of combustible materials in the overhead above the false ceiling and in close proximity to the exhaust duct.

11. Contributing to the further spread of the fire was the large amount of wood, carpeting, and other combustible material throughout the vessel. Even though all wood, carpeting, and other combustible material was specially treated to be fire-retardant, it was not effective in eliminating the spread of fire.
12. Contributing to the spread of the fire was the approximate 30 minute delay in reporting the fire to the bridge.
13. That had a portion of the the sprinkler heads been installed above the false ceiling, the spread of fire may have been retarded and the Bridge would have received an earlier notification through the sprinkler alarm system.
14. That although the sprinkler valves in zones 18 and 21 were not fully open, activation of the sprinkler would not have prevented the spread of the fire since the fire propagated above the sprinkler heads. Further, a massive release of more than 29 of the total heads would have resulted in an immediate deterioration of their effectiveness as the water pressure was reduced.
15. Draft caused by open side ports, port holes and fire screen doors led to the oxygen fueling of the blaze.
16. Contributing to the spread of the fire was the failure of the crew to effect the immediate closing of fire screen doors.
17. That the actions of the crew to extinguish the blaze were not effective in arresting the spread of the fire.
18. Although many agencies were involved, there was no central control identifiable by all participants or organized plan of attack during the critical first 12 to 15 hours of the incident.
19. The crew of the vessel was remiss in not initiating timely announcements to evacuate all passengers once the fire was discovered. In addition, their failure to restrict the movement of passengers and crew on or off the vessel and their failure to establish the gangway on B Deck as an alternate exit hindered the deployment of shoreside emergency gear and the orderly evacuation of the vessel.
20. There were no plans or stability data of the ship available ashore for any of the fire-fighting personnel. This hampered the subsequent efforts in fighting the fire.
21. The failure of the Virgin Island Fire Chief to consult the Master on stability and location of fuel tanks resulted in further confusion as to how best to attack the fire from shoreside.

22. The fact that an English speaking officer was not at the brow to brief the Virgin Island Fire Department Chief and direct him to the several areas of conflagration led to his subsequent decision to initiate total evacuation procedures, vice investigating further, with suitable guidance, the possibility of apportioning part of his resources to onboard firefighting duties.
23. That the density of smoke precluded the crew from continuing fighting the fire probably due to the limited availability of self contained breathing apparatus.
24. That the Virgin Island Fire Department based their evaluation of the extent of the fire primarily on the density and amount of smoke without further investigation as to the actual spread of fire. It was undetermined as to whether or not the fire could have been controlled at that time.
25. The vessel was substantially in compliance with SOLAS 1960 and the 1966 Solas Amendment, Resolution A.108, as a Method II vessel.
26. Although it cannot be determined who turned the fryer/skillet on, there is evidence of inattention to duty on the part of a person or persons unknown for failing to attend to the fryer/skillet while it was in operation.
27. With the exception of above, there is no evidence of actionable misconduct, inattention to duty, negligence, or willful violation of law or regulation on the part of licensed or certificated persons; nor evidence of failure of inspected material or equipment; nor evidence that any personnel of the Coast Guard, or of any other government agency, or any other person contributed to the casualty.

## Recommendations

1. That consideration be given to changing Regulation 76(b) of the 1966 SOLAS Amendments, Resolution A.108, to restrict substantially the use of combustible materials during construction or retrofit of all passenger vessels regardless of date or method of build.
2. That consideration be given to changing Regulation 82(b) of the 1966 SOLAS Amendments, Resolution A.108, to require insulation approved to A-60 around exhaust ducts from galley cooking appliances where the ducts pass through accommodation spaces.
3. That the Coast Guard explore with IMCO the feasibility of requiring vessels equipped with sprinkler systems, to have a number of heads installed sufficient to cover the void between the deck above and any overhead false ceiling.
4. That all appliances capable of generating temperatures high enough to raise the temperature of oils to the point of auto-ignition, be equipped with high temperature cut-outs set below the temperature of auto-ignition.
5. That galley exhaust ducts on all vessels subject to Coast Guard Certification or Examination For Controls Verification, be opened and inspected for cleanliness and fire dampers checked annually during Coast Guard inspection and examination.
6. That a flow test of Method II passenger vessel sprinkler systems be conducted as part of the USCG Control Verification Examination at least every two years.
7. That on vessels required to be equipped with sprinkler systems, consideration be given to requiring the control valves at each sprinkler station to be locked in the open position by some positive means.
8. On all passenger vessels subject to USCG Control Verification Examination, install a placard in English at each elevator warning persons not to use the elevator during fire or emergency situations.
9. That consideration be given to requiring that all passenger vessels calling a U.S. port deposit with the responsible port official where docked, a copy of the vessels fire safety plan, general arrangement and damage control and stability plans.
10. That consideration be given to the following:
  - a. That the cognizant COTP develop for his area of jurisdiction in coordination with local fire and safety officials, a contingency plan for fire or disasters occurring on vessel's pier side or at anchor including a designation and understanding of who is in charge.

- b. That Search and Rescue Coordinates for U.S. Coast Guard who appoint On-Scene Commanders be fully cognizant of Part 86 of the Coast Guard Marine Safety Manual (CG-495) regarding coordination with other agencies and the Captain of the Port.
11. That materials used in retro-fit, renovation or modification of all Method II SOLAS passenger vessels be non-combustible materials.
12. That SOLAS passenger vessels subject to U.S. jurisdiction provide two widely separated and accessible gangways to be designated for passengers and so marked while at a berth.
13. That the U.S. continue to work in conjunction with the international maritime community to develop standards for the training of all ships crews in fire fighting and emergency procedures.
14. That consideration be given to require that draft stops be made of non-combustible material meeting the requirement of A-O.
15. That the Coast Guard consider in conjunction with IMCO the feasibility of requiring the installation of a self activating fire extinguishing system to be installed in each range hood which in the event of a fire would secure a damper located at the screen end, shut down the exhaust fan and activate the extinguishing system automatically.
16. It is recommended that the casualty investigation be closed.

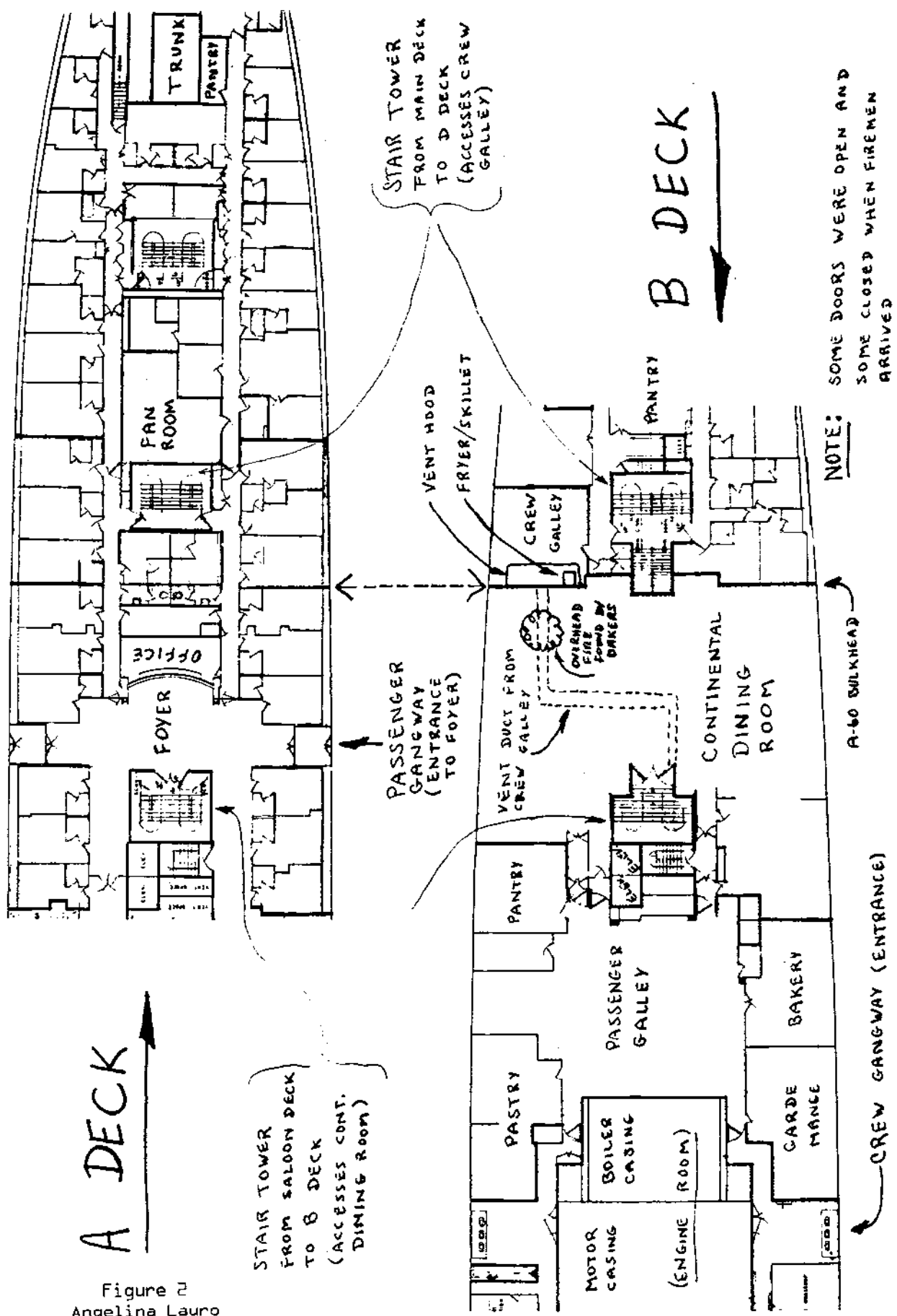


Figure 2  
 Angelina Lauro  
 Partial  
 A & B Deck Plan

A DECK

B DECK

STAIR TOWER  
 FROM SALOON DECK  
 TO B DECK  
 (ACCESSES CONT.  
 DINING ROOM)

STAIR TOWER  
 FROM MAIN DECK  
 TO D DECK  
 (ACCESSES CREW  
 GALLEY)

PASSENGER  
 GANGWAY  
 (ENTRANCE  
 TO FOYER)

NOTE: SOME DOORS WERE OPEN AND  
 SOME CLOSED WHEN FIREMEN  
 ARRIVED

A-60 SULKHEAD

CREW GANGWAY (ENTRANCE)

VENT HOOD  
 FRYER/SKILLET

VENT DUCT FROM  
 CREW GALLEY

OVERHEAD  
 FIRE  
 CAUSED BY  
 BAKERS

PASSENGER  
 GALLEY

PANTRY

MOTOR  
 CASING  
 (ENGINE ROOM)

PASTRY

PASSENGER  
 GALLEY

PANTRY

VENT DUCT FROM  
 CREW GALLEY

OVERHEAD  
 FIRE  
 CAUSED BY  
 BAKERS

CREW  
 GALLEY

PANTRY

PANTRY

FAN  
 ROOM

TRUNK

PANTRY

CONTINENTAL  
 DINING  
 ROOM

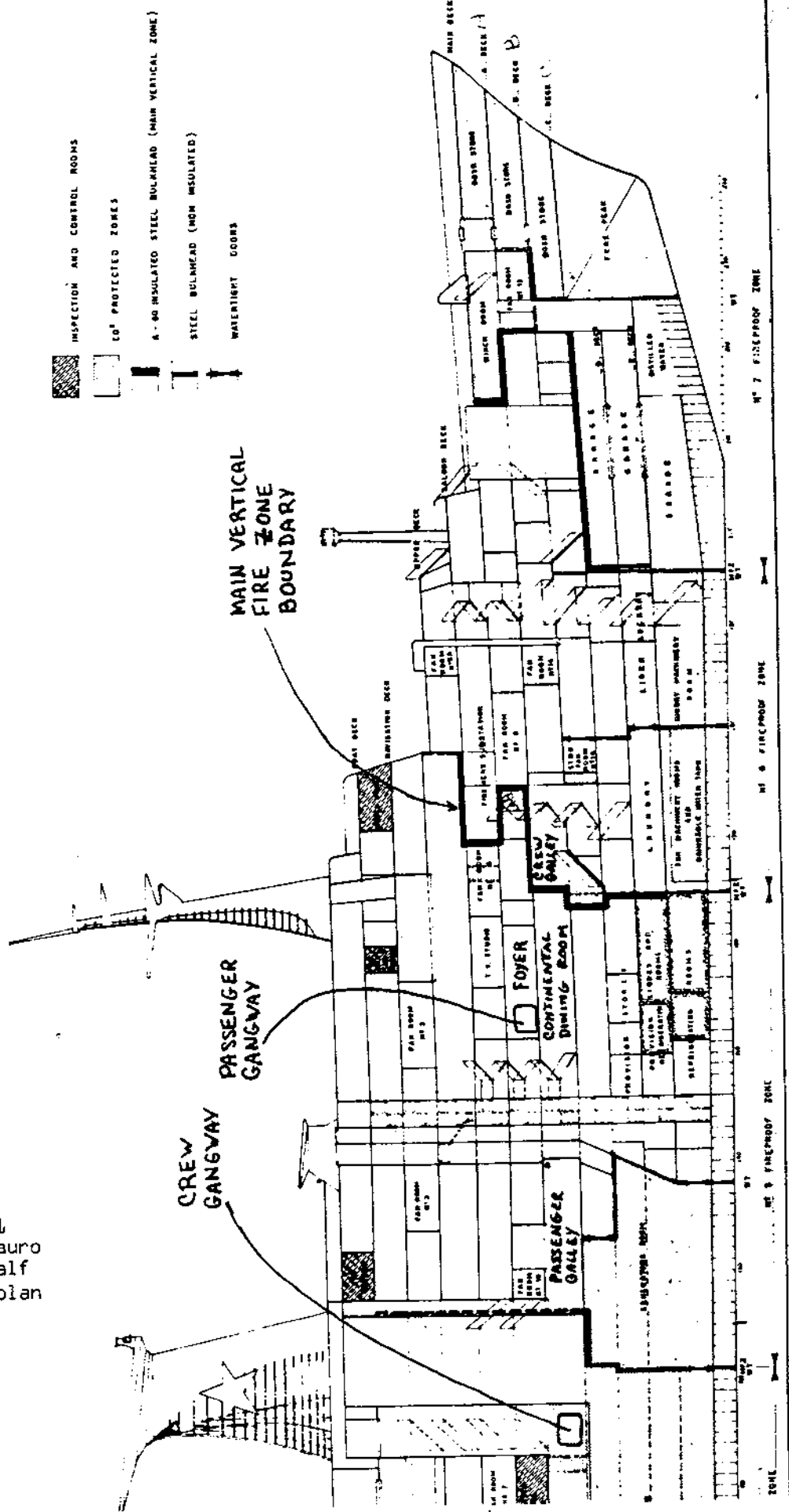
BAKERY

CARDE  
 MANCE

CREW GANGWAY (ENTRANCE)



Figure 1  
 Angelina Lauro  
 Forward Half  
 Side view plan



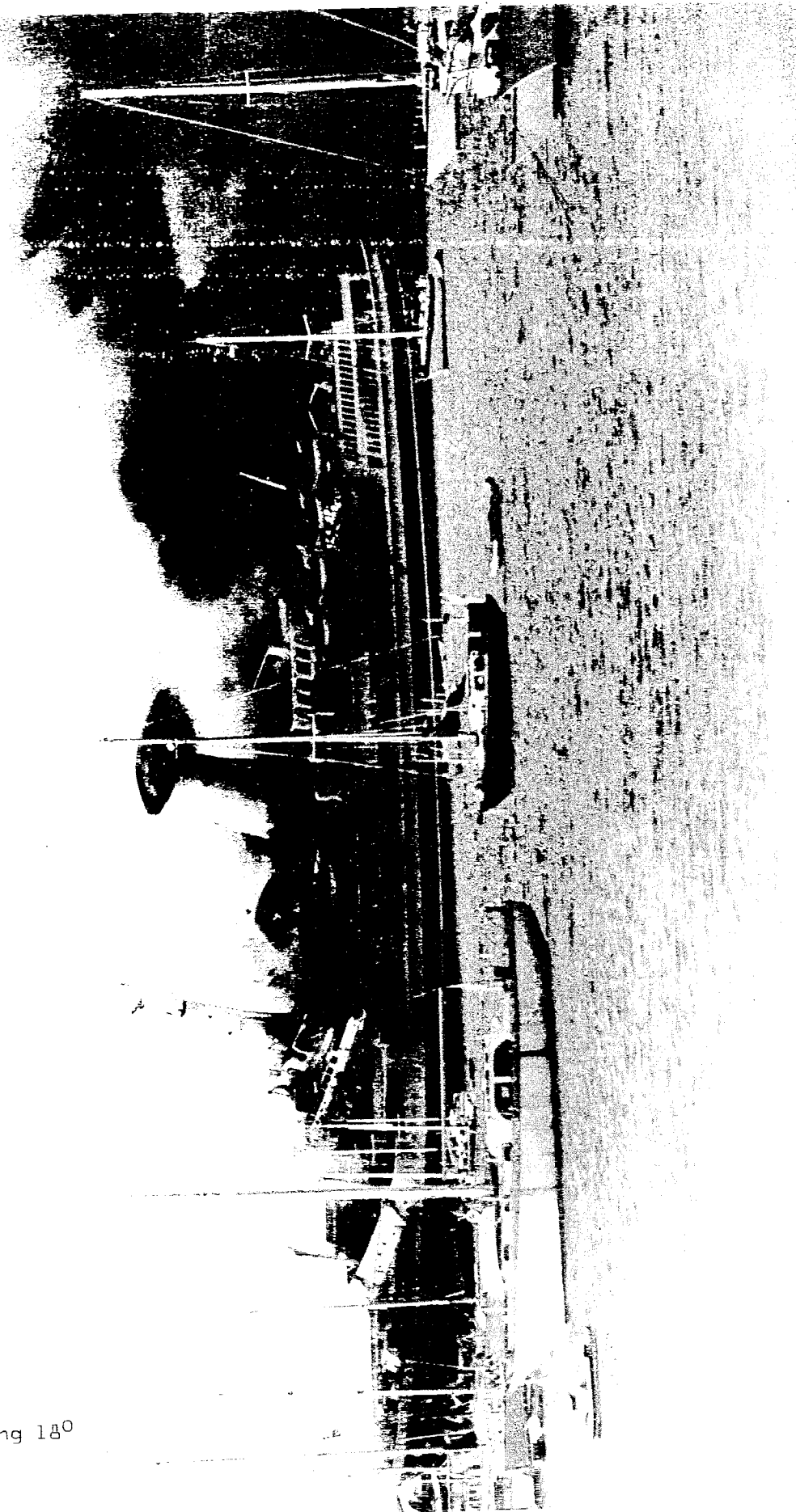


Figure 3  
Angelina Lauro  
On fire and listing 18°

Figure 4  
Starboard side view

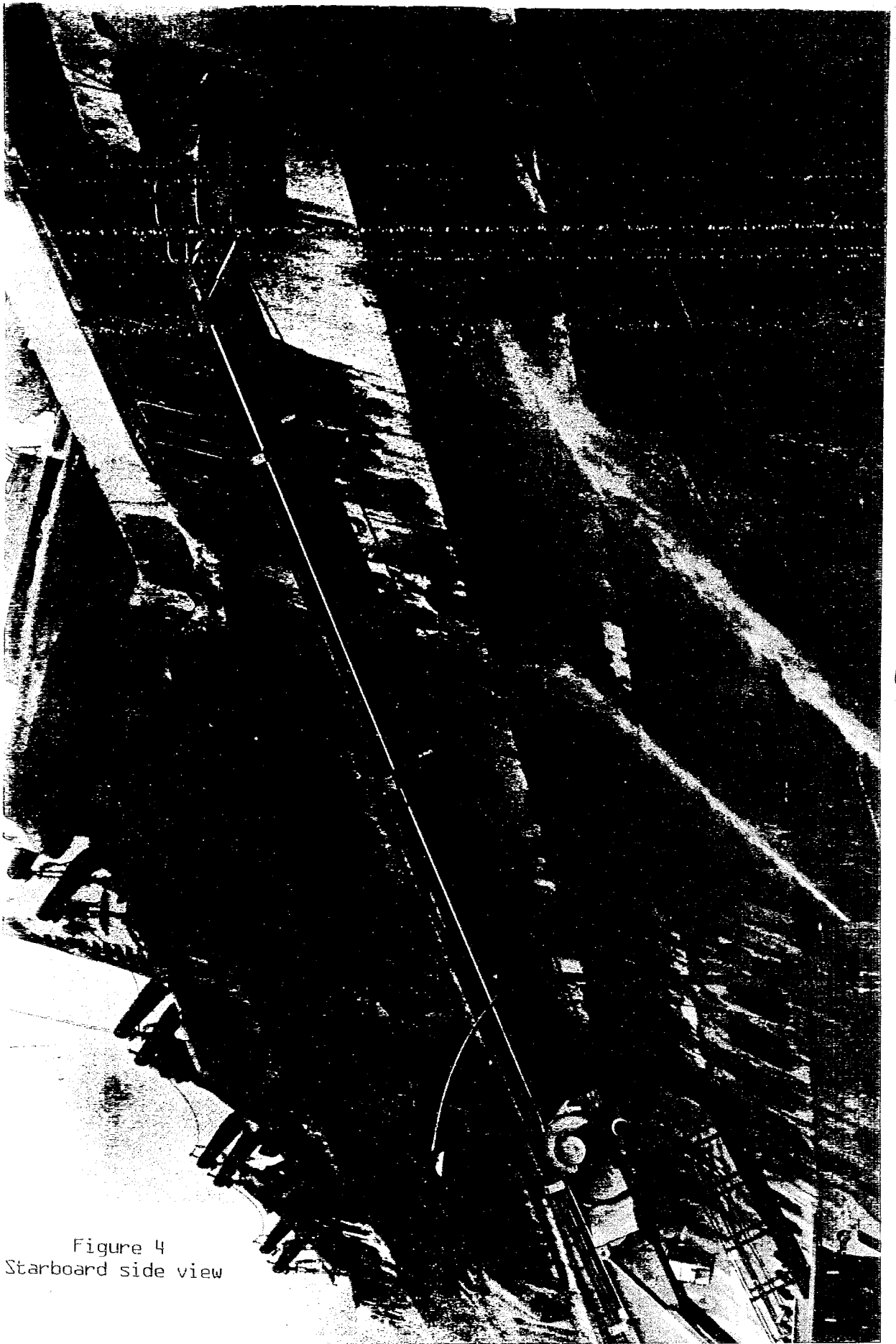




Figure 5  
Pilothouse

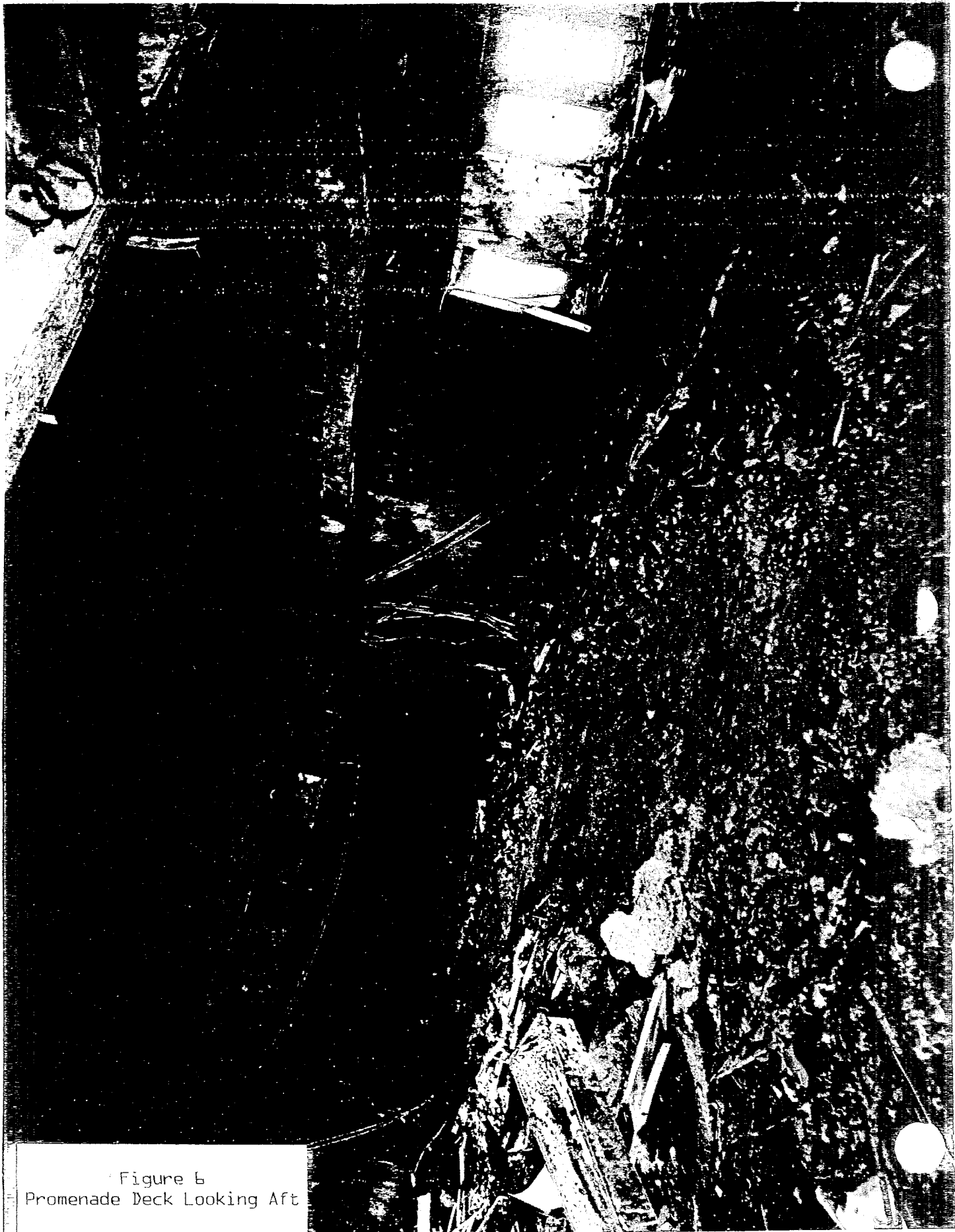


Figure 6  
Promenade Deck Looking Aft



Figure 7  
A deck State Rooms looking forward

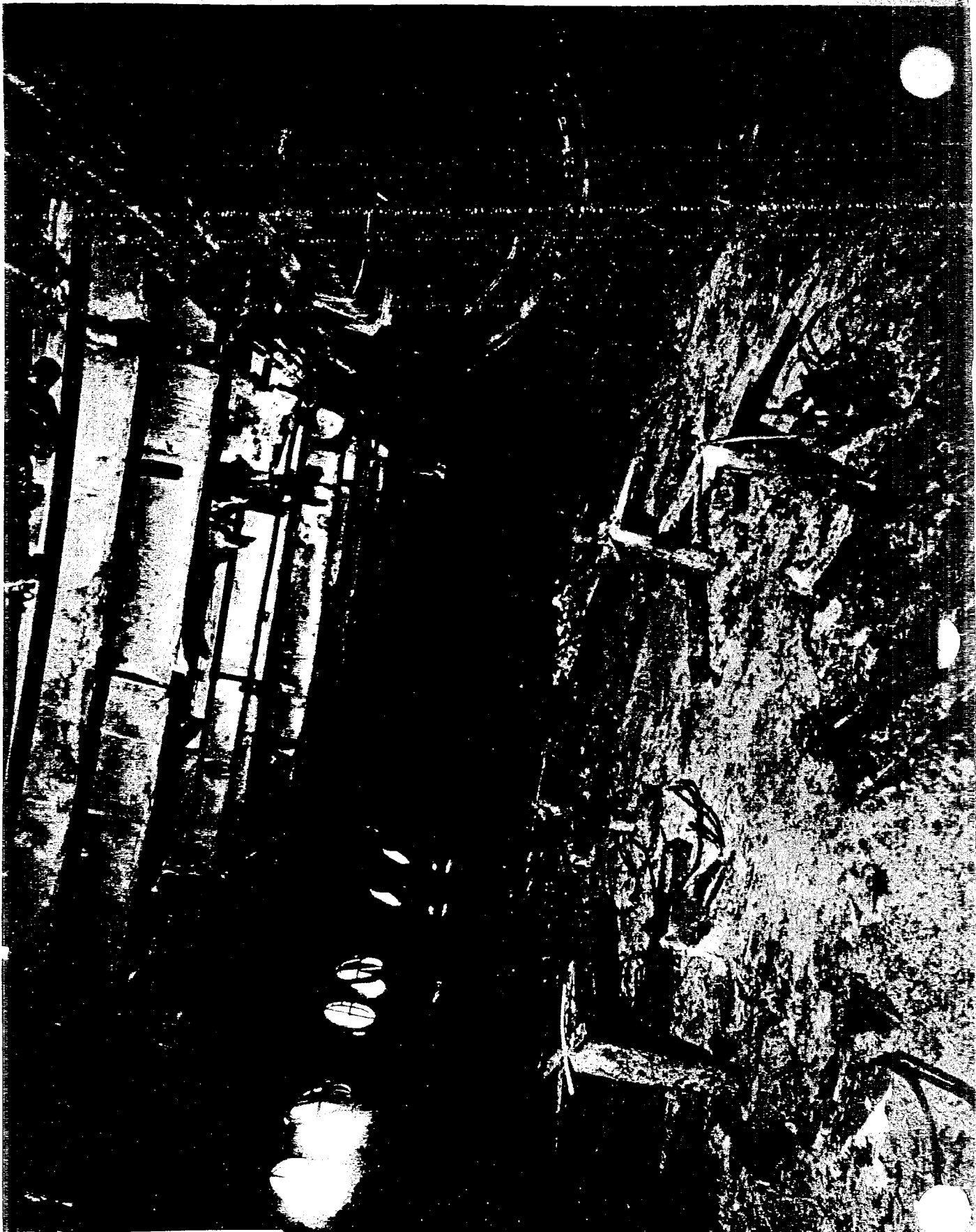


Figure 8  
Continental Dining Room  
Looking Aft

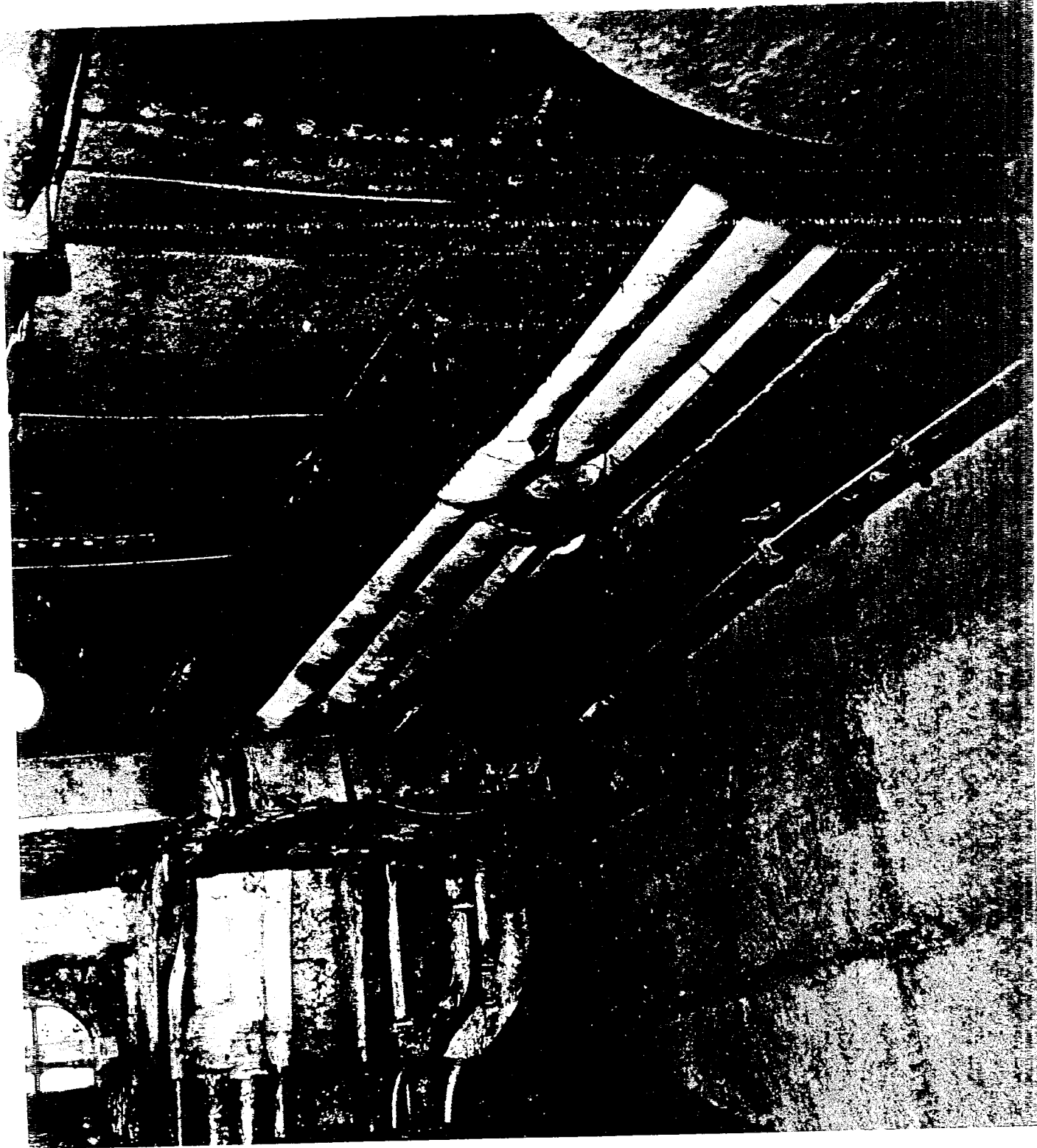
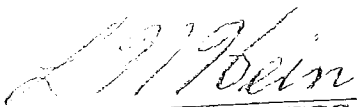


Figure 9  
Continental Dining Room  
View of the Crew Galley  
Exhaust Vent

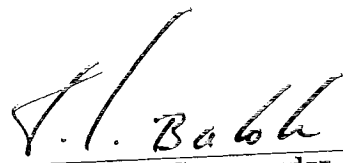




Figure 10  
Crew Galley, view of  
Skillet/fryer

  
\_\_\_\_\_  
L. N. HEIN, Captain USCG  
Chairman

  
\_\_\_\_\_  
D. A. CALICCHIO, Commander, USCG  
Member

  
\_\_\_\_\_  
L. J. BALOK, Commander, USCG  
Member and Recorder