SECTION 13. SYSTEM SAFETY MANAGEMENT

13.1 Sections 9 and 10 of this report discuss in detail the evidence relating to the fitting and subsequent failure of the flexible fuel hoses. The Board has concluded that the hoses were manifestly unfit for purpose. This conclusion is clear but it does not address the underlying situation that led to the fire and tragic deaths of four Naval personnel.

13.2 Inquiries seem to deal in blame and accountability and to concentrate on these issues can lead to an oversimplified analysis of any accident and a failure to address the system errors. In so doing, organisations are in danger of retaining systems with inherent faults or 'pathogens'. These inherent faults can all too easily lead to other accidents, which on close analysis, have similar underlying organisational causes.

13.3 Accidents occur as a result of a complex chain of events, including malign factors (which in themselves are not causative) coming together in a moment when the system is vulnerable. Few, if any, accidents are caused by one single factor but typically by a substantial number of factors including human errors, slips, lapses, violations and mistakes. These occur at all levels of the organisation, not just at the operator level.

13.4 Researchers into accidents have emphasized the extreme difficulty of those involved to foresee any possible adverse conjunction between what seemed to them to be unconnected and, in many instances, not especially unusual or dangerous happenings or decisions (Wageneer & Groeneweg, 1988, p.42):

> Accidents appear to be the result of highly complex coincidences which could rarely be foreseen by the people involved. The unpredictability is caused by the large number of causes and the spread of the information over the participants. . . . Accidents do not occur because people gamble and lose, they occur because people do not believe that the accident that is about to occur is at all possible.

13.5 Reason (1991) cautioned against rushing to judgement and seeking scapegoats:

> First, most of the people involved in serious accidents are neither stupid nor reckless, though they may well be blind to the consequences of their actions. Second, we must beware of falling prey to the fundamental attribution error (i.e. blaming people and ignoring the situational factors). (Reason, Human Error, 1991. P 216).

13.6 A tragic irony of the fire and fatalities aboard WESTRALIA is that all those immediately concerned in the fitting of the flexible hoses (LCDR Crouch, WO Bottomley, WO Jones, Mr Morland, Mr Sergeant and Mr Old) genuinely cared about the ship and saw the fitting of the flexible hoses as a means of enhancing WESTRALIA's operational effectiveness and safety.

13.7 Given the totality of the evidence before the Board, the accident highlights latent weaknesses within the Navy and ADI. These weaknesses involve long term management strategies, line management deficiencies, individual training, perceptions and knowledge, and inadequate defences against breakdowns in the system.

13.8 The evidence before the Board demonstrated, that the ship's company of WESTRALIA and those ex-service personnel employed by ADI:

a. did not sufficiently understand the ship safety regime under which WESTRALIA operated;

b. had not been sufficiently alerted to a safety regime foreign to the majority of Naval ships;

c. had not received any instruction or training in the classification of ships;

d. had not received any clear direction on the need to consult the classification society in line with the conditions of class;

e. did not have the level of training in, or theoretical knowledge of, diesel engines to alert them to the possible dangers.

13.9 The responsibility for ensuring that WESTRALIA's engineers, OAWA, and RPLSS staff had the appropriate base knowledge rested with their respective organisations, Navy and ADI.

RAN

13.10 LCDR Crouch was asked if he received any specific instructions relating to his responsibilities when he was appointed to WESTRALIA. He answered 'no' (T2969). He was also asked if any part of any Naval training covered keeping a ship in class:

> No. I do have a general - - well, a hazy understanding of the requirements to keep a ship in class, mainly from the minesweeping project where we were involved in commercially built craft. That was AMSA requirements, and I believe Lloyds requirements are similar - - -[T2909]

13.11 When asked to explain his understanding of the way classification societies work he stated:

> The vessel would be classified in accordance with its intended use and its capabilities and the - - well, basically, that's it. Its intended use and its capabilities. That is - - it goes down to as far as what expected sea states it can survive and how many people it can carry onboard.[T2970]

13.12 The answer demonstrated, at best, a superficial knowledge of the role of classification societies.

13.13 It could be argued that there is some initial information provided to Naval personnel in the RAN Logistic Support Policy Manual (ABR 5454) at paragraph 3003 [E58]. However there is no detail on the relationship between the ship and the classification society, or the need to conform to the conditions of the certificate of class.

13.14 WO Jones understood that Lloyd's carried out surveys on the ship's structure and machinery [T1956]. However, he considered the issues of Class were a matter for ADI [T1958]. He was questioned about the terms and conditions appearing on the back of the Lloyd's Certificate of Class [E138] by Counsel Assisting.

> You will see the opening paragraph, paragraph 1, of that recitation of the terms and conditions that:

> 'Continuance of class is subject to compliance with the requirements of Lloyds Register of Shipping's Rules and Regulations for the Classifications of Ships'
>
> And attention is drawn in particular to the following extracts from rules, part 1 chapter 2, and one of the extracts is paragraph 1.5, which, without reading the full paragraph but reading it in terms of its presently relevant words:
>
> 'Plans and particulars of any proposed alterations to machinery are to be submitted for approval, and such alterations are to be carried out to the satisfaction of Lloyds Register's surveyors.'
>
> Does that represent your understanding of what should be done in relation to a proposed alteration to machinery on board HMAS 'Westralia' so far as Lloyds are concerned?---Yes, sir.
>
> And this change from rigid, or fixed, fuel lines to flexible fuel lines would have involved a relevant alteration to machinery, would it not?---Yes, sir.[T2064]

13.15 He was referred to general condition 6.19 of the contract [E25]:

> 'Approved alterations to machinery shall be carried out under the inspection of and to the satisfaction of the Lloyds Classification Society/AMSA surveyors as applicable.'
>
> Was any consideration given by you to the contractual obligation or the Lloyds requirement for their involvement in this alteration to the fuel lines on HMAS 'Westralia'?---As per the 200 submitted by the ship, sir.
>
> Yes. Nothing beyond that?---No, sir.[T2064]

13.16 Although the CO was not directly involved in the procedures for the fitting of the flexible fuel hoses, his evidence as to the understanding of the role of class is indicative of the overall knowledge by Naval staff.

13.17 CMDR Dietrich was asked about his knowledge of the classification of ships [T3208]:

> Do you know much about classification societies? ---Not a lot. I have been learning on the job on 'Westralia'.

13.18 When asked what he had learnt of the role of Lloyd's he stated:

> That there are - - that Lloyds conducts regular checks of certain aspects of the ship's engineering configuration, I guess mostly on the engineering side and hull structure side and that the ship is required to meet routine survey requirements of Lloyds and that's factored into our planned maintenance arrangements.[T3208-3209]
>
> So it's factored into your planned maintenance but, I mean, does the Navy provide you with an idiot's guide to what Lloyds require? It would seem sensible to me that at least something is outlined to you - -?---No. The Navy does not provide that. I think to some extent we rely on the contractor.[T3209]

13.19 The Cargo Ship Safety Construction Certificate is issued in accordance with SOLAS 74/78. When asked if he knew anything about the Convention he stated:

> --I'm aware of it.
>
> Again, there is no education process or briefing process that goes on from anybody exactly what is covered in that? Nothing like that is provided to you? ---Not before joining the ship.[T3209]

13.20 The final sentence of para 3003 of the Logistic Support Policy Manual (ABR 5454): 'Standards therefore, should not vary from commercial to military unless an essential need is demonstrated' [E58 tab1], probably had little meaning to those to whom it was directed.

13.21 The Board accepts that issues such as maintaining a ship in Class and the provisions of conventions related to commercial ships on international trade are totally foreign to naval staff. It is outside their experience.

ADI staff

13.22 All the ADI personnel were ex RAN and were selected for their engineering experience, knowledge of Naval maintenance procedures in general and their familiarity with WESTRALIA. Such a selection policy can either be seen as to narrowly focussed or as wholly logical, employing like minded and similarly trained individuals, steeped in the way 'the Navy does business'.[T3862]

13.23 The danger of such a policy is that inherent practices and attitudes become entrenched and introverted. There was certainly limited appreciation of the implications of retaining a ship in class. In the case of WESTRALIA, there was a requirement that the safety provisions and standards 'should not vary from commercial to military unless an essential need is demonstrated'.[E58 Tab 1]

13.24 Mr Morland knew that the ship was required to remain in class with Lloyd's [2580]. Although he was indisposed before questions could be put to him on his detailed knowledge of classification requirements, the totality of his evidence showed that he had no greater understanding than other ADI or RAN witnesses of what was involved in retaining a vessel in Class.

13.25 Mr Morland's role of technical specialist was specifically related to WESTRALIA, and there was an ADI requirement for him to have a 'Knowledge of naval fleet maintenance systems'. However, the ADI description relating to his position contained no reference to Lloyd's or SOLAS74/78 despite the fact that WESTRALIA was to be maintained to commercial standards.

13.26 The only position description of the four man RPLSS management team that mentioned the class society was that of the Quality Coordinator, Mr Shingara Singh.

13.27 Mr Sergeant gave evidence of a meeting with Lloyd's [T3656]:

> when the contract first was undertaken, we arranged a meeting with myself and also Mr Singh, went up to Fremantle, talked through quite a few bits and pieces. There were a couple of surveys that were due at that particular time and you are quite right, we had no idea on what was physically required. We certainly didn't have the Lloyds books and as a result of that opening

> discussion 14 months ago, or thereabouts, we certainly learnt quite a few bits and pieces, but we have an ongoing discussion with Lloyds.

13.28 It is evident that whatever discussions had been held with Lloyd's, the ADI staff did not understand either that:

a. modifications to the hull or machinery of a ship in class require a full approval process by the relevant classification society; or

b. what such an approval process involved.

System failure

13.29 As major accidents are made up of a complex web of factors, it is unlikely that the exact circumstances of the fire aboard WESTRALIA will be replicated in another incident. However accidents are more likely to occur where the system is fundamentally weak. The very complexity of the RAN ordering system and the low level at which important technical decisions are made are fundamental weaknesses.

13.30 There was a failure on the part of both Navy and ADI to provide staff that understood the somewhat unusual situation of operating a 'warship' while requiring that the safety provisions and standards 'should not vary from commercial to military unless an essential need is demonstrated'. The differing, and sometimes parallel, standards and procedures of the RAN and Lloyd's seem to have caused confusion. This, coupled with the limited experience of both the RAN and ADI staff, were elements in a system that failed at a critical time.

13.31 Looking at a system that has failed, in the first instance six basic safety questions should be asked:

a. Were the risk factors identified or identifiable?

b. Was the equipment in use fit for purpose?

c. Were the systems and procedures on board effective to maintain safe operation?

d. Were the individuals involved qualified, competent and effective?

e. Were emergency procedures and defences effective?

f. Was there a management system to monitor performance?

13.32 When considering the factors surrounding the fitting of the flexible fuel hoses in WESTRALIA, on all counts the answers to the above questions must be 'no'.

Other System Weaknesses

13.33 The issues of potential 'system' failure or system weakness are not confined to selecting and fitting flexible fuel hoses. Issues raised in this report demonstrate underlying organisational and management issues that contributed to the fire on 5 May 98 and which could lead to other serious breaches of safe practice. Taking each aspect individually, the

issues raised may seem inconsequential or trivial. Taken as a group they point to a wider malaise.

13.34 The requirements for pre-joining training are apparently being systematically disregarded [R3.156]. As the onus is on the releasing billet to provide the requisite training, the releasing billet has no direct stake in ensuring the procedures are followed.

13.35 When LCDR Crouch took over as the Engineer in October/November 1996, [T2970] he did so in the rank of LEUT from a LEUT Jones [E304]. The RAN Marine Engineering Manual (ABR 5225) states in a note on the supersession procedure at para 191:

> In ships in which the Marine Engineer Officer is below the rank of Commander, as much of this detailed examination as is practicable should be carried out in conjunction with the Marine Enginee Officer on the staff of the Administrative Authority.

13.36 Practical or not, this procedure was not followed although both Officers were LEUTs.

13.37 WESTRALIA had not completed its required number of escape training exercises from the MMS since June 1996 [R3.67]. Although pro-forma returns on training were submitted to Maritime Headquarters this shortfall in training was not identified.

13.38 Allegations of an increasing use of the TM200 format to achieve configuration change were made to the Board [R11.1]. Authorisation to fit flexible fuel hoses in WESTRALIA was a case in point.

13.39 The WESTRALIA Damage Control Log, recording damage control exercises in port shows that the minimum standard achieved at any time was SA- (standard achieved, minus). Since 1 January 1998, over 50 exercises and instructional sessions have been recorded in the log.[E92] Given the evidence before the Board of the general level of knowledge of the ship and its safety systems, it is hard to accept that standards recorded fairly reflect the ship's overall proficiency in damage control.

13.40 On the question of safety audits it is worth considering the lessons from other safety investigations. An assessor to the Piper Alpha Inquiry, Brian Appleton, an ICI Executive and qualified engineer, commenting on an audit of a safety system which contained no criticism whatsoever said:

> In my experience there is always news about safety – some of it bad – continuous good news you worry.

13.41 As has been stated earlier, the Board was particularly concerned at the general lack of knowledge and ignorance of officers of their ship, particularly of the safety equipment.

13.42 Of major concern is the low level of knowledge of the ship's company in the safety systems and equipment and the lack of external identification of this deficiency by Sea Training Group. The primary example of this was the knowledge of the primary firefighting system protecting the space with the highest fire hazard – the CO_2 system protecting the MMS.[R3.135]

13.43 The lack of knowledge of the ship was not confined to individuals, or limited groups of individuals, but appears to apply to the ship's company as a whole. This is indicative of a wider system deficiency in the safety management of WESTRALIA.

13.44 The Board notes that Navy issued the RAN Safety Management Manual (ABR 6303) on 13 February 1998. As such a recent publication, it has not yet had sufficient time to affect the existing safety culture of individuals, ships or organisations within the RAN.

13.45 Numerous specific recommendations have been made elsewhere in this report covering matters referred to above. A more general conclusion follows.

Conclusion

13.46 There are systemic defects within RAN and ADI safety management.

Recommendation

13.47 Training in the RAN Safety Program, specified in ABR 6303, should be given priority.