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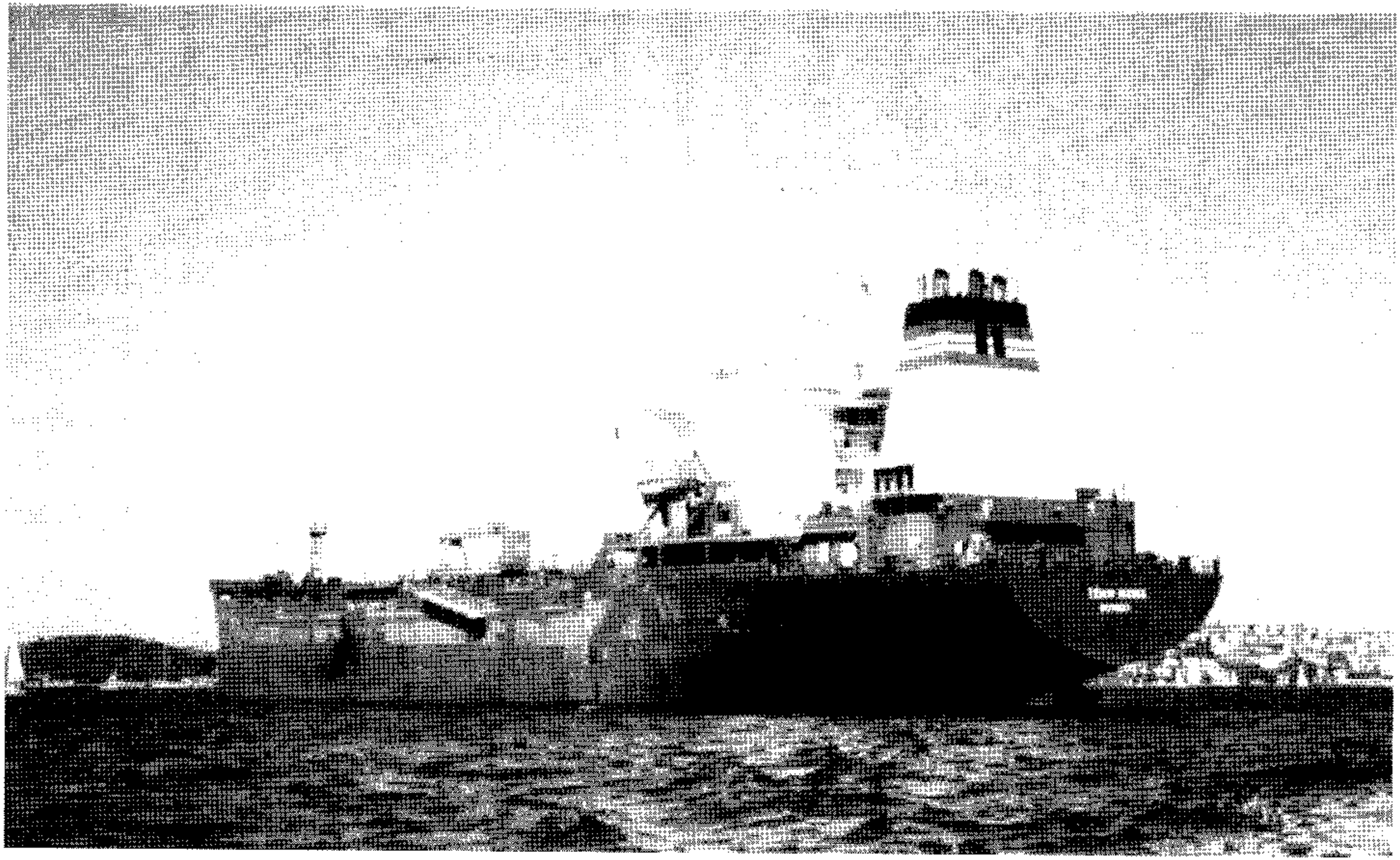


Team Heina

Summary

On 3 February 1995 the Norwegian flag tanker Team Heina was at anchor off Sydney Harbour, waiting to berth at Gore Bay, when, at about 0945, a compression fitting on a line to a fuel pressure gauge on No.3 diesel generator blew out. The resulting spray of hot heavy fuel oil at about 6 bar pressure, ignited on the engine's exhaust manifold and then spread burning oil over the deckhead above the engine. The fire intensified and expanded rapidly.

Most of the engineering department personnel were working around the engine room at the time. The First Engineer ran to the engine control room and shut down the generator before attacking the fire with an extinguisher. The extinguisher, however, failed to discharge. The motorman had grabbed another extinguisher but that, too, failed to discharge. By the time other extinguishers had been brought to the scene and used, the fire had increased to the point where the Chief Engineer decided to evacuate the engine room.

The engine room was evacuated, the vent flaps were closed and the vessel's fixed fire-fighting system (Halon) was discharged. When it became apparent to the ship's crew, who were making their way to their muster stations on deck, that it was a serious fire, a number of them ran to the port lifeboat.

Ten to fifteen minutes after discharging the Halon, a crew member, wearing breathing apparatus, made a re-entry and reported that some small patches of fire remained. These were put out by two other crew members with portable extinguishers.

The First Engineer, wearing breathing apparatus made an entry and started one of the diesel generators, restoring power to the vessel which had remained blacked out since No.3 generator had been stopped. The emergency generator had started but failed to come on line.

The engine room was ventilated and the damage was assessed. Initially it appeared that the damage was superficial, but closer inspection of the main cable run above No.3 generator revealed that it had suffered some damage. The classification society imposed a condition of class on the vessel, requiring repairs at the next drydocking. Pending repairs, only Nos. 1 and 2 generators could be used.

The incident was investigated by the Marine Incident Investigation Unit under the provisions of the Navigation (Marine Casualty) Regulations.

Sources of information

The Inspector acknowledges the assistance of the following in the preparation of this report:

The Master, officers and crew, Team Heina

Materials Evaluation Facility, Civil Aviation Authority

Wiltrading Pty. Ltd.

Jadmac Electrical Services Pty. Ltd.

Narrative

Team Heina

Team Heina is a Norwegian NIS (Second Register) flag tanker of 40,395 tonnes deadweight with an overall length of 176 m and a beam of 32 m. The ship was built in 1991 as a chemical (caustic soda only) and oil tanker at the Trogir yard of Brodogradiliste "Jozo Lozovina-Mosor" in the former Yugoslavia. When launched, the vessel was named Mosor Sun but was soon after renamed Faith. When acquired by its present owners, A/S J. Ludwig Mowinckels Rederi, in 1992, it was again renamed, becoming Team Heina. At the time of the incident, the ship was being operated on time charter to the Shell Company of Australia.

The ship operates a service from the Australian port of Geelong, where it loads most of its cargo of petroleum products, to Papua New Guinea and Fiji. On occasion, the ship calls at Sydney to top up its cargo for the Pacific islands.

The vessel's complement consists of the Master, three mates, three engineers, an electrician, a radio officer and sixteen ratings. Apart from the four senior officers who are Norwegian, the remainder of the ship's complement are Filipino nationals.

The main engine of the Team Heina is a five cylinder Burmeister and Wain 5MC60 slow speed, single-acting, two-stroke of 600 mm bore and 1944 mm stroke, producing 7651 kW (10402 hp) at the shaft. This gives the vessel a maximum service speed of 14 knots. The machinery spaces are classified as UMS (Unmanned Machinery Spaces)

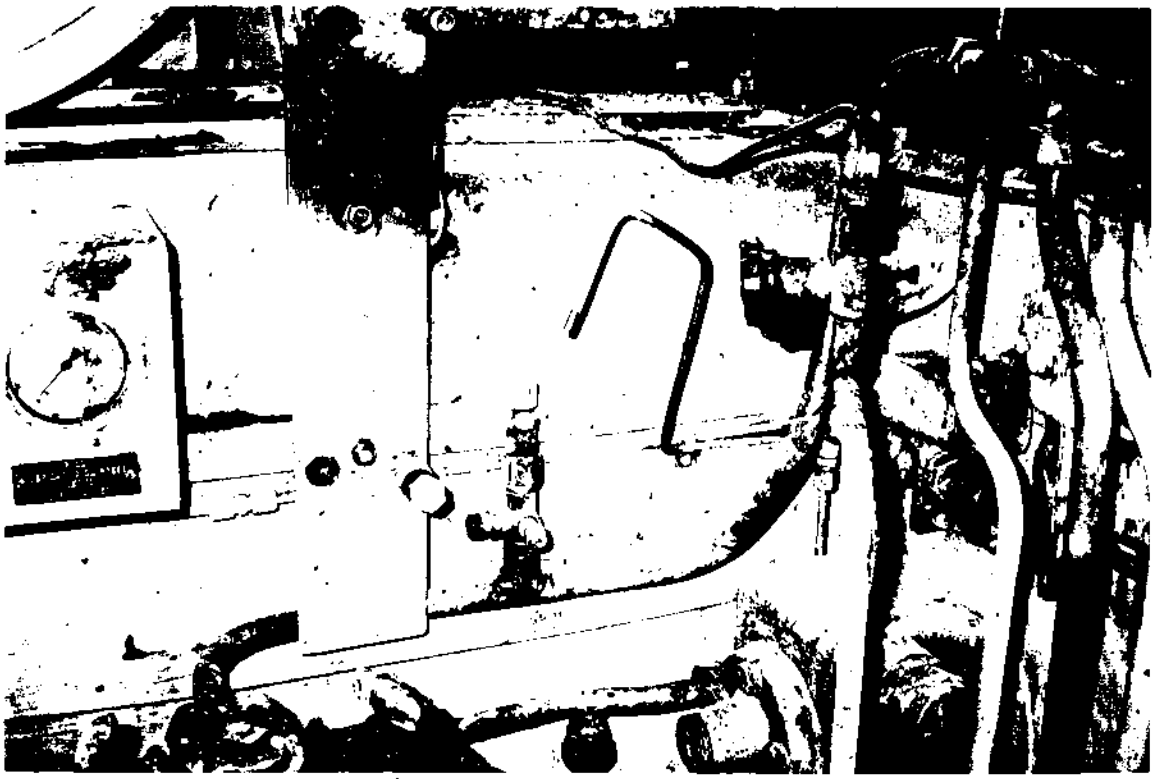
The vessel is fitted with a bow thruster unit.

Auxiliary machinery

Electrical power is provided by three M.A.N. 6l23 diesel generators of 624 kW each and is generated at 450 volts, 60 Hz, 3 phase. The auxiliary engines are arranged to run on heavy fuel oil with the capability to use diesel oil for starting up and for flushing through the fuel system on the engine when shutting down.

The three generators are arranged across a flat at the forward end of the engine room, No.1 being on the port side and No.3 on the starboard. Fuel is supplied from the heavy fuel oil service tank to each engine, via filters and a fuel heater, by an independent electrically driven fuel oil boost pump at a pressure of between 5 and 6 bar. The boost pumps are situated on the same flat as the generators and are normally stopped and started at starter boxes situated near these pumps.

At the aft end of each engine is mounted a gauge panel containing the essential instrumentation for the engine including a gauge indicating the fuel boost pressure. This pressure is read at the forward end of the fuel rail, just before the engine-mounted injector pumps. At this point, a boss is welded to the fuel rail and into the boss is fitted an isolating cock and adaptor. Atop this adaptor is mounted a compression fitting. (See photograph on next page.) A 6 mm steel pipe is secured in this compression fitting and



No.3 generator - fuel supply line showing steel gauge pipe disconnected from compression fitting

runs from there along the engine to the gauge on the panel.

Fire-fighting system

The ship's fixed fire-fighting system is a Halon based system consisting of sixteen 150 kg bottles of Halon gas, distributed around the machinery spaces. There are five bottles on each of the three levels of the engine room and an extra bottle for the inert gas room. The engine room system can be discharged from only one position, the lobby outside the port side main deck access to the engine room. At this position are also situated the remote emergency pump and fan stops and the controls for the quick-closing fuel valves.

In addition to the fixed Halon installation, the salt water hydrants and fire hoses, the ship is equipped with sixty portable fire extinguishers. Of these, thirteen are "Pastor" 12 kg dry powder fire extinguishers (of Yugoslavian manufacture), deployed at various positions around the engine room.

The ship has three fire, or muster, stations. Stowed at these fire stations are, in total, four sets of breathing apparatus (BA sets) together with six spare bottles.

The ship's company is divided into three fire-fighting teams which, in an emergency, muster at the fire stations. Drawn from these three teams, when required, there is a "Technical Squad", consisting of the Second Engineer, the Electrician and one other crew member.

The incident

On Friday 3 February 1995, Team Heina was at anchor off Sydney Harbour, having arrived from Geelong at midday on 31 January, partly loaded

with approximately 6000 tonnes of Premium Motor Spirit and other petroleum products. The ship had anchored there to await a berth at the Shell oil terminal at Gore Bay where it was due to top up its cargo with more product for the Pacific islands.

Shortly before 0945, most of the engineering department staff were working around the engine room when one of the two fitters ran into the engineers' workshop calling out to the Second Engineer that there was a fire in the engine room. Coming out of the workshop, the Second Engineer and the motorman saw that there was a small fire on the top of No.3 generator. The First Engineer, who was working near the auxiliary boiler, saw the commotion and, making his way to the forward end of the engine room, was able to see what was, by that time, a rapidly expanding fire. The First and Second Engineers ran to the engine control room, where the First Engineer shut down No.3, the running generator. This caused an electrical blackout and although the battery-powered emergency lighting came on, the emergency generator, having started, failed to connect to the emergency switchboard. No.2 generator, being set in "stand-by", started automatically but did not connect to the main switchboard. The Second Engineer, going outside the control room, saw that the fire had increased considerably in both size and intensity. He returned inside the control room and checked that No.3 generator was off, before grabbing a fire extinguisher from the control room. He attempted to make his way down to the generator flat below, but was driven back by the heat and smoke.

The First Engineer had meanwhile left the control room and made his way down to the generator flat where he had also grabbed an extinguisher, close to No.3 generator, which he attempted to discharge at the base of the fire. The extinguisher, however, failed to discharge. The motorman brought another extinguisher from the port side of the generator flat but this one, too, failed to discharge. A few moments later, other crew members arrived at the scene with more extinguishers. Five or six extinguishers were discharged at the fire but the fire was, by this time, swirling around the deckhead and was of such a size and intensity that the extinguishers had little effect.

Before the fire started, the Chief Engineer had been working on the bottom plates level of the engine room, where a pump was being overhauled, when he smelt something burning. Looking around, he had seen the activity of people running around the engine room and so he, too, ran towards the generator flat where he joined the First Engineer discharging extinguishers at the fire. The First Engineer attempted to reach the handle for the fuel isolating valve on No.3 generator, but it was close to the seat of the fire and the heat prevented his reaching it. Burning paint flakes and insulation were falling onto his unprotected head and arms.

It very quickly became evident to the Chief Engineer that the fire was out of control and he ordered everyone to evacuate the engine room.

The Master had been sitting in the ship's office when at 0946 he heard the fire doors closing, followed by the

sounding of the ship's automatic fire detection alarm. Approximately 20 seconds after the fire alarm sounded, the ship suffered an electrical blackout. He raced up towards the bridge, noticing as he went, that the accommodation stairwell and alleyways were beginning to fill with smoke.

The ship's walkie-talkie radios were kept on the bridge. The Master sent the Third Mate down from the bridge with radios for the Chief Engineer, the Mate and the other officers. Shortly afterwards, the Chief Engineer called the bridge and told the Master that they had attempted to extinguish the fire with extinguishers, but that they had been unsuccessful, the first two having failed to discharge, and that the fire was now out of control. He suggested that the Halon should be released and the Master readily agreed.

The engine room vent flaps were secured in a very short time by the vessel's Technical Squad and the Chief Engineer and the First Engineer made their way to the Halon release station, just outside the engine room port access on the main deck level. That station was already full of smoke, visibility was less than a metre and breathing was difficult. It was necessary for the Chief Engineer to use a torch in order to locate the Halon release. Once it was ascertained that there was nobody remaining in the engine room, the Master ordered the Halon to be released. The quick-closing valves for the heavy oil and diesel oil service tanks were also operated at about the same time. The Chief Engineer was able to hear the Halon gas issuing from the cylinders in the engine room. No.2 generator, although running, had not connected to the switchboard, and the ship remained without power. After the release of the Halon and the closing of the valves on the fuel oil service tanks, No.2 generator engine could be heard to slow right down, although it did not stop, continuing to consume the fuel in the line between the service tanks and the engine. Thick white smoke issued from its exhaust in the funnel.

The fire alarm, followed shortly by the blackout, had sounded at 0946. By 0950, all the vent flaps had been closed, the engine room evacuated and the Halon released. Following the release of the Halon, a member of the Technical Squad started the emergency fire pump in the forecastle, which is driven by its own diesel engine, and pressurised the ship's firemain. Meanwhile, the other two emergency teams, under the direction of the Mate and the Second Mate, laid out and prepared fire hoses on deck. The whole of the accommodation and machinery spaces were by then full of black smoke. At 1014, the Master called the vessel's owners by cellular phone and reported the situation.

After some ten to fifteen minutes, one of the crew, equipped with a BA set, was sent into the engine room to ascertain whether the fire had been completely extinguished. A few minutes later he returned and reported that there were a few small pockets of fire remaining. Two more men in BA sets were sent in with dry powder extinguishers and quickly put out the residual fires.

After receiving the report that all the fires were out, the First Engineer donned a BA set and entered the engine room to start one of the main generators and to connect it to the switchboard. As the quick-closing

valves on the fuel service tanks had been shut from the emergency operating position, it was necessary for him to locate the valves in the smoke and semi-darkness and to open them again. While in the engine room, the First Engineer noticed that there was still some flame around the insulation on the pipes above No.3 generator. However, at that moment, the whistle on his BA set started to sound, indicating that he was running out of air, and he returned to the deck. With a new BA set and a fire extinguisher, he returned to No.3 generator and extinguished the remaining fire before starting No.2 generator and manually connecting it to the main switchboard.

With No.2 generator running once more, power and main lighting were restored. The Chief Engineer, meanwhile, hearing that the fire was out and observing from the top of the engine room that the smoke was clearing, decided to open the skylight to start ventilating the engine room. After a short while, with no apparent increase in smoke and with some natural ventilation in the engine room, it was decided to start the main ventilation fans.

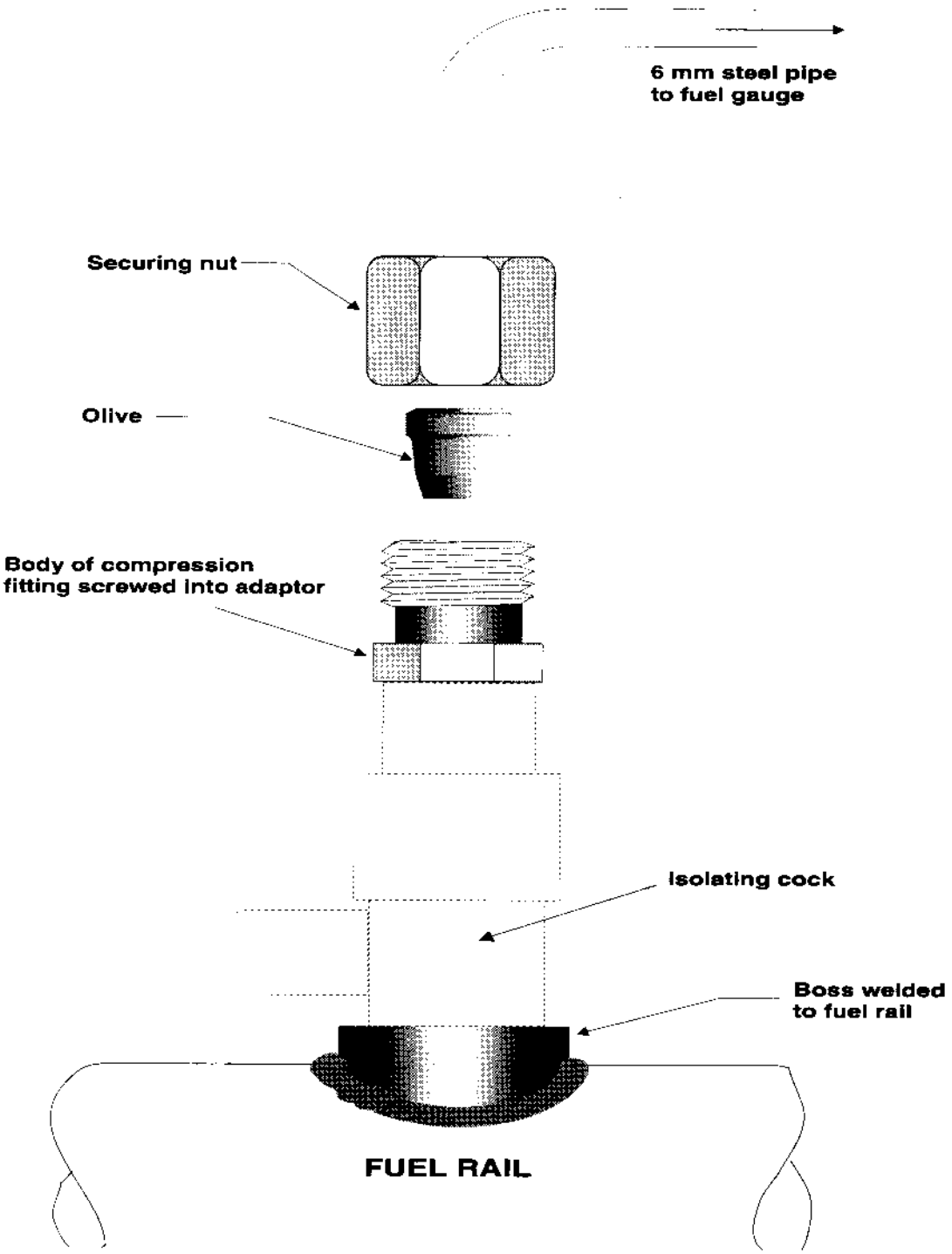
No.2 generator ran for only three minutes before stopping and causing a further blackout as the quick-closing valve on the service tank closed again, not having been properly reset the first time. The First Engineer opened this valve once more and re-started No.2 generator.

The fans cleared the remaining smoke and after a further 30 minutes the engineers entered the engine room, without BA sets, to take stock of the damage. A small amount of smoke was found to be still issuing from the cabling above No.3 generator, but that was quickly stopped by discharging another extinguisher at the cable trays.

An examination of the area where the fire had occurred revealed some damage to control cabling and burned insulation on pipes running above No.3 generator. There was much scorching of the deckhead, but the damage appeared to be comparatively minor and the only effect on the operation of the vessel or its machinery was that the auto-synchronising of generators was no longer functioning and this operation had to be carried out by hand. Later examination, however, by electrical contractors repairing the damaged cable runs, revealed that some charring of the insulation on the main phase cables from No.3 generator had occurred. Megger test* readings showed a sufficiently low resistance reading for the classification society to put a condition of class on the vessel, requiring renewal of the main phase cables from No.3 generator to the switchboard at the next dry-docking. In the meantime, No.3 generator could not be used.

The cause of the fire was found to be at the forward end of No.3 generator, where a tapping for a 6 mm pressure gauge line comes off the main fuel pipe supplying the engine-mounted fuel injection pumps (the fuel rail). The end of the gauge pipe had blown out of its compression fitting, allowing hot heavy fuel oil, at a pressure of between 5 and 6 bar, to spray vertically upwards to the deckhead and ignite on the hot exhaust manifold and turbo-charger casing.

* High voltage test of the resistance of the insulation using a "Megger" tester.



Assembly of compression fitting

Comments and Analysis

Compression fittings

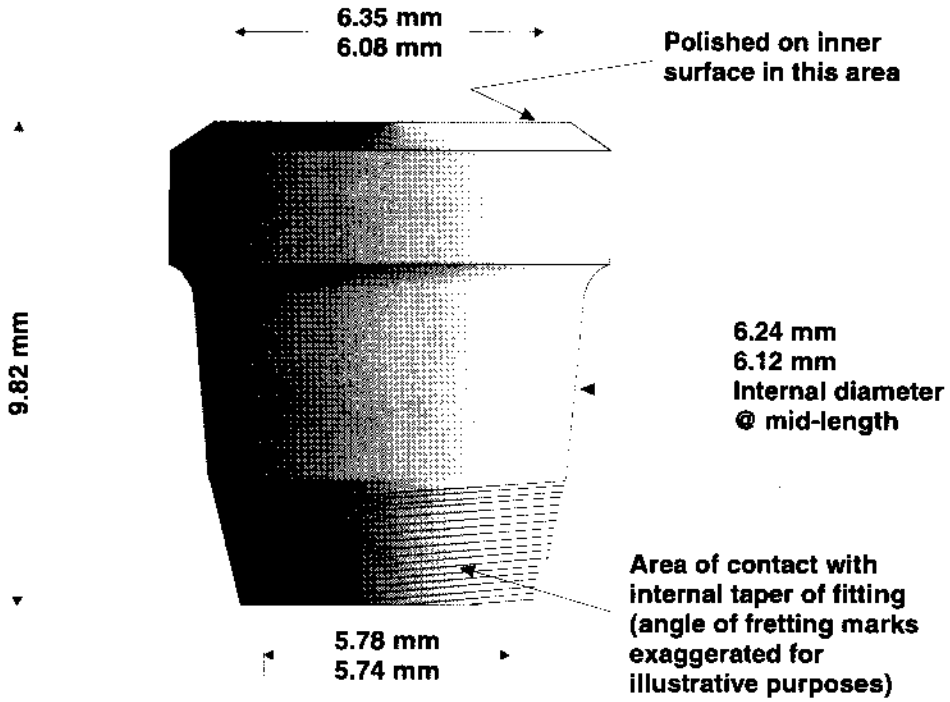
Pressure of fuel in the fuel rail is measured by a gauge on the engine instrument panel mounted at the aft end of the engine. The tapping for the 6 mm steel pipe leading to this gauge is situated at the forward end in the fuel rail supplying the engine-mounted injection pumps. The pressure in the fuel rail is maintained at a steady pressure of 5 to 6 bar by the fuel booster pump. The end of the 6 mm steel pipe to the gauge is inserted into a compression fitting (see diagram page opposite page). A steel collar, known as an "olive", is fitted around the pipe below the securing nut. When the securing nut is tightened, the olive is compressed by the tapered surfaces in the main body of the fitting and in the underside of the nut. The olive distorts slightly, thus compressing and gripping the outside surface of the pipe and at the same time providing a pressure-tight seal, so long as the nut is tight.

Assembly is simple. The nut is slid over the end of the pipe, followed by the olive, and the end of the pipe and the olive are fully inserted in the body of the fitting before the securing nut is tightened onto the top of the body of the fitting. Disassembly is equally easy should it be necessary to remove the gauge pipe for maintenance or any other reason. It is necessary to ensure, however, that the pipe is inserted sufficiently far into the assembly (i.e. protruding below the bottom of the olive) to enable the correct compression to take place.

Examination

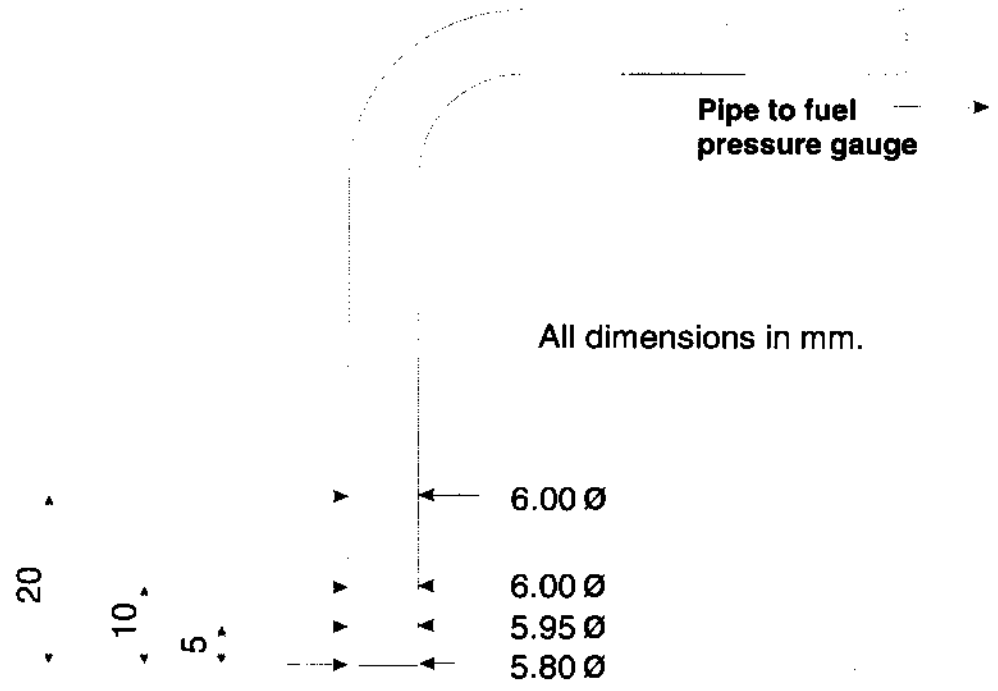
As part of the investigation, the olive from the compression fitting and the end of the steel gauge pipe were carefully measured to ascertain whether or not the pipe had been properly inserted into the fitting before the securing nut had been tightened. The resulting measurements are shown in the following diagrams. In addition, the olive was cleaned and examined under a microscope at the Materials Evaluation Facility of the Civil Aviation Authority in Canberra.

The measurements taken indicate that the olive and the pipe had been compressed, and the pipe had been gripped by the fitting. However, as there was no short uncompressed length at the very end of the pipe, where it should have protruded through the olive, it appears that the pipe may not have been fully inserted into the fitting before the nut was tightened upon initial assembly. In addition to this, fretting marks on the tapered surface of the olive, where it mates with the inside of the fitting, indicated that the pipe and olive had not been sitting squarely in the fitting.

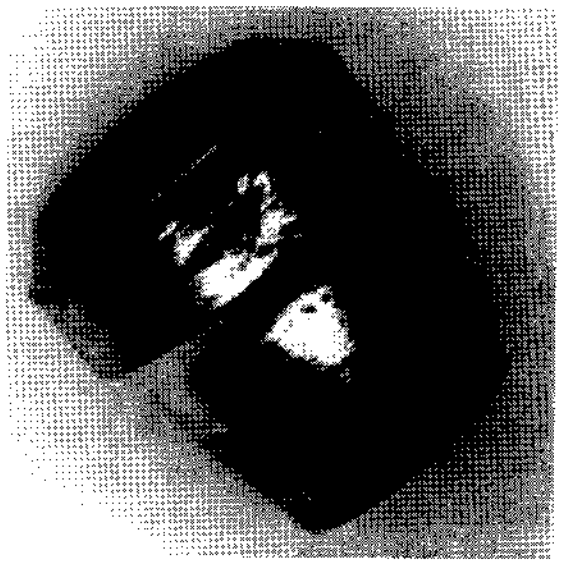


Max. and min. internal diameters shown

"Team Heina" - No.3 generator
Olive from gauge connection



"Team Heina" - No.3 generator
End of steel pressure-gauge pipe



This can be seen in the photograph above and is illustrated in the top diagram on the opposite page (the angle being exaggerated for illustrative purposes) On the top inside surface of the olive, on one side only, at the position shown in the diagram, could be seen a polished area where the surface of the pipe had been rubbing on the olive at the one spot. This would further indicate that the gauge pipe did not enter the fitting squarely and the spring of the steel pipe was exerting a sideways pull on the compression fitting. Microscopic examination of the olive also revealed a crack down one side extending the full length of, and right through, the wall.

As most diesel generators suffer from some considerable degree of vibration, it is probable that the vibration, combined with the sideways pull exerted by the steel pipe in the fitting, caused fretting, with the result that, over what may have been a considerable period of time, the securing nut slackened back slightly and eventually allowed the pipe to be pushed out of the olive by the pressure of the fuel oil. Had the pipe been fully inserted into the olive upon initial assembly, the short length of uncompressed pipe protruding below the olive should have prevented the pipe from being pushed out of the olive and an observable leak from the fitting would have developed instead.

Maintenance

The vessel has a computerised planned maintenance system for planning and carrying out maintenance on the engine room and deck machinery. An item such as a compression fitting for a gauge connection, however, would not be one where any planned maintenance would be either expected or required. However, although no specific maintenance or checks were required on this part of the engine, it was usually sighted as part of an overall check around the generator by the duty engineer officer during the course of his daily rounds. None of the engineers on board the vessel at the time of the incident had noticed anything amiss during his rounds on the day of the fire or on the days leading up to it. In addition, none of those interviewed could recollect any work having been carried out on the generator in which it was necessary to remove this gauge connection. It was not possible to establish when, or if, this connection had been disturbed during the life of the vessel. The indications of a sideways strain on the fitting, caused by the spring of the steel pipe, would suggest that the problem had been present, if dormant, since the generator was built.

Fire-fighting

The ship's personnel undertook monthly fire drills. Most of the crew had been employed by the company for a number of years and had been on the Team Heina for several months. In the opinion of the Master and the other officers, they had a good knowledge of the vessel and its equipment and, with the regular fire exercises, were quite familiar with the fire-fighting equipment. Nevertheless, when it became apparent not only that the alarm was for a real fire, but also that it was a serious one, as indicated by the rapidly increasing thick black smoke, several of the vessel's crew ran from their fire stations to the one remaining lifeboat. (The vessel's starboard lifeboat had been badly damaged in an accidental release from the falls two weeks earlier at Port Moresby and had been landed). When they had been persuaded to return to their fire stations, the men detailed to don the proximity suits were both reluctant and very slow to dress and prepare their equipment. This reluctance to participate in the fire-fighting operation lasted until it was time for the first re-entry into the engine room when the first man refused to enter. It was reported, however, that once he had been persuaded by the Mate to enter, he carried out his duties quite satisfactorily as did the others after him.

The vessel's "Technical Squad", led by the Second Engineer, had practiced shutting down the engine room vent flaps many times and, when called upon to carry out this task in this instance, accomplished it with great speed and efficiency, taking only four minutes from the sounding of the fire alarm to the time that all dampers were reported shut and the Halon was released.

The fire was initially tackled by the First Engineer and the Motorman with two "Pastor" 12 kg dry powder extinguishers. Both of these extinguishers failed to discharge when actuated. Five or six more extinguishers were brought by the crew from other areas of the engine room and these operated successfully. The fire, however, had grown significantly in the intervening period. Given the nature of the fire, it is possible the situation would not have been under control even if the flames had been extinguished by the dry powder in the early stages of the incident. Hot fuel oil was still issuing from the compression fitting on the fuel rail and spraying onto the exhaust manifold and the turbo-charger of No.3 generator, where it might well have been re-ignited. The outcome of such a scenario, however, is a matter for conjecture and depends in part on how rapidly the exhaust manifold and turbo-charger would have cooled after the engine was shut down.

The attempts by the First Engineer to shut off the fuel supply to No.3 generator, at the generator flat, were unsuccessful and it is considered that the Chief Engineer was correct in ordering the evacuation of the engine room at that point and deciding to use the fixed (Halon) fire extinguishing system.

The Halon system is a "one shot" system, which discharges all the gas at once. If it fails to extinguish the fire in the first instance, there is no possibility of a second attempt.

At the time that the decision was made to use the Halon, the fuel booster pump had stopped, because the vessel had no electrical power, but the outlet valves on the fuel oil service and diesel oil service tanks were still open and the fuel system (and hence the fire) was being fed by gravity.

Re-entry

Once the Halon had been released, a period of ten to fifteen minutes elapsed before a re-entry was made into the engine room by a crew member wearing a BA set.

The decision has to be taken, after the release of Halon gas, as to when the gas has had sufficient time to extinguish the fire, and also when sufficient time has elapsed for the fire, if not fully extinguished, to have started to regain a hold as the Halon gas begins to disperse. Halon gas has no cooling effect on the fire and this decision can only be made taking into consideration such factors as the original source of ignition, the fuel available to the fire, and the intensity of the fire when the Halon was released. There is always the possibility that the fire will have to be tackled with hoses if the Halon release is not entirely effective.

In the event, it was possible for men in BA sets to extinguish the remaining pockets of fire with extinguishers.

Approximately thirty minutes later, re-entry was made by personnel without BA sets. The engine room had been ventilated during this period, but no tests of the atmosphere were carried out before it was declared safe. A test with a portable oxygen analyser would have been appropriate before unprotected re-entry was made.

By the end of the fire-fighting operations, all the air in the BA sets and that in the six spare bottles had been used up and it had not been possible to recharge the sets on account of the electrical blackout, the recharging compressor being electrically driven.

Fire extinguishers

The first two extinguishers used to fight the fire failed in spite of the fact that all of the vessel's fire-fighting equipment had very recently been serviced. The ship had arrived in Geelong during the early hours of the morning of 28 January, six days before the fire. On its arrival in Geelong, a representative of an international fire-protection company started a routine service of all the ship's fire-fighting equipment.

He was on board for approximately six hours, working through the night, and it was reported that during that period he serviced a total of sixty dry powder, foam and CO_2 extinguishers, as well as carrying out a service on all 16 of the 150 kg cylinders (and the three 4.5 kg cylinders for the paint locker) which comprise the ship's fixed Halon system.

The Inspector considers that, in view of the work load that this schedule imposed on one man, the service of each item of equipment could not possibly have been carried out thoroughly. This view is supported by the fact that when the investigators inverted one of the fire extinguishers in the engine room which had failed to discharge, the dry powder in the

extinguisher could be felt falling as a lump to the opposite end. Item 8 of the company's relevant service work sheet for these extinguishers indicates that, as part of the service schedule, the cylinder should be inverted and the powder loosened.

Emergency generator

Following the incident, a local firm of electrical contractors was engaged to assess the fire damage to the generator electrical systems. They also investigated the reason for the failure of the emergency generator to connect to the emergency switchboard. Two reasons were found: the first was a problem with the governor which prevented the generator from reaching the required speed and the second was that two manual/automatic change-over switches, for operation of the two circuit breakers which connect the machine to the emergency switchboard, had been left in the "manual" position. It was reported that the emergency generator had been used, without problem, the previous week when the engine room sea water cooling system had to be shut down to change a salt-water cooling valve.

12 kg dry powder extinguisher of the type which failed to discharge

Conclusions

These conclusions identify the different factors contributing to the accident and should be not read as apportioning blame or liability to any particular organisation or individual.

1. The fire in the engine room was caused by a spray of hot fuel oil, from a failed compression fitting on the fuel rail of the starboard generator engine (No.3), being ignited by the hot exhaust manifold.

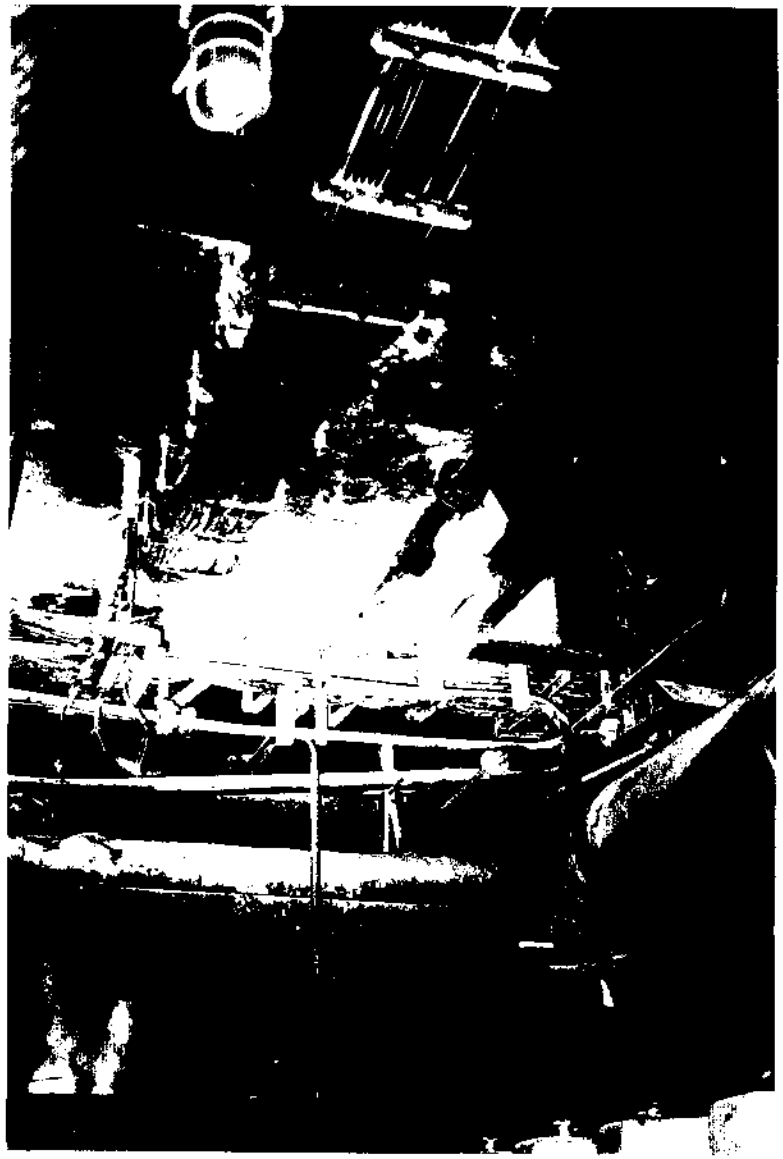
2. The pipe to the fuel pressure gauge had blown out of the compression fitting following prolonged fretting of the pipe within the olive and of the olive within the compression fitting. The fretting was caused by misalignment of the pipe with the fitting and the added fact that the pipe had probably not been inserted sufficiently far into the olive on initial assembly. The combined effect would have been exacerbated by engine vibration.

3. The actions taken by the ship's staff to fight the fire were correct and the speed with which the preparations for Halon flooding were made was commendable.

4. It is speculative as to whether the failure of the first two dry powder fire extinguishers to discharge had any effect on the overall fire-fighting operations. However, it is not expected that two extinguishers serviced only six days previously, should fail in such a manner. The Inspector considers that the work load and schedule for servicing the ship's fire-fighting equipment by one man was such that the service could not have been sufficiently thorough.

5. The re-entry to the engine room, without breathing apparatus, was made on the assumption that there had been sufficient ventilation for sufficient time. As portable oxygen analysers are part of the safety equipment carried by tankers, it would have been prudent to have used one to check the atmosphere before the re-entry was made.

Bottles from fixed Halon installation being landed for refilling



Fire damaged deckhead and cables above No. 3 generator

Submissions

Under sub-regulation 16(3) of the Navigation (Marine Casualty) Regulations, if a report, or part of a report, relates to a person's affairs to a material extent, the Inspector must, if it is reasonable to do so, give the person a copy of the report or the relevant part of the report. Sub-regulation 16(4) provides that such a person may provide written comments or information relating to the report.

The report was sent to the owners, Master, Chief and First Engineers of the Team Heina and to Wiltrading Pty. Ltd.

In submission, Wiltrading stated that the number of extinguishers which the technician found were to be serviced, when he arrived on board, was considerably higher than had initially been advised by the ship. The technician, however, believed that he could cope with the extra work load in the time available and did not call for assistance.

Details of vessel

Name	Team Heina
Flag	Norwegian (NIS)
Lloyd's Number	8808501
Year of build	1991
Type	Tanker
Owner	A/S J. Ludwig Mowinckels Rederi
Builder	Brodogradiliste "Jozo Lozovina-Mosor" Trogir
Classification	Lloyd's Register
Length overall	175.65m
Breadth	32.02m
Summer draught	11.2m
GRT	22,607
NRT	13,116
Summer deadweight	40,395
Engines	Burmeister & Wain 5 cylinder two-stroke single acting deisel 7651 kW
Crew	25 Norwegian/Filipino