



**Report of the investigation into
the engine room fire
onboard the *MV. Laurentian*
at sea on
11 October 2001**

The Bahamas Maritime Authority investigates incidents at sea for the sole purpose of discovering any lessons which may be learned with a view to preventing any repetition. It is not the purpose of the investigation to establish liability or to apportion blame, except in so far as emerges as part of the process of investigating that incident.

It should be noted that the Bahamas Merchant Shipping Act, Para 170 (2) requires officers of a ship involved in an accident to answer an Inspector's questions fully and truly. If the contents of a report were subsequently submitted as evidence in court proceedings relating to an accident this could offend the principle that a person cannot be required to give evidence against himself. The Bahamas Maritime Authority makes this report available to any interested parties on the strict understanding that it will not be used as evidence in any court proceedings anywhere in the world.

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1.

SUMMARY

- 1.1 At the time of the incident the vessel was at 26°09.1'N, 053°07.1'E and engaged in deploying a streamer prior to the commencement of work. At 0614 the duty engineer informed the bridge of a fire in the engine room. The initial fire on the No.1 engine was extinguished by the engine room staff, but subsequently re-ignited. The engine room team could not extinguish the secondary fire and the engine room was evacuated at 0620. All personnel on the vessel were mustered at the muster stations and at the same time all external vents were closed.
- 1.2 At 0621 flames were seen coming from the starboard funnel and starboard access door on main deck which was open at the time. The fuel oil quick closing valves were activated and at 0626 all main engines stopped, rendering the vessel powerless.
- 1.3 Boundary cooling was applied on funnel casings and the engine room forward water tight bulkhead which were monitored for temperature rise. The vessel was then taken in tow by the accompanying "chase boat" and at 0700 the tow was underway. Subsequently the engine room was re-entered and the harbour generator started allowing lighting and limited power to be restored.
- 1.4 After starting Nos. 3 & 4 main engine generators the vessel regained propulsive power, and released the tow line to the "chase boat". In water seismic equipment was recovered overnight and then the vessel proceeded to Dubai for repairs.

2.

PARTICULARS OF VESSEL

2.1 “*M.V.Laurentian*” was an offshore supply/ survey vessel registered at Nassau, Bahamas, of welded steel construction with the following principal particulars:-

• Official Number	-	715224
• IMO Number	-	8112500
• Length overall	-	84.7 metres
• Breadth	-	16.8 metres
• Depth	-	7.10 metres
• Gross Tonnage	-	3375 tonnes
• Net Tonnage	-	1013 tonnes
• Call Sign	-	C6DQ3
• Year of build		1983
• Class		Det Norske Veritas
• Owner		Seismic Exploration International Inc.
• Manager		Techmarine International Ltd.

2.2 Power was produced by 4 Wartsila 8R 22 HE main engine generators that developed a total of 5120 kW operating a diesel electric system powering two 1500 kW azimuthing thrusters.

2.3 The vessel was built in Norway and was formerly named “Labrador Horizon”.

2.4 At the time the vessel complied with the all statutory and international requirements and certification.

3.

CONFIGURATION OF MACHINERY

The vessel power configuration is as follows:-

3.1 The 4 main engine generators supply 600 volts to the main switchboard. The main switchboard supplies the following equipment at 600 volts:-

- Main azimuthing thruster motors which operate at 1200 or 1800 revs/min.
- Bow thrusters
- Windlass power packs
- Auxiliary switchboard distribution panel

3.2 All auxiliary services are supplied from 440 volt system fed from two transformers located in the after end of the engine room

220 volt supplies for lighting etc. are fed from the 220 volt switchboard

3.3 Main propulsion is from two animating thrusters, however, an independent diesel driven aqua master (retractable thruster) unit is located forward of the engine room to provide back up forward propulsion in the event of main propulsion breakdown.

3.4 At the time of the incident nos. 1,2 &4 generators were supplying the main switchboard. Both animating thrusters were running at 1800 revs /min. The aqua master was also deployed and running at the time of the incident.

3.5 The main engine fuel is drawn from the daily service tank and fed to the fuel oil booster pump. The booster pump supplies the generator fuel rails from a common piping system at a pressure of 5 bar. Fuel isolating vales for maintenance purposes are fitted at the forward end of each engine located under the floor plates just forward of the turbocharger.

3.6 Fuel at 5 bar is fed to the engine driven booster pump which increases the pressure to 8 bar feeding it to the main supply rail which is connected to each individual high pressure fuel pump suction by an individual line. This line is flanged at both the rail and fuel pump suction, the flanges being secured at both ends by two Allen screws.

4.

NARRATIVE OF EVENTS

- 4.1 All times noted in this narrative are given in the style of the standard 24 hour clock and as local time which was GMT +4.
- 4.2 The weather at the time of the incident was, wind NW Force 4, sea slight and visibility good
- 4.3 At the time of the incident the vessel was in position 26°09.1'N 053°07.1'E and was engaged in deploying a streamer at 3.2 knots, course 305° prior to the commencement of work.
- 4.4 At 0614 the duty engineer informed the bridge of a fire in the engine room. The officer of the watch sounded the fire alarm whereupon the chief engineer entered the engine room to find the forward end of the starboard outboard, No.1, main engine engulfed in flames. The 3rd engineer was fighting the fire with a CO₂ fire extinguisher.
- 4.5 The chief engineer went to the control room and informed the bridge of the fire and its location. He then disconnected No.1 main engine from the main switch board and shut the machine down.
- 4.6 He then proceeded to the forward compartment and returned with a wheeled foam fire extinguisher and began to douse the fire. With this unit and other portable units brought to bear by the engine room staff who were on the scene the flames were knocked down. The bridge was then informed that the fire was extinguished.
- 4.7 However, the engine room staff were unable to shut off the fuel supply to the engine due to the high heat concentration in way of the forward end of the engine where the fuel shut off valve was sited. The fuel re-ignited and attempts to extinguish the fire were successful in only keeping the fire confined to the starboard forward corner of the engine room. At this point the chief engineer instructed the 3rd engineer to activate the fuel quick closing valve to the main engines starving the fire of fuel and blacking the vessel out.
- 4.8 Further attempts to extinguish the fire using portable apparatus failed and the chief engineer gave instructions for the engine room staff to muster in the engine control room, while informing the bridge of this decision. The master instructed all engine room staff to evacuate the engine room and the ventilation flaps and watertight doors to be closed.
- 4.9 Whilst all engine room personnel were assembled in the control room a high pressure release was heard in the engine room and this was assumed to be a bursting disc on a Halon cylinder releasing due to the heat in the area. At the same time as the pressure release was noted, a large fire ball was observed over the top of No. 1 engine travelling forward towards the forward casing. At this time the engine control room

was evacuated through the emergency escape hatch and the machinery space completely sealed off.

4.10 Boundary cooling was applied on funnel casings and the engine room forward water tight bulkhead. After monitoring of the engine room boundary bulkheads and no rise in temperature noted it was decided not to activate the Halon system as it would be better kept in reserve.

4.11 The vessel was then taken in tow by the accompanying “chase boat” and at 0700 the tow was underway. Subsequently the engine room was re-entered and the harbour generator started allowing lighting and limited power to be restored.

After starting Nos. 3 & 4 main engine generators the vessel regained propulsive power, and released the tow line to the “chase boat”. In water seismic equipment was recovered overnight and then the vessel proceeded to Dubai for repairs.

5.

CONCLUSIONS

- 5.1 Subsequent investigation indicated that the Halon smothering system was intact with all cylinders at the correct operating pressure of 40 Bar. The high pressure release which was heard from the engine control room (4.9) was believed to be the relief valve vent in the main air receiver which was located on the forward bulkhead directly ahead of No. 1 generator.
- 5.2 The primary fire was caused by the fuel leakage due to the failure of the 'O' ring on No 8 high pressure fuel pump suction flange which allowed fuel at 8 bar pressure to spray out below the fuel pump cover and impinge on the exhaust manifold in way of the turbo charger. The 'O' ring failed due to the top retaining "Allan" screw vibrating loose which eased the pressure on the flange allowing 'O' ring to blow out.
- 5.3 Although the fire was knocked down, fuel to the engine could not be isolated due to the intense heat in the location of the shut off valve. This allowed the leakage at No.8 fuel pump to continue. The fuel return line was isolated, but the fuel supply line isolating valve could not be shut. Therefore fuel leakage continued, re-igniting and causing a secondary fire. The secondary fire was fuelled with further oxygen from the main air receiver relief valve which resulted in the fire ball.
- 5.4 The starboard engine casing access door situated on to Main Deck was open, causing a natural draught up the casing. When the fire ball occurred it was drawn up the casing by the draught and exited partly out of the open door and partly out of the top exhaust vent. This resulted in the main fire damage being localized to the starboard forward end of the engine room.
- 5.5 The fuel system fitted to the vessel is a conventional fuel booster system with one pump supplying four engines. In the case of a diesel electric system such as this, stopping the fuel booster pumps to isolate a fuel leak will result in the loss of all power supplies.

6.

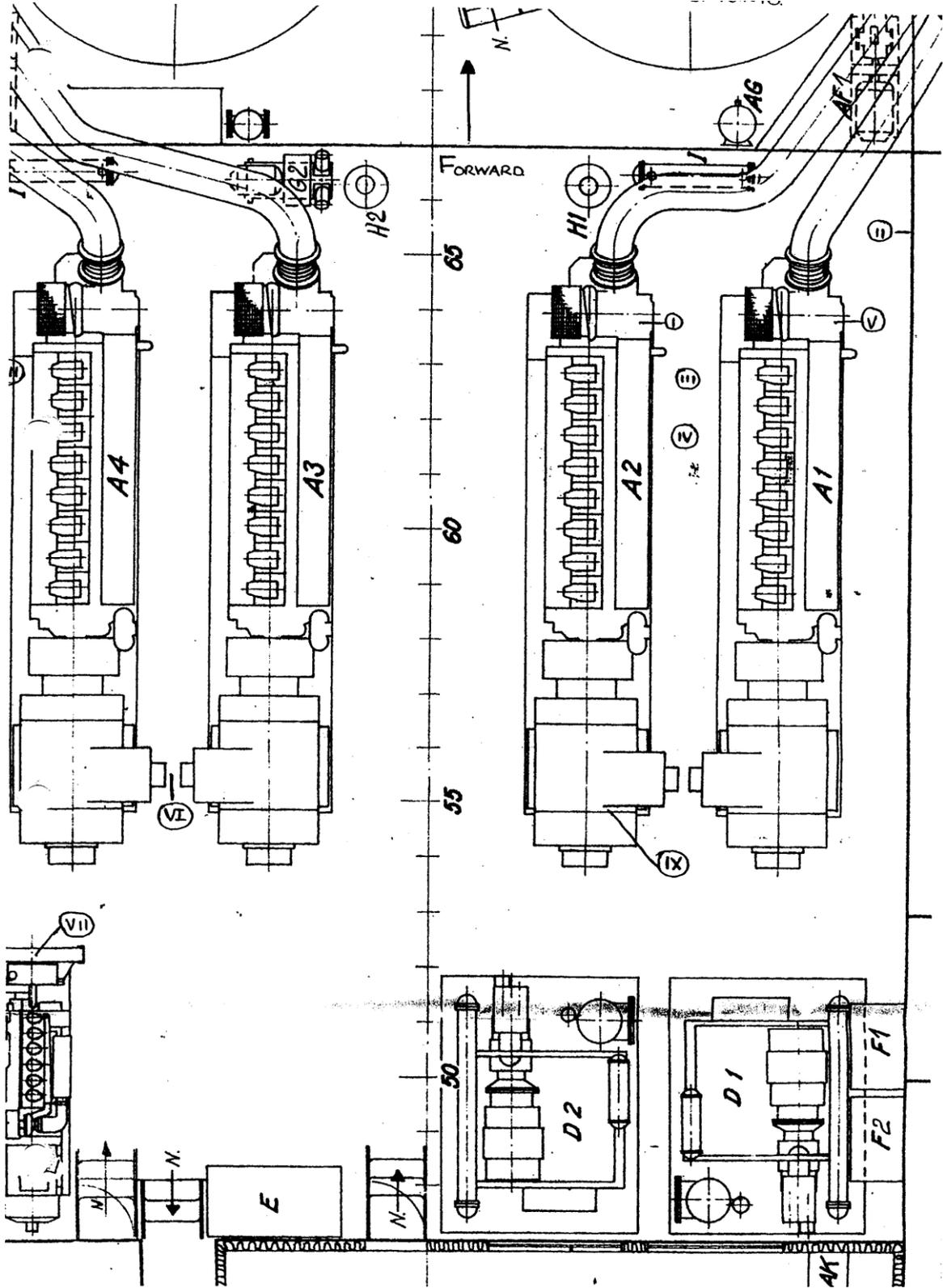
RECOMMENDATIONS

The owners of M.V. Laurentian are recommended to :-

- 6.1 Replace fuel line retaining “Allan” screws in way of HP fuel pump suctions on all 4 main engines
- 6.2 Fit fuel pump covers with sealing strips in way of the cylinder head cover landing face.
- 6.3 Fit independent remote shut off valves to each main engine to allow individual engine remote fuel isolation.
- 6.4 Investigate the cause of vibration in No.1 main engine fuel system and rectify.
- 6.5 Review and apply the requirements of SOLAS 2001 Chapter II-2 Regulation 15. 2.7 – 2.12.
- 6.6 Fit a sheet steel guard between No. 8 cylinder and the turbo charger of each engine.

The owners have attended to each of the above recommendations during the repairs to the vessel after this fire.

ANNEX 1



ANNEX 2

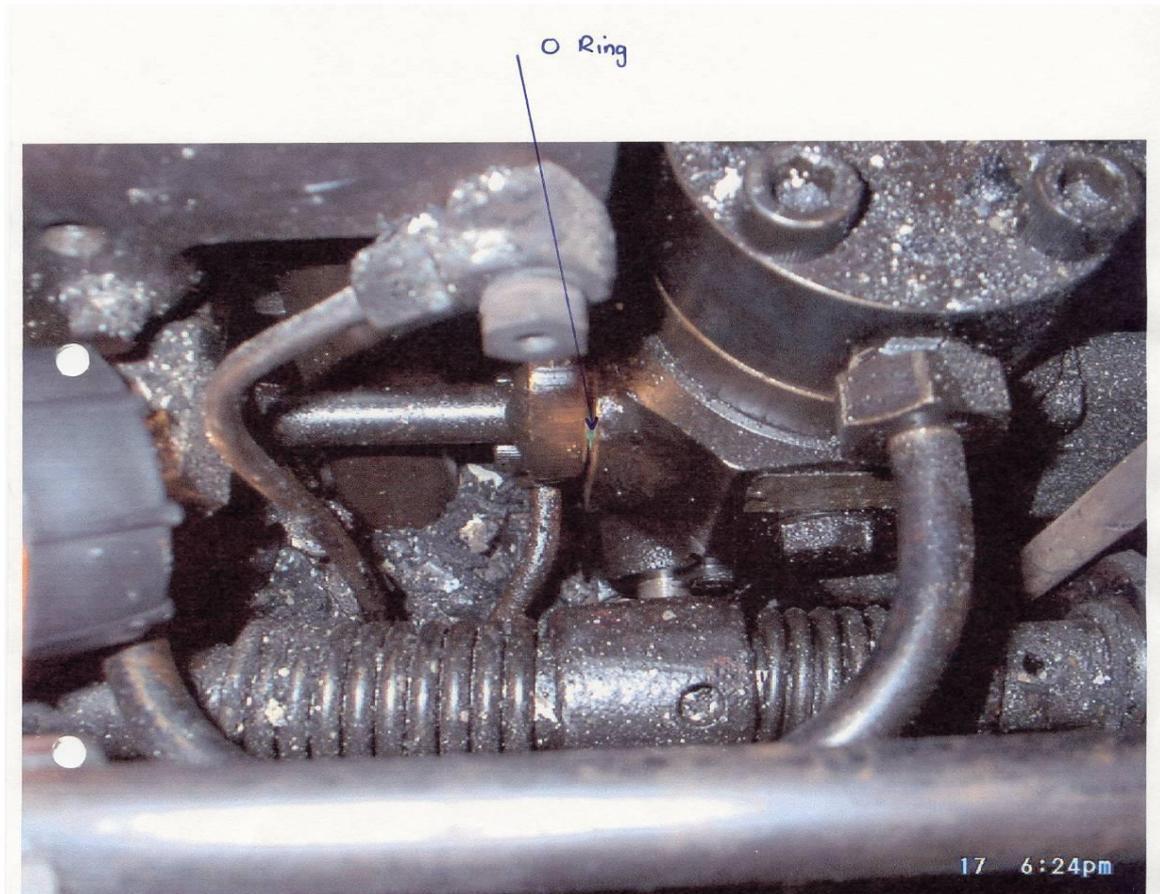


Photo 1 No 8 Cylinder fuel pump



Photo 2 Guard retro fitted between No. 8 cylinder and turbo charger on each engine



Photo 3. Quick closing valve operating station in MCR

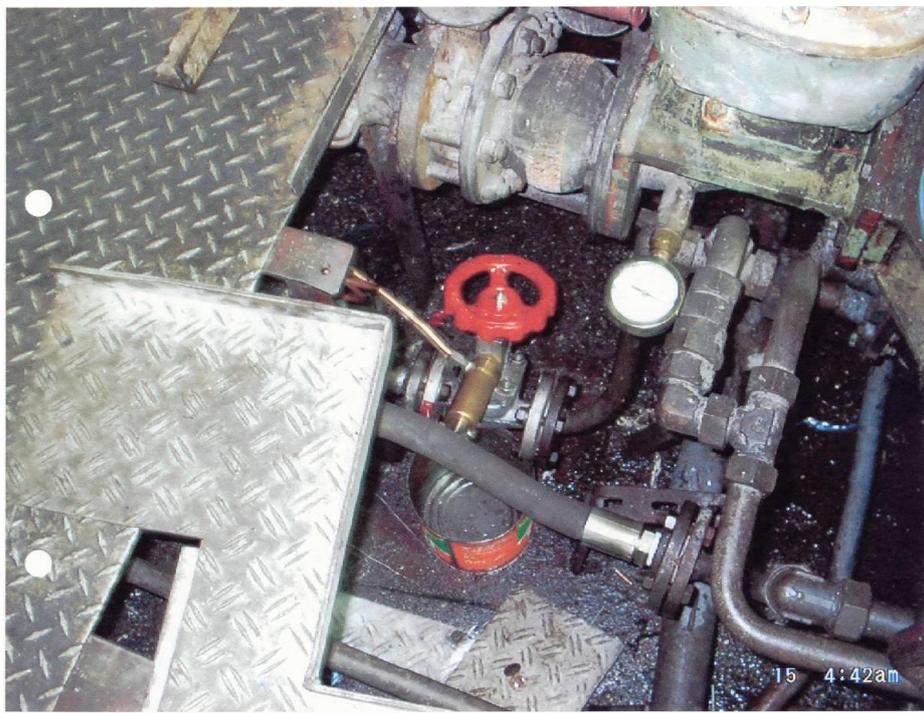


Photo 4. New fuel oil quick closing valves fitted on each main engine