



Report of the  
Board of Inquiry  
into the fire in  
HMAS WESTRALIA  
on 5 May 1998



EXECUTIVE SUMMARY



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**EXECUTIVE SUMMARY**

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## REPORT OF FIRE IN HMAS WESTRALIA ON 5 MAY 1998

1. In accordance with the Maritime Commander's instructions an inquiry into the circumstances surrounding the fire in the main machinery space of HMAS WESTRALIA on 5 May 98 has now been completed.

2. The inquiry was conducted in HMAS STIRLING from 11 - 22 May 98, HMAS PENGUIN from 25 - 29 May 98 and again in STIRLING from 2 June - 17 July 98. The members of the Board visited WESTRALIA on a number of occasions including 9 and 12 May 98.

3. Members of the Board of Inquiry are:

Commodore Richard Lamacraft, RAN (President)

Christopher William Filor, PSM, Inspector Marine Accidents

Captain Russell Bryan Schedlich, RAN

Assistant Chief Officer Lindsay Cuneo, Fire and Rescue Service of WA

Commander Edward George Walsh, CSC RANR

4. The Board was directed by its terms of reference to investigate all the relevant circumstances surrounding the fire in WESTRALIA on Tuesday, 5 May 98, the death of personnel in that fire and the injury of other members of the ship's company. The Board was directed that the inquiry should include, but not be limited, to:

- (1) the cause of the fire and the manner in which it was fought;
- (2) all the circumstances relevant to the death and injury of personnel;
- (3) the involvement of the ship's company including their training and competence;
- (4) the materiel state of WESTRALIA at the time of the fire; and,
- (5) the involvement of other naval units and external agencies.

5. As the Board became aware of important safety issues that required immediate attention, these were raised with the Maritime Commander. Four issues were raised, these were:

- a. use of flexible fuel hoses in certain circumstances;
- b. escape training using emergency life support respiratory devices;
- c. firefighting re-entry procedures after CO2 drenching; and
- d. HMAS WESTRALIA compartment escape routes.

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### SUMMARY OF THE INCIDENT

6. Prior to the ship sailing from Fleet Base West on 5 May 98, WESTRALIA had undergone an assisted maintenance period for about 6 weeks. During this period, members of the ship's company of WESTRALIA in conjunction with Fleet Intermediate Maintenance Authority and the ship's contractor, ADI Limited, carried out maintenance work. The work included the fitting of new flexible fuel hoses to the ship's main engines by a subcontractor under the direction of ADI Limited.
7. Trials were conducted with the ship alongside the wharf on 22 April 98. The ship sailed on 29 April 98 and conducted a series of sea trials, both whilst under way and at anchor. On 1 May, WESTRALIA returned to Fleet Base West. Final preparations for an overseas deployment were conducted on Monday, 4 May 98.
8. At 0900 on 5 May 98, WESTRALIA sailed from Fleet Base West for the Western Australia Exercise Area to rendezvous with HMA Ships SUCCESS, DARWIN and ADELAIDE. WESTRALIA proceeded north through Cockburn Sound to Gage Roads.
9. At about 1030, when about 2½ miles east of the Fairway Buoy in the Deepwater Channel, a fuel leak was noticed in the area of the number 9 cylinder on the inboard side of the port main engine. It was a significant leak, with fuel was emerging under pressure in a manner similar to a garden hose.
10. The leak was reported to the machinery control room and on inspection, it was initially thought that the fuel might be leaking from a banjo bolt in the vicinity of number 9 or 10 cylinders. The port main engine was shut down to enable repairs to be carried out and personnel in the main machinery space set up some fire fighting equipment. The standing sea fire brigade mustered in the machinery control room.
11. At about 1035, fire broke out in the main machinery space. Personnel saw the fire start on the outboard side of the starboard main engine. A "woofing" sound was heard in the machinery control room and a flame and black smoke appeared through a cable duct near an urn on the port side.
12. A fire report was made to the bridge and emergency stations was sounded. A brief inspection of the main machinery space through the door of the machinery control room revealed thick black smoke and flames. Visibility was severely limited. Four people escaped from the main machinery space into the machinery control room. Three of the personnel were injured and were initially treated by the ship's emergency medical organisation and later assisted by medical staff from SUCCESS, STIRLING and the Sea Training Group.
13. The fire was intense, causing rapid smoke build up and extreme heat. Despite some heroic but unsuccessful firefighting efforts, the atmosphere in the main machinery space soon became inadequate to support life. Electrical cabling on the deckhead over the fire was quickly damaged (Figure 1) with a consequent loss of services, including some communications.



Figure 1. Fire damaged cabling above the main engines (underneath the machinery control room) Photograph courtesy of WA Police Service

14. The starboard main engine was shut down and electrical power to the main machinery space isolated. The emergency generator started automatically. The machinery control room was evacuated at 1038. One minute later, the Engineering Officer recommended to the Commanding Officer that the main machinery space be drenched with carbon dioxide (CO<sub>2</sub>). One person was thought to still be in the machinery space and the recommendation was not accepted at that time.

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15. After the machinery control room evacuation, the emergency power circuits were subject to severe voltage fluctuations, probably as a result of fire damage in the main machinery space. Power to the gyro compass and the communications centre was lost. After these initial problems, the power supply to the navigation equipment, including the radars, was stabilised.
16. The ship's situation was communicated to Fleet Base West via a mobile telephone at 1045. Maritime Headquarters West notified RAN ships in the Western Australian exercise area shortly after.
17. At 1050, a hose team entered the main machinery space from the fridge flat to fight the fire. After making a successful entry despite intense heat and thick smoke, the team was withdrawn to allow the CO<sub>2</sub> drench to be activated. This occurred at 1101. In the intervening period, pipes were made for a number of missing personnel.
18. The drench was remotely initiated but some of the CO<sub>2</sub> bottles failed to discharge and were discharged manually seven minutes later. The boundary of the main machinery space was monitored for hot spots and the conclusion reached that the fire had not been extinguished. At 1126, hose team 2 entered the main machinery space via the fridge flat to attack the fire again.
19. The first external assistance, a boat from STIRLING, arrived alongside at 1143, and transferred a medical officer and a CPOMED. At the same time, the Sea King helicopter from SUCCESS landed another medical officer and medical and firefighting equipment.
20. At 1151, hose team 3 relieved hose team 2 and continued fighting the fire from the top plates of the main machinery space. Foam was pumped into the space through the funnel at 1153. At 1206, the hose team discovered the body of LSMT Meek on the top plates adjacent to the port ladder to the middle plates. Hose team 1 relieved hose team 3 at 1210 and progressed down to the middle plates and fought the fire from there. They found the bodies of MIDN Pelly, POMT Smith and ABMT Carroll prior to reporting at 1232 that the fire was extinguished.
21. At 1218, HMA Ships SYDNEY, DARWIN and ADELAIDE were seen approaching on the starboard side. Within two minutes of that, the Fleet Base West tug TAMMAR passed a line to the forecastle. The tow commenced with the ship about 150 metres from a shoal. The towline parted at about 1250.
22. The civilian tug WAMBIRI which operates out of the Port of Fremantle, had been standing by WESTRALIA since about 1220. She connected up at 1314, despite some difficulties on WESTRALIA's forecastle in handling the heavy towing hawser. The tow then resumed.
23. At 1250, a medical team in breathing apparatus entered the main machinery space to formally assess and identify the four bodies. All were declared deceased by the medical officer from SUCCESS. Five injured personnel were medevaced to St John of God Hospital in the Perth suburb of Murdoch at 1350. One additional person was treated on board for smoke inhalation and there were a number of personnel similarly affected who did not seek treatment.

24. The four deceased personnel were extricated from the main machinery space over the period from about 1515 to 1730. This task was undertaken by ship's staff, the two medical officers, medical personnel from SYDNEY, DARWIN, STIRLING and the Sea Training Group.

25. The ship berthed at Fleet Base West at 1811. At about 1830, a Reserve legal officer, a Disaster Victim Identification Team<sup>1</sup>, and a forensic pathologist boarded the ship. A comprehensive inspection of the main machinery space was conducted. Photographs were taken, as well as a video film. Police conducted formal identification procedures of the four deceased, and a number of flexible fuel hoses were photographed and taken into custody by the Reserve legal officer. Further inspections of the main machinery space were conducted by police officers from the Arson Squad on the following day.

## **THE MANNER IN WHICH THE FIRE WAS FOUGHT**

26. The fire was fought in three basic stages using sequentially, 'first aid' extinguishers, the fixed main machinery space fire smothering system and hoses equipped with water wall and foam nozzles. The fire was overhauled and extinguished, reflecting favourably on the tenacity of the hose teams and the effectiveness of hose team training. The direct attack on the fire was supplemented by boundary cooling and, later, the introduction of foam through the funnel door.

27. Following the report of the fuel leak from the inboard side of the port main engine, an attack hose with a foam nozzle was laid out on the middle plates. A 90 litre foam extinguisher was also made ready. By 1033, the standing sea fire brigade had mustered in the main switchboard room, but were not committed to the main machinery space. Foam was not laid on top of the leaked fuel.

28. When the fire erupted at 1035, the Engineering Officer of the Watch alerted the bridge and emergency stations was immediately piped. In the main machinery space, sailors attempted to fight the fire using 'first aid appliances'. The fire, however, was too fierce and the use of extinguishers was ineffectual. The prepared hose and nozzle was not used.

29. The crew went to their emergency stations dressed in coveralls, anti-flash hoods and gloves. The Engineer and support staff manned damage control headquarters. The aft and forward damage control section bases were established. Almost immediately after the machinery control room was evacuated, the Engineer advised the Commanding Officer to CO<sub>2</sub> drench the main machinery space. The Commanding Officer declined as he was concerned that the missing personnel may still be alive within the main machinery space.

30. Hose teams were organised and dressed in Fearnought suits and open circuit compressed air breathing apparatus. Smoke boundaries were established, fuel isolated and ventilation closed down. At 1050, a hose team entered the main machinery space through the fridge flat aft on 1 deck, using standard firefighting techniques for fighting major fires. At 1100, when it was clear that any person within the main machinery space could not have

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<sup>1</sup> Representing the WA State Coroner – Comprising Officers from the WA Police Arson Squad, the Emergency Operations Unit and the Forensic Division

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survived, the Commanding Officer approved the release of the CO<sub>2</sub> drench. At about 1101, the hose team was withdrawn to allow the CO<sub>2</sub> fixed smothering system to be operated.

31. The CO<sub>2</sub> was released from the fire control room on 01 deck. Due to a malfunction in the CO<sub>2</sub> release system, only 50-65 per cent of the bottles were activated. About seven minutes later, the remaining bottles were released manually. During this time, boundary cooling was maintained around the main machinery space perimeter.

32. At 1126, about 15 minutes after the manual release of the CO<sub>2</sub>, the second of the three fire teams re-entered the space to fight the fire. The three hose teams fought the fire over the following hour, and during that time the four fatalities were located. The fire was reported as extinguished at 1232.

33. The Board cannot say whether the CO<sub>2</sub> extinguished the fire or not. The decision to re-enter the main machinery space to fight the fire, after only fifteen minutes was, however, premature and showed a lack of understanding of the way in which a fire extinguishing system using oxygen depletion works. This lack of understanding increased the risk to the ship and the hose teams.

34. While there is much to commend in the way the ship's company fought the fire, the Board is concerned at a number of important issues which are discussed in detail on in the body of the report. The most significant issue was the lack of understanding by key personnel of the ship's CO<sub>2</sub> system.

## TRAINING AND COMPETENCE

35. All members of the ship's company contributed, in some way or other, in successfully overcoming the major main machinery space fire and in providing good medical care to the casualties sustained.

36. Containment of the fire and major fire fighting efforts to combat it were ultimately successful. The requirement for boundary cooling was well understood although containment of the forward boundary of the fire (the bulkhead between the main machinery space and aft pump room) was slow to be set up. Firefighting teams from both forward and aft damage control section bases conducted major firefighting competently and with vigour.

37. Ventilation control was not well understood. The ship had developed a standard operational procedure which involved closing both the supply and exhaust ventilation to the main machinery space in the event of a fire. Although appropriate as preparation for use of the CO<sub>2</sub> drench, it prevented heat and hot gases from escaping, thus increasing the dangers and difficulties faced by personnel re-entering the main machinery space to conduct search and rescue and firefighting.

38. Ship knowledge, particularly of emergency systems, displayed by some officers and senior sailors when giving evidence, was less than satisfactory.

39. Documentary evidence received by the Board indicate that 20-25% of the crew had not received all the required pre-joining training for their billets. Additionally, approximately 10% of the crew were not in-date for damage control training.

40. The ship had progressed annual continuation training satisfactorily, although some training serials were not carried out as realistically as they might have been. Some important damage control training serials had not been practiced regularly. Escape drills, particularly using emergency life support respiratory devices, had not been regularly practiced.

## **MEDICAL RESPONSE TO THE INCIDENT**

41. Of the four personnel who escaped from the main machinery space after the outbreak of the fire, three suffered smoke inhalation, two of them also sustaining burns to their hands. These personnel were treated initially by the two medical sailors and the Ship's Medical Emergency Team (SMET) members in the starboard boat space and then moved to RASCO (replenishment control station). They were assessed and stabilised by the two medical officers who embarked and then left in the care of the SMET members whilst the medical staff attended to matters in the vicinity of the main machinery space. Two other personnel became casualties, both suffering acute situational reactions. Five casualties were medevaced by Sea King helicopter, without medical escort. One other member of the ship's company presented with mild smoke inhalation, was treated on board and returned to duty. There is evidence that other personnel suffered mild smoke inhalation but did not present for treatment.

42. The clinical management of the casualties was most satisfactory under the circumstances. The overall medical management of the incident suffered from the fact that no member of the medical organisation maintained the overall coordination and resource management role. This resulted in the casualties treated in RASCO being left in the care of the SMET members, their requirements for the medevac being inadequately considered, and it being conducted without a medical escort of any kind.

43. There were no evident deficiencies in the clinical skills and training of any of the personnel involved in treatment of casualties. The SMET members in particular displayed a high level of skill and professionalism, noting the essentially part-time nature of their role.

## **THE DEATH AND INJURY OF PERSONNEL**

44. The four personnel who died in the incident did so from acute carbon monoxide poisoning resulting from smoke inhalation. Based on the rapidity of fire development and the production of smoke within a large but confined space, and noting the reported levels of carboxyhaemoglobin in each of the deceased, it can be concluded that all were unconscious within five minutes of the outbreak of the fire, and died within ten minutes, well before the CO<sub>2</sub> drench.

### ***Cause of Death***

45. The Board finds that the causes of death were as follows:

- e. Midshipman Megan Anne Pelly L154029 Date of Birth 8 December 1975 – Died accidentally from acute carbon monoxide poisoning due to smoke inhalation in the main machinery space of HMAS

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WESTRALIA off the coast of Western Australia in the vicinity of Perth at approximately 1045 on 5 May 98.

- f. Petty Officer Shaun Damian Smith S138258 Date of Birth 27 November 1968 - Died accidentally from acute carbon monoxide poisoning due to smoke inhalation in the main machinery space of HMAS WESTRALIA off the coast of Western Australia in the vicinity of Perth at approximately 1045 on 5 May 98.
- g. Leading Seaman Bradley John Meek S147321 Date of Birth 16 July 1972 - Died accidentally from acute carbon monoxide poisoning due to smoke inhalation in the main machinery space of HMAS WESTRALIA off the coast of Western Australia in the vicinity of Perth at approximately 1045 on 5 May 98.
- h. Able Seaman Phillip John Carroll S155254 Date of Birth 17 June 1974 - Died accidentally from acute carbon monoxide poisoning due to smoke inhalation in the main machinery space of HMAS WESTRALIA off the coast of Western Australia in the vicinity of Perth at approximately 1045 on 5 May 98.

## EXTERNAL ASSISTANCE

46. WESTRALIA did not make any general emergency or urgency broadcast to alert other shipping and civilian authorities. Although the Port of Fremantle was only seven nautical miles away, the Fremantle Port Authority was not asked for help or resources. The fact that the Port had significant firefighting resources on almost immediate call, was not known to the command team in WESTRALIA.

47. WESTRALIA received prompt and effective support from SUCCESS, ADELAIDE, ANZAC, DARWIN, SYDNEY and STIRLING, which were able to provide assistance within 70 minutes of the outbreak of the fire. This large number of assets was well coordinated by ADELAIDE. Each request for support made by WESTRALIA was met quickly and safely.

48. Prompt and effective additional medical support was provided by STIRLING (MO and CPOMED4), SUCCESS (MO), ADELAIDE (WOMED), SYDNEY (POMED4 and ABMED3), and DARWIN (ABMED3). Additional medical equipment (Thomas packs, intravenous fluids and oxy-viva sets) was also provided.

49. St. John of God Hospital, Murdoch, was well placed to receive the casualties by air, triage, resuscitate and stabilise them, and, if it had proven necessary, transfer them to more sophisticated treatment facilities in central Perth. St. John's Ambulance provided two ambulances on site to cater for the possible need for transfer to another hospital.

### ***Critical Incident Stress Management***

50. A major critical incident stress management activity swung into operation very shortly after the fire was extinguished. Ships in company and STIRLING provided peer support members, chaplains, psychologists and social workers who all provided on-site

support. Members of WESTRALIA's crew, and members from other ships who had assisted on board WESTRALIA, were targeted.

51. An informal 'de-fusing' was undertaken through the CO addressing the ship's company on return to Fleet Base West on the evening of the incident. An information session was conducted for the whole ship's company at STIRLING on 6 May, and group 'de-briefing' was conducted at STIRLING on 7 and 8 May. This de-briefing focused on each individual's recounting of their activities and was done in groups of about 30 personnel who had shared similar experiences on the day. The feedback from ship's company was mostly favourable, although some felt it was of little use and others attended against their will.

52. There was some suggestion that de-briefing conducted before personnel had had the opportunity to record their recollection of events, may have exacerbated the process of 'contamination' of evidence that can occur through witnesses discussing matters among themselves.

### ***Assistance to families***

53. A comprehensive attempt to inform the next of kin of personnel on board was generally highly successful, with some families receiving more than one contact from authorities. The Personal Services Officer WA, the Defence Community Organisation and STIRLING provided significant assistance to families during and in the days following the incident. Briefings, and wharfside facilities for all, and travel and accommodation arrangements for the relatives of the casualties, were all provided expeditiously and effectively.

54. There were some difficulties with notification of the next of kin of the fatalities. Although they were informed early about the missing personnel, the intense media interest on the day resulted in the announcement of the deaths, but without names, before all of the next of kin received official confirmation.

55. There was a significant chaplaincy effort involving on board provision of support during the day, and on subsequent days for both the injured and the relatives of the casualties.

## **FIREFIGHTING AND SAFETY EQUIPMENT**

56. Although the fire fighting effort was successful, the report details equipment problems with breathing apparatus, protective clothing and safety equipment. The Board has made a number of observations and detailed recommendations of a fleet wide nature on these issues.

## **MATERIEL STATE OF THE SHIP**

57. When WESTRALIA sailed there were a number of deficiencies in the materiel state of the ship. The two serious deficiencies, the flexible supply and return fuel hoses and the CO<sub>2</sub> system, were not readily apparent. At that time, the flexible fuel lines gave no sign of any inherent flaw. The condition of the CO<sub>2</sub> system, and particularly the tension of

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the operating wires, would only have been apparent to an expert on close inspection. At 0900 on 5 May 98 there was no obvious materiel deficiency that should have prevented the ship from sailing.

### CAUSES OF THE FIRE

#### *Source of fuel and ignition*

58. The fire was caused by fuel spraying under pressure from a hole in a newly fitted flexible fuel hose (Figure 2) on the starboard main engine coming into contact with a hot machinery component. A contributing factor to the size of the fire was probably fuel that spilt some minutes earlier from a similar leak from a hose on the port main engine. The supply of fuel to the fire was reduced by the prompt shut down of the starboard engine; the isolation of electrical power to the fuel boost pump and the operation of the remote fuel shut off valves. There is a possibility that fuel draining from the return line fed the fire for some time, albeit at a much reduced rate.

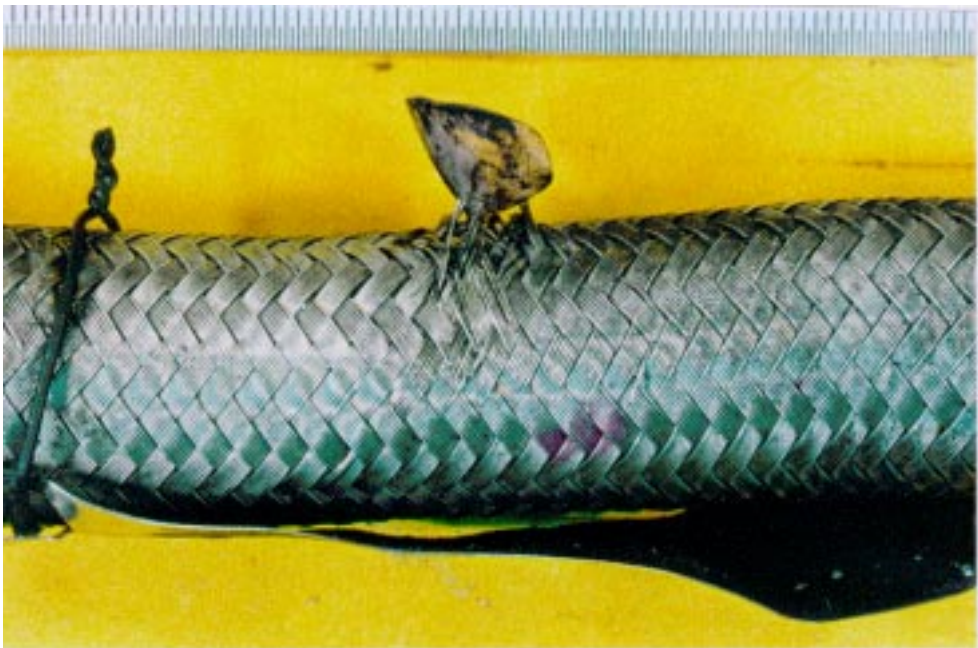


Figure 2. Hose S9R. The inner teflon tube can be seen protruding through the wire braid in a fan shape. Figure 48 from Metlabs Report

59. Testing of the failed and other fuel hoses clearly demonstrated that the steel braiding wires had failed due to fatigue after less than 40 hours operation. The failed hoses had approximately 50 adjacent wires in 5 to 7 braids fractured leaving the internal teflon tube unsupported.

#### *Spill Pulse Pressure*

60. What caused the flexible fuel lines to fatigue? Diesel engines with jerk pumps are known to be prone to pressure pulses in the fuel system. The most likely source of the fatigue loading was the action of the injector pump which releases spill pressure pulses into the supply and return lines of the low pressure fuel system, with the magnitudes of high but uncertain peak value. The presence of these pulses is well known by the engine

manufacturer and the International Maritime Organisation. There was no consultation with relevant experts by the contractor, subcontractor or ship's staff. Lloyd's Register of Shipping approval of the intended arrangements was not obtained as required in order to maintain the ship's certification, and as requested by the ship.

## **HOW THE FLEXIBLE FUEL HOSES CAME TO BE FITTED**

61. The new flexible fuel hoses were fitted by a subcontractor to ADI Limited during March and April 98. The flexible fuel hose change to the main engines was a configuration change which bypassed the prescribed processes. It was not approved by appropriate authorities and did not comply with Lloyd's Register of Shipping requirements. Although the hoses were capable of withstanding the expected static system pressure, the arrangement was poorly engineered and the design did not take into account dynamic considerations.

## **RAN CONFIGURATION MANAGEMENT**

62. There were some suggestions to the Board that avoidance of the formal configuration change process is widespread within the RAN. Although no real evidence of widespread abuse was presented, the issue is of sufficient concern to suggest that a review of the process is warranted.

## **QUALITY ASSURANCE**

63. The principal organisations involved in the fuel hose work (ADI Limited, Enzed and Ordering Authority Western Australia) were all accredited to a quality standard. Evidence presented to the Board showed that the quality management systems in place were either inadequate or inadequately implemented to prevent the provision of a non-conforming product.

64. Part of the problem seems to be due to a lack of rigour by both external and internal quality auditors. The Board suggests that Defence may obtain better value for money in the longer term by contracting the accrediting and auditing organisations directly, to ensure absolute independence and minimise any possible conflict of evidence.

## **SYSTEM SAFETY MANAGEMENT**

65. The Board has attempted to take a broad view of the causes of the accident and look at system issues as well as the specifics of the flexible hoses. The weaknesses exposed in evidence are symptomatic of wider problems within the RAN and ADI Limited.

66. The lack of knowledge displayed by some personnel is not so much a reflection on them personally but is an indication of an inadequate system. The inadequacies principally relate to training and selection of key personnel.

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67. Safety management on a system basis is best practice. The Board suggests that a disciplined, systematic approach to safety be more closely embraced.

### COMCARE

68. Comcare requested that the Board address certain occupational health and safety issues not specifically covered by the terms of reference (Comcare letter dated 11 May 98). These are covered in section 14 of the report.

69. A cooperative relationship was established between the Board and Comcare representatives. In his opening address, counsel assisting the Board invited Comcare and any other interested person, to bring forward any questions which they wanted counsel to raise; Comcare availed themselves of this request on one occasion. All requests by Comcare to the Board for copies of documents provided to the Board have been met.

### RECOGNITION OF PERSONNEL

70. The Board concluded that among many exceptional performances on the day of the fire, some personnel should be singled out for special mention and recognition. The proposals relating to such recognition are in section 15 of the report.

### PRINCIPAL FINDINGS

71. The fire in HMAS WESTRALIA on 5 May 1998 was caused by diesel fuel from a burst flexible hose spraying onto a hot engine component and then igniting. The hose was one of a number of new flexible hoses supplied by the ship's support contractor, ADI Limited, to replace the original rigid pipes. In the Board's view, the hoses were not properly designed and were unfit for the intended purpose.

72. A change of this type should have been processed through the RAN configuration change process as well as being approved by the ship's classification society, Lloyds Register. Both processes were bypassed, largely as a result of ignorance and incompetence. Key personnel within the RAN, and more particularly ADI Limited, were not adequately trained or qualified for the responsibilities placed on them. Regardless of the scrutiny that was avoided by bypassing these approval processes, ADI Limited should have taken steps to ensure that a safe, properly engineered product was supplied for a demanding application; it demonstrably failed to do so.

73. The four personnel who died in the fire did so as a result of acute carbon monoxide toxicity consequent upon inhalation of fire fumes. From the rapid increase in the magnitude of the fire and consequent production of smoke and fumes, the Board is able to conclude that incapacitation occurred within five minutes and death within 10 minutes of the outbreak of the conflagration and well before the CO<sub>2</sub> drench.

74. The dangerous and difficult fire in the main machinery space of WESTRALIA was fought heroically and effectively by the ship's crew. There were many acts of bravery and exceptional performances on the day. The Board has identified a number of personnel

in the recommendations whom it believes should be singled out for special recognition. The choice has been difficult.

75. WESTRALIA received excellent support from a wide variety of sources and it was most welcome but not used to its full potential. The ship's crew can take great pride in the fact that they saved their ship. Tragically, nothing further could have been done by them to save their shipmates.

76. The Board's many recommendations have been drafted with the clear aim of preventing a re-occurrence and making life at sea safer. Unfortunately, there can be no guarantees that fire can be totally avoided in what is inherently a dangerous environment.

## **RECOMMENDATIONS**

77. The Board has made 114 recommendations. The most important, as far as WESTRALIA is concerned, are associated with the main engine fuel supply, the fixed firefighting system, escape routes from the main machinery space and training of personnel. On a RAN wide basis, the recommendations of most significance are those relating to configuration management, the use of fixed firefighting systems and the training and selection of personnel for key positions.

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## AUTHORISATION

The President and Members of the Board of Inquiry into the fire in HMAS WESTRALIA on 5 May 98 confirm that we unanimously support the findings, conclusions and recommendations presented in this executive summary, and volume 1 of the official report.



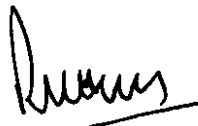
L. Cuneo  
Assistant Chief Officer,  
Fire and Rescue Service of WA  
Member



C.W. Filor  
Inspector of Marine Accidents,  
Commonwealth Department of Workplace  
Relations and Small Business  
Member



E.G. Walsh  
Commander, RAN  
Member



R.B. Schedlich  
Captain, RAN  
Member



R. Lamacraft  
Commodore, RAN  
President

**28** August 1998