

SECTION 18. RECOMMENDATIONS

18.1 This section reproduces all the recommendations made in the report. The first number in the list is a recommendation number included for convenient reference. The second is the paragraph number of the reference in the body of the report. The page number at which the recommendation is found follows the recommendation.

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Section 3 – Actions of the Ship's Company and their Training and Competence

1.	3.46	DC training should emphasise the importance of conducting search and rescue procedures.	52
2.	3.66	DC training should emphasise the requirement for personnel to evaluate and assess the risk associated with any type of emergency scenario so that measured departures from the SOP can be initiated to match the risk.	55
3.	3.68	The importance of conducting escape training using ELSRDs should be re-promulgated to the Fleet. (The Board understands that this recommendation has already been implemented.)	55
4.	3.73	DC training should emphasise the limitations of portable fire extinguishers as well as their use.	56
5.	3.79	The guidance and directions provided in ABR 5476 should be re-emphasised to command teams.	57
6.	3.80	DC training should emphasise the importance of ventilation for effective firefighting operations.	57
7.	3.81	The operating levers for ventilation supply flaps and funnel exhaust flaps should be colour coded and marked for ease of identification	57
8.	3.83	Fleet units should be made aware of the correct procedures for re-entry to a fire scene after drenching (The Board is aware that this recommendation has already been actioned)	57
9.	3.95	DC training should reinforce breathing apparatus procedures concerning working in pairs and correct entry control.	59
10.	3.103	DC training should emphasise the issue of varying air consumption rates and the need for personnel in OCCABA to frequently to monitor air pressure.	60
11.	3.111	DC training should include instruction on the effect of beards on OCCABA duration and on what adjustments are to made by board markers to compensate for air loss.	61
12.	3.112	Navy should review its policy regarding personnel with beards wearing OCCABA in light of AS/NZS1715-1994 and occupational health and safety requirements.	61
13.	3.119	Stage 2 BA control procedures should be considered for introduction into the Navy.	63

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| 14. | 3.124 | Naval personnel should be trained in the use of the international shore connection. | 63 |
| 15. | 3.125 | DC training should re-emphasise the importance of conducting firefighting training serials which involve civilian fire brigades. | 63 |
| 16. | 3.136 | ABR 5476 should be amended to include a section on the properties of CO ₂ and the hazards when it is used as an extinguishing agent. | 65 |
| 17. | 3.146 | The WESTRALIA emergency file should be re-written. | 66 |
| 18. | 3.147 | The Sea Training Group should check routinely validity of SOPs in emergency files. | 66 |
| 19. | 3.153 | OOW's and OOD's should be trained to ensure competence in ships systems and their emergency arrangements. This competence should be fully demonstrated prior to the award of the appropriate certificate. Where qualified personnel join a ship which has different systems from the ship in which their certificate was obtained, these personnel should understudy current ships staff until competent to undertake duty alone. | 67 |
| 20. | 3.157 | The requirement for personnel to have received the appropriate PJT prior to joining a ship should be further emphasised. | 67 |
| 21. | 3.158 | Consideration should be given to ship's raising a Priority 1 URDEF (which would prevent the ship from sailing) if key personnel, or a significant number of the ship's company, join without the proper qualifications. | 68 |
| 22. | 3.163 | The NBCD Instructor's course should be examined to ensure appropriate modules exist, which encompass ACT requirements and exercise planning /execution. | 68 |
| 23. | 3.166 | RAN ships should be directed to conduct a fast cruise, prior to sailing, after periods of IMAV or AMPs when there has been a change in key personnel or a significant proportion of the crew . | 69 |
| 24. | 3.168 | Fleet units should document and practice, receiving assistance from external agencies. | 69 |
| 25. | 3.172 | The RAN should investigate the distribution of professional articles, from appropriate journals and literature, to the Naval Community. | 70 |
| 26. | 3.174 | Appropriate training should be provided, to enable selected RAN personnel to understand and implement requirements of 'classification societies'. | 70 |
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Section 4 - Medical Response to the Incident | | | |
| 27. | 4.13 | Medical SOPs should reflect a requirement for the Duty SMET to muster with SSFB on all occasions so as to be in a position to render initial first aid if casualties occur during an incident. If a ship then goes to Emergency Stations, non-Duty SMET members should muster at their designated First Aid Post. | 73 |
| 28. | 4.31 | The importance of clear and concise casualty information being passed over normal communications circuits should be emphasised in damage control training. | 75 |

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29.	4.32	The importance of making the key decision as to whether or not casualties discovered at an incident scene require emergency extrication should be emphasised in damage control training.	75
30.	4.33	The limitations of stretcher capability should be emphasised in damage control training.	75
31.	4.53	The quality and suitability of current service issue body bags should be investigated.	78
32.	4.54	Stretcher requirements for the extrication of casualties should be reviewed.	78
33.	4.55	Training in the use of all means of casualty extrication from compartments should be regularly conducted, emphasising methods that allow the evolution to be conducted rapidly. Ships should consider the provision of suitable lifting mechanisms to aid the rapid manual extrication of casualties.	78
34.	4.67	Training of medical officers in shipboard medical incident management should be provided, with a particular emphasis on the need to assume control when embarked in response to a major incident with mass casualties.	80
35.	4.68	The training of senior medical sailors should be reviewed to ensure that proper emphasis is placed on medical incident management in shipboard mass casualty incidents.	80
36.	4.75	Damage control and medical training should include an emphasis on the need to pass clear information on casualty status through the normal communications circuits to ensure accurate tracking of casualty status throughout an incident so that appropriate management decisions can be made.	82
37.	4.81	Medical materiel should be better distributed between the sickbay and the FAPs rather than concentrated in the sickbay.	82
38.	4.90	The suitability of the SMET jacket should be further investigated.	83
39.	4.91	All medical personnel, including SMET members, should be required to wear Red Cross Brassards when duty and when at Action or Emergency Stations.	83
40.	4.103	Major damage control exercises should include realistic numbers and types of simulated casualties, and should be conducted so that the senior medical sailor receives regular training in medical incident management.	85
Section 5 - Death and Injury of Personnel			
41.	5.63	Training of all medical personnel should be based on casualty management protocols.	94
Section 6 - External Assistance			
42.	6.12	Ships' damage control and firefighting equipment should be marked for purposes of parent unit identification.	97
43.	6.16	A Billy Pugh type net should be developed for use by Seahawk and Sea Sprite Helicopters.	98

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| 44. | 6.30 | Consideration should be given to developing a Standard Operating Procedure, with the appropriate authorities, whereby an Air Exclusion Zone is established around an emergency incident. | 100 |
| 45. | 6.65 | HMA Ships should be made aware of major port facilities that are available to assist in emergencies. The 'Port Guide' should contain details of Port Emergency Plans. | 104 |
| 46. | 6.66 | HMA Ships based at Fleet Base West should be issued with a copy of the FPA emergency plan. | 104 |
| 47. | 6.67 | A MOU between the RAN and FPA should be developed for the handling of Naval Vessels in distress which fall within the bounds of the FPA emergency plan. | 104 |
| 48. | 6.104 | CISM debriefing should not occur until all personnel involved in an incident have made some written record of their recollections and this record has been secured for future reference in formulating statements. This procedure should be included in the Navy policy on CISM. | 109 |
| 49. | 6.105 | Controlled follow up or other studies should be initiated with a view to contributing to the empirical data available in the scientific literature evaluating the effectiveness of CISM. | 109 |
| 50. | 6.110 | Navy should examine the appropriateness of introducing more extensive preparation of all personnel for critical incidents, including sailors at the time of entry, and expanding that preparation beyond simple awareness to stress/trauma management, both for the individual and for managers. | 110 |
| 51. | 6.116 | Navy should introduce a requirement for at least one CISM Peer Support Member to be posted to each Major Fleet Unit. | 111 |
| 52. | 6.117 | All Chaplains should be trained as CISM Peer Support Members. | 111 |
| 53. | 6.141 | Operational authorities should include in their headquarters' crisis response teams a member solely tasked with coordinating the interface between the operational authority and DCO/PSO authorities. | 114 |
| 54. | 6.150 | Agreements should be developed with civilian health authorities and hospitals on the procedures to be followed in the event of casualties being required to be medevacced by air from ships off the Australian coast. | 115 |
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Section 7 - Firefighting and Safety Equipment | | | |
| 55. | 7.6 | Thermal Imaging Cameras used by firefighting teams should be capable of determining the seat of a fire against very high background temperatures. | 116 |
| 56. | 7.10 | Although the hose nozzles currently in service in the RAN are appropriate in various fire situations, further evaluation should be undertaken of the most appropriate nozzles, and particularly waterwall nozzles, for use in the whole range of situations which can be foreseen. In particular, compartments with unusual | |

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		configurations, such as the exceptionally large spaces in WESTRALIA's MMS, need further study.	117
57.	7.19	The allocation of spare OCCABA cylinders in a ship should be equal to the number fitted to the breathing apparatus sets.	118
58.	7.20	ABR 5476 should be updated to reflect the allocation of OCCABA and spare cylinders.	118
59.	7.21	During any major incident, a coordinator should be designated to gather all OCCABA resources and place them in a central location.	118
60.	7.35	The Navy should review its policy on the servicing of OCCABA to ensure it meets the highest standards and meets the manufacturer's instructions.	120
61.	7.36	A Navy instruction should be distributed outlining the following:	120
		<ul style="list-style-type: none"> • The type and part number of the O-ring to be fitted to OCCABA. • Cylinder servicing - outlining care and maintenance procedures for O-rings. 	120
62.	7.37	All facemasks should be numbered and matched to a backplate.	120
63.	7.38	A system should be implemented in ships to record OCCABA set numbers and dates serviced.	120
64.	7.39	Standard operating procedures should be reviewed to ensure high-pressure hand wheels are tight before cylinders are opened (part of the donning procedure).	120
65.	7.40	The Navy should investigate the purchase of new breathing apparatus that has fewer hand wheels and complies with the Australian Standard.	120
66.	7.46	The Navy should fit DSUs and BA control tags, if they are acceptable for marine use, to all OCCABA.	121
67.	7.49	Fuel should be stored in a convenient position to re-supply the Bauer compressor.	122
68.	7.55	The Navy should determine whether more effective and reliable portable radio communication systems than the Maxon are available for use within the ship.	122
69.	7.56	A voice activated radio communication device should be fitted to a number of OCCABA in each ship.	123
70.	7.63	HMAS WESTRALIA should comply with the Lloyds and SOLAS requirements for emergency fire pump fuel supplies.	123
71.	7.65	Navy should conduct an evaluation on the battle lanterns to determine their suitability.	124
72.	7.66	An inventory should be undertaken to determine if there are enough torches on board WESTRALIA.	124
73.	7.70	Helmets should be introduced for hose team members.	124
74.	7.75	The number of ELSRDs in the MMS should be increased from six to at least six on each level and placed on or near the escape routes, clearly identified and readily accessible.	125

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Section 8 - Materiel State

75.	8.15	Correct installation and operation of the fuel back pressure system should be confirmed before further use.	128
76.	8.19	Appropriate fuel isolating cocks should be fitted to the fuel rails.	128
77.	8.24	The emergency power supply to essential radio communications equipment should be reviewed.	129
78.	8.27	The ship's sound powered circuits should be checked for proper operation.	129
79.	8.32	The gas tight integrity of the MMS should be brought up to the required standards.	130
80.	8.37	All cable and pipe penetrations between the MMS and the MCR should be sealed to prevent smoke entry.	131
81.	8.38	The electrical cables above the engines should be either relocated or covered with a fire resistant material.	131
82.	8.49	All RAN fixed firefighting systems should be checked to ensure:	132
		<ul style="list-style-type: none"> • operating instructions can be clearly seen by the person operating the controls 	132
		<ul style="list-style-type: none"> • all valves and levers are clearly labelled and logically numbered 	132
83.	8.50	WESTRALIA's CO ₂ system should be thoroughly overhauled before being set to work again.	132
84.	8.52	Firemain pressure gauges should be fitted in HQ1 and the Damage Control section bases	132
85.	8.55	Investigations should establish whether the indicator cocks should be lagged and or shielded. If appropriate, insulation and shielding should be fitted.	133
86.	8.57	In the absence of information about the actual magnitude of the spill pulse pressures and a lack of clarity about whether any flexible hose can withstand this operating environment, a new piping arrangement, using the rigid steel option, should be procured from the engine manufacturer and fitted.	133
87.	8.59	Although the remaining life of the ship is short and the provision of a satisfactory set of ships drawings and documentation is unlikely to be achievable, priority should be given to providing accurate information on the ships emergency arrangements.	134
88.	8.81	The Board recommends that enclosed escape arrangements be fitted at both ends of the MMS as a matter of urgency.	137
89.	8.99	A wide and less steep ladder should be fitted from the fridge flat landing to the top plate running centrally from aft to forward.	140
90.	8.100	A wide ladder should be installed on the port side between the middle and top plates concluding in line with the workshop door.	140
91.	8.101	The existing central port ladder and the ladder from the fridge flat to the top plate should be removed.	140
92.	8.104	A system should be provided to enable personnel working in the MMS to communicate with the MCR. A system similar to the	

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- 'Flight Deck Loop' communication system would be ideal (combined communications and hearing protection system) 141
93. 8.108 Whilst WESTRALIA's CO₂ fire protection system might be considered satisfactory, consideration should be given to other fire protection systems such as water mists, which could be fitted in lieu, particularly if these are safer and more adequately meet Navy's requirements. 141
94. 8.113 Data recording equipment should be fitted in command positions of all HMA ships and submarines. 142
95. 8.118 A system should be installed that allows the MMS ventilation exhaust flaps to be opened remotely. 143
96. 8.127 The fire detection system should be upgraded in the WESTRALIA. 144
97. 8.128 A CCTV system should be installed in the MMS, MCR and HQ1. 144
98. 8.130 Audible warning devices activated by buttons placed on each level of the MMS and in the MCR should be fitted. The cabling should have appropriate fire protection. 145
99. 8.134 Additional emergency lighting and reflective tape should be placed at a low level on designated escape routes, ladders and doors to assist personnel to evacuate the MMS in smoke or darkness. An arrangement similar to that used to identify escape routes in commercial passenger aircraft would be ideal. 145

Section 9 - Causes of the Fire

100. 9.98 The RAN should adopt the guidelines set out in IMO's draft MSC Circ. 861 in relation to diesel engine fuel systems. 168

Section 10 - How Hoses of Inadequate Design Came to be Fitted

101. 10.168 The WMO billet should be filled by a person who has, amongst other requirements, received appropriate training in contract administration, financial management and Lloyds Classification Society requirements. 195
102. 10.172 Consideration should be given by an appropriate authority as to whether ADI failed to comply with the Act. 196
103. 10.173 Care should be taken to ensure that all RAN contracts include explicit reference to occupational health and safety legislation as stipulated in ABR 6303 Chapter 4. 196

Section 11 - RAN Configuration Management

104. 11.7 An urgent review of the configuration management training provided in MEO and CO Desig courses together with a review of other pre joining and career courses should be conducted. 198
105. 11.8 A firm reminder of the importance of a disciplined approach to configuration management to the RAN community should be issued and reinforced on a regular basis. The Board notes the direction given by the Maritime Commander [MHQAUST

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		message 210733Z JUL 98] to initiate audits and to manage the safety implications resulting from the unauthorised configuration changes and inappropriate use of procedural workarounds.	198
106.	11.9	A technical review of work packages by a competent professional engineering authority should be introduced as part of the procedure for authorising work.	198
107.	11.10	A review of the RAN configuration management process in the light of the shortcomings revealed to this Inquiry and the recent organisational changes such as Class Logistic Offices and Refit Planning Logistic Support Services (RPLSS) contractors, should be conducted. The review should include an assessment of the level of engineering expertise available in the RPLSS offices.	198
Section 12 - Quality Assurance			
108.	12.8	RAN contract managers and ships' staff should thoroughly check work instructions to ensure that all requirements are accurately specified and the appropriate level of QA checks are included.	200
109.	12.9	Work should not be accepted until all QA requirements have been met, including the provision of the appropriate documentation.	200
110.	12.14	OAWA's SOPs should be updated to reflect the WESTRALIA RPLSS contract.	201
111.	12.15	SOPs for all RAN contract managers should address each type of maintenance process in which the contractor is involved, clearly defining the responsibilities of both parties.	201
112.	12.16	RAN contract managers should insist on receiving all appropriate quality documentation (including test certificates and opening/closing reports) and check them for accuracy and completeness prior to approving payment.	201
113.	12.30	Defence should re-examine the policy of quality accreditation for companies engaged in Defence work with a view to contracting the accrediting organisations to work on Defence's behalf. A price reduction resulting from the transfer of responsibility for the work should be vigorously pursued.	203
Section 13 - System Safety Management			
114.	13.47	Training in the RAN Safety Program, specified in ABR 6303, should be given priority.	210