5202/1/HMNZS Cant · RHIB

(9)

RECORD OF PROCEEDINGS

COURT OF INQUIRY

assembled by

Commodore D.V.ANSON RNZN
Maritime Component Commander

Into

The circumstances that resulted in the loss of the Port RHIB and near loss of the starboard RHIB from HMNZS CANTERBURY on 10 July 2007

RECORD OF PROCEEDINGS

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SEPARATE RECORD OF EXHIBITS

MD 634

ORDER FOR THE ASSEMBLY OF A COURT OF INQUIRY

Orders by: Commodore D.V. Anson, Maritime Component Commander, Joint Forces New Zealand.

A court of inquiry consisting of the following officers is to assemble at Devonport on 24 July 2007 at 0900 for the purposes of collecting and recording evidence on the circumstances that resulted in the loss of the Port RHIB and near loss of the Starboard RHIB from HMNZS CANTERBURY on 10 July 2007

and reporting and commenting thereon as required by the terms of reference below:

President: Commander K.N. CORLES, RNZN, MNZM

Members: Lieutenant Commander R. MCLAUGHLIN, RNZN, MNZM

The president is to order or summon the witnesses to attend in accordance with rule 149 of the Armed Forces Discipline Rules of Procedure 1983. Upon completion the president is to forward the record of proceedings to the assembling authority.

The court is to have regard to the provisions of rule 153 and rule 154 of the said Rules of Procedure at all times. The court is to read section 200 and, where applicable, section 201 of the Armed Forces Discipline Act 1971, DFO(D) Section 19 and Part XIV of the said Rules of Procedure before commencing its inquiry.

TERMS OF REFERENCE

See Attached

Signed at Trentham this 23rd day of July 2007

D.V. ANSON
Commodore, RNZN
Maritime Component Commander

TERMS OF REFERENCE

A Court of Inquiry is assembled to investigate the circumstances that resulted in the loss of the Port RHIB and near loss of the Starboard RHIB from HMNZS CANTERBURY on 10 July 2007 ("the incidents").

1. What was the time and exact location of each incident?
2. What were the light, sea and weather conditions at the time of each incident?
3. What was the chain of events and circumstances that immediately led up to each incident?
4. Was the navigation plan sound and appropriate for the passage of the ship in the location where the incident occurred?
5. Was the ship being navigated in accordance with all relevant RNZN orders, regulations and procedures?
6. What were the causes of the incidents?
7. Had appropriate operational risk management steps, including weather prediction, been taken and were these sufficiently robust?
8. What actions, emergency and otherwise, were taken immediately after the incident in response to each incident? Where these actions in accordance with relevant RNZN or ship orders, regulations and procedures?
9. What actions were taken to report the incident, including reports to international or New Zealand agencies, and were they timely and in accordance with normal reporting procedures? If not, why not?
10. Were all actions taken following the incidents adequate and proper given the circumstances?
11. Were all persons involved in the navigation of the ship and securing the RHIBS at the time of both incidents appropriately trained and qualified to perform their duties?
12. Were there any injuries sustained as a result of the incidents and if so, what was the nature and extent of such injuries and how did they occur?
13. Have any similar incidents occurred in the recent history of the ship? If so, what actions were taken subsequent to the previous incidents and how were they able to occur?
14. Are there any recommendations or changes that could be made to prevent a recurrence of any such an incidents?
15. What technologies might be utilised to better apprise Command when sea conditions and weather are exposing the RHIB alcoves and RHIBs to added risk.
16. What technologies may assist decision making with respect to appropriate risk mitigation strategies for RHIB stowage?

17. Comment on the existence and adequacy of all orders, regulations and procedures, including international maritime regulations, relating to the incidents.

18. Was either or both the incidents due to a design fault or underlying physical or systemic fault in either of the RHIBs, the fastenings, the ship or anything else?

19. Was there any damage to any property or equipment? If so, what was the extent and cost of the damage, and is the damage able to be repaired?

20. When and by whom were the boat, the fastenings and deployment system last inspected for function and safety? Was this in line with ships orders or any other relevant order or safety standard including international maritime safety requirements? Was this documented and if so are the relevant papers in order?

21. Which branch of which insurer was notified and on what date?

22. Comment on any other matters the Court considers relevant to the purpose of the Inquiry.

STATEMENT OF COMPLIANCE WITH RP 154

This is to certify that RP 154 has been complied with.

Commander A.M MILLAR RNZN was offered the rights under RP 154 but declined to exercise those rights.

K.N. CORLES
Commander, RNZN
President

LIST OF WITNESSES

1. Commander A.M.MILLAR RNZN
   Commanding Officer, HMNZS CANTERBURY
   14 Page Statement, signed 3 August 2007

2. Lieutenant Commander M.R WRAY RNZN
   Executive Officer, HMNZS CANTERBURY
   7 Page Statement, signed 3 August 2007

3. Lieutenant R.D. THOMPSON RNZN
   Navigation Officer, HMNZS CANTERBURY
   6 Page Statement, signed 3 August 2007

4. Lieutenant Commander M.HARVEY
   Engineering Officer, HMNZS CANTERBURY
   15 Page Statement, signed 3 August 2007

5. Lieutenant A.D. SORENSON RNZN
   Officer of the Watch, HMNZS CANTERBURY
   3 Page Statement, signed 3 August 2007

6. Chief Petty Officer Seaman Combat Specialist K.J. STINSON
   Chief Boatswains Mate, HMNZS CANTERBURY
   8 Page Statement, signed 3 August 2007

7. Petty Officer Electronics Technician S.A. HOLDAWAY
   Voyage Data Recorder Maintainer, HMNZS CANTERBURY
   3 Page Statement, signed 9 August 2007

8. Warrant Officer J.A. REDDECLIFFE
   Warranty Co-ordinator, Fleet Engineering Centre
   5 Page Statement, signed 3 August 2007

9. Captain W.J. TUCKER RNZN
   Captain Fleet Support
   5 Page Statement, signed 8 August 2007

10. Commander P.G. SULLIVAN RNZN
    Director Naval Engineering, Naval Staff
    4 Page Statement, signed 8 August 2007

11. Commander A.P. HAYES RNZN
    Director Marine Engineering, Naval Staff
    6 Page Statement, signed 8 August 2007

12. Mr Christopher John HOWARD
Acting Director Naval Construction, Naval Staff
5 Page Statement, signed 10 August 2007

13. Commander J.E. BEADSMOORE RNZN
Fleet Warfare Officer, Maritime Operational Evaluation Team
2 Page Statement, signed 10 August 2007

14. Lieutenant Commander K.K. WISHART RNZN
Maintenance Manager, Fleet Engineering Centre
1 Page Statement, signed 8 August 2007

15. Commander P.D. MAYER RNZN
Operational Support Commander, Fleet Engineering Centre
6 Page Statement, signed 8 August 2007

16. Chief Petty Officer Seaman Combat Specialist S.J.LANE,
Fleet Seamanship Inspector, Maritime Operational Evaluation Team
2 Page Statement, signed 13 August 2007

REPORT OF THE COURT OF THE INQUIRY

General

1. This Inquiry was carried out over the period 24 July to 13 August. Evidence from 16 witnesses was considered.

References

What was the time and exact location of each incident?

2. **Port RHIB Loss.** The exact time of the loss of the Port RHIB is not known. The port RHIB was discovered missing by the Executive Officer during informal rounds, at 1915 on 10 July 2007. It is probable that the port RHIB was lost at approximately 1840 when the ship experienced a significant roll of 28 degrees to port. The Ships Log records the loss at 1839 in position 36° 51' South, 176° 40.7' East. This entry was made subsequent to the discovery of the loss at 1915.

3. **Starboard RHIB Damage.** The exact time of damage to the starboard RHIB is also not known. However the starboard RHIB was confirmed to be secure at the time the port RHIB was noted lost. The starboard RHIB was observed from the starboard bridge wing by a number of the Ships Officers to be outboard of the Ships side, at about 2000. An entry in the Navigation Record Book records the "Starboard RHIB outboard" at 1958 in position 36° 40.7' South, 176° 15.1' East.

What were the light, sea and weather conditions at the time of each incident?

4. **Port RHIB Loss.** The Commanding Officer reported the weather conditions at the time as easterly wind of 60 knots, gusting 73, sea state six, swell six metres, no moon, completely overcast, a very dark night. This was substantiated by the Officer of the Watch and the Ships Log records the wind at 1900 as from 105 at 60 knots and sea state five. The Voyage Data Recorder (VDR) recorded the wind as southerly at 48 knots but the Environmental Data Management System (EDMS) was unserviceable and the recordings of the VDR are unreliable.

5. **Starboard RHIB Damage.** The weather conditions at 2000 were the same as at 1900 except the Ships Log records the wind as having increased to 65 knots.

6. Of significance over the seven hour period leading up to both incidents is a 12 hectopascal drop in barometric pressure. This is consistent with the reported wind strength. Sunset was at 1710. There is some discrepancy in the reported sea state. All witnesses who reported the sea state indicated it

was sea state six, but the Ships Log records it as sea state five. From the reported wave height of six metres it can be deduced that the sea state was at the upper end of sea state six bordering on sea state seven. This is consistent with a wind strength of 60 knots which would produce waves building to greater than six metres.

What was the chain of events and circumstances that immediately led up to each incident?

7. On 10 July 2007 CANTERBURY was transiting the East Coast of the North Island on the final leg of her delivery voyage to Devonport Naval Base. When the ship departed Wellington on 9 July 2007 the ship was secured for sea. The Command Team was aware of a complex depression developing to the North West of the North Island. The view was held that the worst of the weather would be avoided.

8. During the day of 10 July, the ship received an updated forecast that showed the depression was expected to expand into three distinct areas of low pressure and move south to the Auckland area. The weather forecast available on VHF radio had also been recorded.

9. Rough conditions were expected during the transit across the Bay of Plenty. The ship was secured for sea.

10. The ship rounded East Cape at about 1300 with the wind easterly at about 25 knots and sea state three.

11. Through the afternoon the wind increased quickly so that by 1800 it was fifty knots and the sea had increased to sea state five. This caused the ship roll to increase becoming heavy on occasion. However the auto pilot was steering well and maintaining good course stability. Based on this and not wishing to put the ship beam on to the sea, or head into it and risk damage to forecastle fittings and the gun, the Command decided there was no viable option but to continue.

Was the navigation plan sound and appropriate for the passage of the ship in the location where the incident occurred?

12. The navigation plan was sound. Consideration was given to deviating from the plan, due to the weather conditions experienced. The decision was made to continue with the navigation plan. Initially this decision was based on the premise that the ship would avoid the worst of the weather. Once the ship was heading across the Bay of Plenty the weather deteriorated. At that stage the Command realised that the ship had not avoided the bad weather and decided that that there was little choice but to continue towards the Hauraki Gulf. The Commanding Officer decided it would have been dangerous to alter course across the sea and was also conscious of the potential for damage on the forecastle had he altered course into the sea.

The auto-pilot was holding course very well. In the situation at the time and with the way the ship appeared to be handling the conditions the decision to continue was sound.

Was the ship being navigated in accordance with all relevant RNZN orders, regulations and procedures?

13. In the prevailing circumstances the ship was being navigated by the best means available.

What were the causes of incidents?

14. Both incidents are directly attributable to the ingress and egress of a significant quantity of sea water into and out of both RHIB alcoves.

15. **Port RHIB Loss.** The quantity of water into and out of the port RHIB alcove is presumed to have swamped the port RHIB. The combination of the increased port RHIB weight, RHIB buoyancy and the quantity of water egressing from the alcove is believed to have caused the gripes to break and the RHIB to become unseated from the davit flippers. The port RHIB has then suffered massive structural failure and this is evident from the disintegration of the transom and the failure of the RHIB forward lifting points. The port RHIB was then washed overboard with the transom and forward lifting points remaining on the port davit sling. It is surmised that the structural failure of the port RHIB would have resulted from a combination of the increased RHIB weight and the violent movement and impact of the unrestrained RHIB in its alcove.

16. **Starboard RHIB Damage.** Similarly the quantity of water into and out of the starboard RHIB alcove swamped the starboard RHIB. The combination of increased RHIB weight, RHIB buoyancy and the quantity of water egressing from the alcove is believed to have caused the starboard RHIB gripes to break and the starboard RHIB to be unseated from the davit flippers. The starboard RHIB was seen to be protruding from the starboard alcove by Ships Staff and was being subject to infrequent wave action. The starboard RHIB was secured back into its stowed position when the ship reached sheltered waters. It was noted that the RHIB engine bay was flooded, there was damage to the RHIB collar and hull and minor damage to the davit.

17. Water entered the RHIB alcoves during the crossing of the Bay of Plenty because of a combination of a number of variables; relative direction of sea, extreme ship motion in three dimensions, wave height; and the position of the Alcoves relative to the sea.

18. **Relative Direction of Sea** For the crossing of the Bay of Plenty the sea was from about green 170. In the "Commentary on MRV Seakeeping Model Tests", David Byrne indicates that there were isolated instances of

large roll angles in heavy stern quartering seas. The ship was experiencing similar isolated instances during the crossing of the Bay of Plenty.

19. **Extreme Ship Motion.** At the time the ship was carrying 180 tonnes of cargo and was ballasted to the optimum conditions to keep the propellers as deep in the water as possible without making the ship too stiff. Despite this, the ship was rolling significantly (up to a maximum of 28° to port) at a roll frequency of less than 11.5 seconds. Notably the Ship's Anti Roll system will not function when the period of ship roll is less than 11.9 seconds. A change of course to head into the sea would have increased the likelihood of bow slamming and propeller emergence.

20. **Wave Height.** The reported wave height of approximately six metres is almost twice the height of the alcove deck level above the waterline. A wave of six metres would exceed the top of the RHIB collar by approximately a metre, when the RHIB is in its stowed position.

21. **Position of Alcoves.** The RHIB alcoves are 3.3 metres above the waterline of the ship. Sea state 6 and winds of 60 knots as experienced by the ship on 10 July will generate waves of six metres or more. Experience to date, on two occasions prior to 10 July 2007, categorically confirm tank testing results that the alcoves are vulnerable to ingress of significant quantities of sea water in higher sea states.

Had the appropriate operational risk management steps, including weather prediction, been taken and were these sufficiently robust?

22. The ship received weather analysis and forecast for 10 July which gave a good indication of the expected weather. The weather experienced was as expected but arrived earlier than the Commanding Officer anticipated. The command did not use the formal RNZN Operational Risk Management (ORM) process. In hindsight the Commanding Officer believes that had he used the formal ORM process the result would have been the same.

23. There were few options for the ship once the bad weather arrived. Tauranga was closed and there is nowhere else between Hawke Bay and the Hauraki Gulf that provides shelter from an easterly storm. There was also consideration given to the risks of damage to fittings on the forecastle, and the gun, which could have occurred with a change in course and heading the ship into big seas. The Maritime Sector Specialist Commentary on MRV Seakeeping Model Tests warns against sailing with very heavy seas from the stern quarter, but states that "sailing with the seas right astern and maintaining a reasonably high forward speed can be a comfortable point of sailing for this ship but not without the dangers of broaching if the heading falls off for any reason". The ship did not have access to this report before the incidents but it is probable that to continue with the sea almost right astern (green 170), and with a high forward speed (19 knots) was the most viable option available.

24. The command was aware of the potential for water ingress into the boat alcoves but the consequences of water ingress were not fully appreciated. Previous incidents had resulted in damage to a boat but not total loss, and the forced opening of alcove doors allowing water in to the cargo deck. As a result of the door opening the ship established a procedure to lash the doors shut to prevent further instances of water entering the cargo deck.

25. The ship was aware of the MARIN report but had no visibility of any of the subsequent studies or recommended risk mitigation strategies. The Commanding Officer was not aware of the Operational Safety Case which identifies the potential outcomes from the hazard of water ingress to the RHIB alcoves. He had major concerns about the possibility of damage to fittings on the forecastle and the gun when heading into heavy seas. He had also experienced severe bow slamming during the delivery voyage, and propeller emergence was a significant issue.

What actions, emergency or otherwise, were taken immediately after the incident in response to each incident? Were these actions in accordance with relevant RNZN or ship orders regulations or procedures?

26. When the port RHIB was discovered missing the Executive Officer immediately reported it to the bridge. The Commanding Officer was informed without delay. The command team decided that it was too rough to attempt to secure the remnants of the port RHIB and would wait until the ship was in more sheltered waters. When the starboard RHIB was first noticed out of its normal stowage position, the command team once again decided that it was still too rough to do anything until the ship was in more sheltered waters. Once in the calmer waters of the Hauraki Gulf, the remnants of the port RHIB were recovered and the starboard RHIB was returned to its proper stowage. This occurred some time after 2200 that evening. These actions followed the principles of good seamanship and safety of personnel. There was not an option to manoeuvre the ship to provide a safe working environment on either side of the ship.

What actions were taken to report the incident, including reports to international or New Zealand agencies, and were they timely and in accordance with normal reporting procedures? If not, why not?

27. Soon after the port RHIB was discovered missing, the Commanding Officer informed the Maritime Component Commander of the incident by telephone. Within two hours an Operational Defect report had been sent by priority signal. In addition, the Commanding Officer contacted the National Rescue Coordination Centre to advise of the loss of an emergency locator beacon (EPIRB). The EPIRB was subsequently found in the RHIB washed up on the beach. It had not activated. This needs to investigated further.

28. The damage to the starboard RHIB was initially reported by Priority signal early on 11 July.

29. A written report, by e-mail was submitted by the Commanding Officer on 13 July.

30. Subsequent to these reports, warranty claims have been lodged to the ship builder regarding the loss and damage to the RHIBs.

Were all the actions taken following the incidents adequate and proper given the circumstances

31. All actions and decisions undertaken by the Command and Ships Staff of CANTERBURY were adequate, appropriate and proper given the circumstances, and the knowledge and experience of the ship at that time. Due consideration was given to the safety of both Ships Staff and the overall material state of CANTERBURY at all times.

Were all persons involved in the navigation of the ship and securing the RHIBS at the time of both incidents appropriately trained and qualified to perform their duties.

32. The Navigating Officer is a specialist, having completed the RAN Advanced Navigation Course in October 2006.

33. The Chief Boatswains Mate is an experienced seaman who has held the same position in four other ships before joining HMNZS CANTERBURY

Were there any injuries sustained as a result of these incidents and if so what was the nature and extent of such injuries and how did they occur.

34. There were no injuries resulting from the incidents.

Have any similar incidents occurred in the recent history of the ship? If so what actions were taken subsequent to the previous incidents and how were they able to occur?

35. Prior to the subject incident there have been two other separate incidents of water ingress to the RHIB alcoves. Both incidents resulted in damage to the RHIBs.

36. The first incident occurred during the delivery voyage from Fremantle to Melbourne, before the ship was delivered to the RNZN. An ingress of water in to the starboard alcove occurred when the ship was crossing the Great Australian Bight. The sea was from the starboard quarter at about sea state four. The ingress of water was sufficient to open the starboard alcove door and allow water to enter the cargo deck. The RHIB was seen to

be full of water. The extent of the damage to the RHIB was not known due to the RHIB being removed from the ship by Tenix on arrival in Melbourne for repair. Inquiries from ships staff on the extent of the damage were met with a response that indicated all it needed was a "bit of a clean out". When the RHIB was returned to the ship there appeared to be no structural damage and that any swamping of the engine bay was minor. During the delivery voyage 240 tonnes of OPV Modules were carried on the Flight Deck and the ships anti-roll system was functioning. This first incident was reported in a brief given by the Commanding Officer to the Naval Leadership Board in October 2006 as one of five concerns requiring further investigation.

37. The second incident occurred during the passage from Melbourne to Lyttelton. This time the sea was from the starboard beam, sea state four. On that occasion the ship rolled to 21 degrees. Water ingress into the starboard alcove was sufficient to swamp the RHIB and once again opened the alcove door allowing water to enter the cargo deck. On investigation the RHIB engine bay was found to be full of sea water and all the electrics had been fully submerged. The defective starter motor and alternator were removed and refurbished.

38. There were no remedial actions taken following the first incident. At that time the ship did not belong to the RNZN. One RNZN observer on the delivery voyage, who witnessed the incident recorded his observations. The second incident was reported, and following that incident the ship established a routine of lashing the alcove doors shut to stop them being inadvertently opened by the sea. However, the follow on effect of this is to slow down the time taken to launch the boat in an emergency.

39. The risk of water ingress to the RHIB alcove was well known and documented. The Project Director advised the RNZN via a Memorandum dated 24 Apr 07 (not received by Naval staff until 10 May 07) that the issue of water ingress to the RHIB alcoves was still open. He recommended that evidence be gathered to quantify the frequency and extent of water ingress and to determine the options available to address this issue. Naval Staff accepted this recommendation.

40. This recommendation had not been formally advised to the ship. Naval Staff expect any report to be in the form of either a Defective Material or Design Report (DMDR), warranty claim or a RNZN 1 for safety issues.

Are there any recommendations or changes that could be made to prevent a recurrence of any such incidents?

41. The ship is required to patrol in sea conditions up to the top end of sea state seven, and survive in sea state nine. To patrol in sea state seven implies no restriction on manoeuvre which negates the risk mitigation strategy of a change of heading to avoid damage, to the RHIB, forecastle fittings, or machinery resulting from propeller emergence. The Operational

Safety case identifies that the alcoves are likely to be affected by seas when they are above sea state four. Apart from restricting the ships operations to lower sea states there are three areas of action that could prevent a recurrence of this type of incidents: securing of the RHIB, elimination of the seawater that floods the RHIB alcoves, re-siting the RHIB's higher up in the ship.

42. There are several changes that can be made with the securing of each RHIB. These include stronger gripes, securing the lower end of the gripes to the deck rather than the davit, stronger lifting points in the RHIBs, waterproof covers for the RHIB electronics. All of these options will reduce the risk of loss of the RHIB and the violent movement and impact of an unrestrained RHIB in its alcove from the ingress of water.

43. However, this will not address the issue of the RHIB's flooding which will have the same impact on operational availability as the complete loss of a RHIB. To completely mitigate the risk of damage caused by swamping of the alcoves and to enable the ship to operate to limits of the contracted specifications, there are three options which need to be considered in detail by expert Naval Architects as to their practicality, effectiveness and cost. These options are: firstly re-site one or both RHIBs and davits somewhere higher in the ship where it is less susceptible to water ingress. Secondly, build some form of door or wave deflecting device that stops the majority of the water entering the alcoves. Lastly, to so significantly alter the ships motion that the waves will not ingress into the alcove.

44. The Operational Safety Case for the MRV identified the risk to the RHIBs by water ingress to the alcoves as one of the highest risk hazards (high to extreme) and detailed the worst credible scenario as loss of both RHIBs with damage to launching arrangements. The safety case also identified some mitigation options, and stated immediate action is required to reduce the risks to a lower acceptable level. These include reviewing the feasibility to install physical protection for the alcove from sea effects.

45. The third action that could prevent a loss or damage to the RHIB's is to re-site them somewhere else less vulnerable. This would need to be studied in detail to ensure any change can still meet the SOLAS requirements for the ship to have fast rescue boats. For example, a ship of the same design has the fast rescue boat sited up high behind the bridge.

What technologies might be utilised to better apprise Command when sea conditions and weather are exposing the RHIB alcoves and RHIB's to added risk

46. The ship is already fitted with some technologies that provide information to the Command to assist in the decision making process. The EDMS provides real time weather information relating to wind direction and strength and barometric pressure. There is also a roll and pitch indication available on the bridge. The RHIB alcoves have a closed circuit television

feed available on the bridge to show water ingress in to the alcoves. The draw back with the roll and pitch indication and the CCTV system is that if they are to be monitored full time they need a dedicated observer. Pitch and roll is not recorded on the VDR so unless someone is monitoring the indicator there is no way of knowing the pitch and roll experienced and no permanent record unless written down. Similarly the CCTV is not monitored continuously. Looking at the CCTV system at night ruins the night vision of the observer so it is invariably turned right down or off during the dark hours. To use it also requires the alcove to be lit, which can be unsound if the ship is operating in a tactical environment which may be the case when on patrol. In the advent of bad weather manning the CCTV system will give the command a better appreciation of the incidence of water ingress.

What technologies may assist decision making with respect to appropriate risk mitigation strategies for RHIB stowage?

47. The RNZN Operational Risk Management system should be sufficient to assist with decision making for appropriate risk mitigation strategies. Although it was not mandated for the situation of 10 July, it should be used to compliment Command experience, at least until the risk mitigation strategies identified in the Operational Safety Case are implemented.

Comment on the existence and adequacy of all orders, regulations and procedures, including international maritime regulations, relating to the incidents.

48. The only shortcoming identified in the orders, regulations and procedures is the absence of a Rigging Warrant for the ship. While the frequency and procedures for testing of the RHIBs, davits and associated rigging are covered in the FMMS, the absence of a Rigging Warrant means that the ships staff does not have a consolidated statement of equipment, or an authority for supply. Additionally the contents of a Rigging Warrant are held on charge. Provision of a Rigging Warrant was raised by ships staff with MOD in Melbourne but discussions went no further past this initial query. It was also highlighted as a discrepancy in the report from the RNZN Safety And Readiness Check (Harbour) conducted prior to CANTERBURY's departure for New Zealand.

49. Existence of a Rigging Warrant should have highlighted the absence of a safety chain at the davit head, which is shown in the RHIB Launching Arrangement in NZBR MRV1 300.000000-1. It is unlikely that this safety chain would have prevented the loss of the port RHIB as it was the RHIB lifting points that gave way. If a safety chain had been fitted and attached, it would have transferred the overload from the hook direct to the davit frame. This may have avoided overloading the davit wire and precluded the requirement to shorten and load test the davit wire.

50. It is imperative a Rigging Warrant is provided to the ship without delay.

Was either or both the incidents due to a design fault or underlying physical or systemic fault in either of the RHIB's, the fastenings, the ship or anything else?

51. Both incidents occurred as a direct result of the design of the ship. The alcove position relatively close to the water line combined with the roll characteristics resulted in an ingress of a significant amount of seawater which had sufficient force to rip the RHIB's out of their stowage. Actions to mitigate the risk to the RHIB's in their alcoves in the current configuration would result in heightened risk of damage in other areas. The area of greatest risk is propeller emergence. The "Commentary on the MRV Seakeeping Model Tests" by David Byrne identifies propeller emergence when the sea is right ahead or on the bow as an area of immediate concern and states *"There are no operational actions available to the ships commander which can alleviate the problem in practice".* It goes further to say *"alterations of course and speed do not assist".* The Project Director reports that the only issues outstanding relating to propeller emergence is the possibility of low oil level in the engine sumps resulting from pitch and roll. The Project Director will regard the low oil level issue as closed if no advice on changes is made. There is also the issue of bow slamming when heading in to the sea. This remains open and is to be monitored to determine what, if any, additional stiffening is required.

52. The risk to the RHIBs in the alcoves from water ingress was well known and documented once identified during the tank testing and stated in the MARIN Report. The "Commentary on the MRV Seakeeping Model Tests" identified the risks of excessive rolling in very heavy seas from the stern quarter and excessive pitching when heading into the sea. The retrospective Operational Safety case identified the worst credible consequence of immersion of the alcoves as the loss of both RHIBs with damage to the launching arrangements. This has been borne out by the events of 10 July. Water ingress results from the positioning of the alcoves relative to the water line combined with the pitching and rolling in heavy seas.

53. The Marico Marine report states that the RHIB lashing arrangements appear satisfactory, but this observation was taken from a single visit to the MRV in harbour. The report recognises that the comments should not be considered a comprehensive list of the findings.

54. The Seamanship report for the SARC (H) conducted in Jun 07 noted that the gripe fastening arrangement was unsafe for ships staff to release, as they are required to move outside of the fitted guardrails. A change to the fastening arrangement could ensure the RHIBs remain in place, but that could have the effect of transferring the force of the water to other areas,

which could then result in possible damage to the davit and launching arrangements. Any change needs to be considered in detail as to the practicality, effectiveness and cost.

55. Prior to the 10 July incidents of water ingress had only occurred on the windward side of CANTERBURY. However both the windward and leeward RHIBs incurred damage on 10 July, which raises serious doubt about the efficacy of the risk mitigation strategy of maintaining course and speed consistent with protecting one RHIB.

Was there any damage to any property or equipment? If so what was the extent and cost of the damage and is the damage able to be repaired?

56. The port RHIB, minus the transom and lifting strops, was lost overboard and recovered a few days later from a beach on Great Barrier Island. The starboard RHIB suffered water damage to its electrics, structural damage to the RHIB collar and fastenings. Both davits suffered damage. The total cost of the loss and damage is in the order of $305,000. This is subject to a warranty claim.

57. A complete summary of the damage is contained in Exhibit V. The port RHIB was a complete loss. The starboard RHIB and both port and starboard davit were damaged and required repair before they could be used again.

58. The discrepancy in the damage cost figure is accounted for by a revised higher cost of a new RHIB. The cost in the repair estimate is $200,000. This was the cost of the replacement RHIB supplied by Tenix which is ex OPV 1. The cost of a new RHIB to replace OPV 1's has been advised by Tenix as $275,000.

When and by whom were the RHIB, the fastenings, and deployment system last inspected for function and safety? Was this in line with ships orders or any other relevant order or safety standard including international maritime safety requirements? Was this documented and if so are the relevant papers in order?

59. The ship underwent a Lloyd's survey, which included a change of flag state survey and was completed on 16 May 2007. That survey included a check of certification to ensure that all safety equipment is in date for test. The RHIB davits were last tested on 9 August 2006. There is no record of the RHIB gripes being tested.

Which branch of which insurer was notified and on what date?

60. There has been no notification to an insurer by the RNZN. The ship

and its fittings are still within the warranty period which expires on 30 May 2008.

Comment on any other matters the Court considers relevant to the purpose of the inquiry

61. It worthy of note that the RNZN was not formally advised of the recommended risk mitigation strategies until three weeks before taking ownership of the ship. This is considered as being too late for any of the safety case recommendations to be implemented. The MOD Project Director, in his Memorandum of 24 Apr 07 considered the matter of the RHIB aperture "still open" and that water ingress be monitored and recommendations provided as to practical measures that could be implemented. There was no time frame given to indicate how long this issue would remain open.

62. Coincident with the heavy roll at about 1840, 10 July, the ship suffered a machinery breakdown. The ship was operating in Economy mode with the propulsion plant in Bridge control. The lever setting at 80, was at the top of the range for economy mode. The large roll buried the starboard propeller deep in the water, creating a significant load increase on that engine. As a result the engine speed slowed and exceeded the low frequency limit for the Power Take Off generator. The safety device actuated and opened its breaker, resulting in a loss of fifty percent of the ships electrical power. Ships staff in the MCR took charge of the plant reverting it to Diesel Engine Mode. A generator was started to take the ships load and the ship continued in Diesel Engine mode for the rest of the evening. This was an important lesson learnt for ships staff with CANTERBURY's propulsion performance that will be applicable throughout the ship's commission.

63. The results of the incidents of 10 July alone provides sufficient evidence to recommend action be taken as soon as possible to resolve this issue.

64. The accepted solution to resolve the water ingress issue needs to factor the following considerations:

a. Part B of Chapter 3 of the SOLAS convention requires ships fast rescue boats to be in a state of readiness such that they can be launched within five minutes.

b. The normal Patrol State condition of CANTERBURY will most likely be without cargo being carried.

Conclusions

65. HMNZS CANTERBURY lost her port RHIB and damaged her starboard RHIB while crossing the Bay of Plenty in heavy weather on 10 July 2007. Both RHIBs were confirmed secure for sea when the ship prepared to sail the previous day. With the exception of the davit gripes, all fitted RHIB and davit related rigging had been certified as being correctly tested during the ship build. The ship does not have a Rigging Warrant.

66. The weather forecast had predicted strong winds but they arrived earlier than the Command expected them to. They arrived after ship had rounded East Cape but before the ship reached the Hauraki Gulf. The ship encountered winds upwards of 60 knots and six metre waves. At this time there was nowhere for her to go to seek shelter and it was deemed dangerous to change course. The Commanding Officer was also concerned about the possibility of damage in other areas of the ship if he changed course. He had no alternative other than to continue to the Hauraki Gulf. He did not use the formal Operational Risk Mitigation process but had he done so it is most likely the answer would have been the same.

67. When the port RHIB was found missing it was deemed too dangerous for personnel to go out onto the port alcove to make good the remnants of the RHIB. This decision was revisited when the starboard boat securing arrangements gave way and it was again deemed too dangerous for personnel to go out to secure the starboard RHIB into its davit. Access to either alcove was not possible until the ship reached the relative shelter of the Hauraki Gulf.

68. All actions, decisions and reporting of the incidents undertaken by the Command and Ships Staff of CANTERBURY were adequate, appropriate and proper given the circumstances. Due consideration was given to the safety of both Ships Staff and the overall material state of CANTERBURY throughout the transit and no injuries occurred as a result.

69. The loss and damage to the RHIBs and davits was caused by the alcoves being subject to ingress and egress of large volumes of sea water. This volume of water flooded both RHIBs and the combination of the increased weight, the buoyant force on each RHIB when submerged and the quantity of water egressing from the alcove caused the gripes to break and then each RHIB became unseated from its davit flippers. The subsequent violent forces that the RHIBs were subject to caused the structural failure and loss of the port RHIB, the damage to the starboard RHIB and the damage to both davits. The repair costs for the damage are in the order of $30,000, which does not include the replacement costs of a new RHIB.

70. The water ingress occurred because of the combination of ship roll, position of the alcoves relative to the waterline, the wave height and wave direction. The alcove position and ship movement are a result of the ship design. The alternative action to put the sea ahead on the bow would have resulted in bow slamming, deck wetting on the forecastle and extreme propeller emergence. The "Commentary on MRV Sea Keeping Model Tests" identifies propeller emergence as the area of most serious risk. The Project Director states that all but one of the issues of propeller emergence has been resolved and if advice is not forthcoming on the remaining item it too will be considered closed. The bow slamming issue is still open until an assessment is made of what stiffening may be required.

71. Although there are several changes that can be made to increase RHIB securing to reduce the risk of RHIB loss, this will not address the issue of RHIB flooding, which will have the same impact on operational availability as the complete loss of a RHIB. The complete elimination of the risk of damage caused by alcove swamping, while enabling the ship to operate to contracted specification limit will require significant design and constructive work. The range of remedial options will need to be considered in detail as to their practicality, effectiveness and cost by expert Naval Architects.

72. The risk and significance of water ingress to the RHIB alcoves is well known and documented since first noted during the MARIN tank testing. There have been two previous recorded occasions where water ingress has forced the door to the cargo deck to open. In both of these instances there was sufficient water to flood the RHIB in its stowage.

73. The Retrospective Operational Safety Case identified the worst credible scenario from seawater ingress as the loss of RHIB's and damage to the launching arrangements. It also identified the most likely consequence as minor damage to seaboat and loss of unsecured items. The Safety Case identifies a range of possible risk mitigation strategies. The Project Director considered the matter of water ingress as being "still open" and recommended the situation be monitored and recommendations reported. The RNZN was not formally advised of the recommended risk mitigation strategies until three weeks before taking ownership of the ship. This was too late for any of the Safety Case recommendations to be implemented. The Safety Case now needs to be reviewed and mitigation strategies that provide the best answer to protect the RHIB's need to be actioned.

74. Although the incidents of 10 July have realised the worst credible scenario documented in the Retrospective Operational Safety Case, all four incidents of flooding of RHIBs have reinforced the certainty of the most likely consequence of immersion of the alcove. It is evident that change, or a combination of change strategies, need to be implemented without delay as there will be further damage and potential loss if the current paradigm is allowed to continue.

Recommendations

75. It is recommended that:

a. The Operational Safety Case mitigation strategies to resolve the risk of loss or damage to the ships RHIB's be pursued as a matter of urgency. Mitigation strategies must determine the best positioning of the RHIB's while meeting the SOLAS for fast rescue boat requirements.

b. A review of the Retrospective Operational Safety Case relating to Immersion of Alcove (HAZID 801) be undertaken. The review needs to be cognisant of the ships performance characteristics demonstrated to date.

c. A review of the stability of the ship be undertaken to provide a situation whereby the anti-roll system will work.

d. The Operational Risk Management System be implemented when the sea conditions are likely to pose a risk to the RHIB's, at least until the water ingress to the alcoves or positioning of the RHIB's has been resolved.

e. Non activation of the port RHIB EPIRB be investigated.

f. Inputs to the VDR be modified to allow pitch and roll to be recorded.

g. A Rigging Warrant be developed for the HMNZS CANTERBURY.

Dated at Auckland this 15th day of August 2007

K.N. CORLES
Commander, RNZN
President

R. G. McLAUGHLIN
Lieutenant Commander, RNZN
Member

COMMENTS BY ASSEMBLING AUTHORITY

1. According to the CONUSE for HMNZS CANTERBURY, she is to be capable of conducting operations as follows:
   a. sea state 9 - survive and continue with mission;
   b. sea state 7 - sustain patrol;
   c. sea state 6 - range and stow SH2G, conduct VERTREP of personnel and stores to/from flight deck, launch fast rescue boat;
   d. sea state 5 - launch, recover, embark SH2G;
   e. sea state 4 - launch, recover minimum one sea boat, launch, recover embarked forces boats; and,
   f. sea state 3 - suspended stern ramp operations with landing craft, transfer of two unit loads each weighing up to 22 tonnes and troops and Field Service Marching Order (FSMO) to landing craft, off shore cargo operations and LCM launching operations using cranes.

2. Notwithstanding the magnitude of the prevailing storm and its affects on parts of New Zealand, the COI has found that with the ship operating well within the above operating limits (specified by the customer in order to 'sustain patrol') both the Port and Starboard RHIBs and associated working mechanisms suffered significant damage, and in the case of the Port RHIB, total loss. Thus in this single incident both RHIBs – a capability central to a number of the ship's functions and risk mitigation strategies - were rendered completely unusable.

3. The principal cause of the damage was wave action within the RHIB alcoves.
   [Comment: in my view the term 'water ingress' understates the real risk to the RHIBs and davits].

4. The COI notes that prior to and including this incident at least one of the RHIBs had been damaged to some extent on each and every one of the open ocean passages undertaken by the ship in southern latitudes. On each occasion the ship was operating within the required operating envelope for patrolling. Para 37 of the Court's report indicates that this risk had manifested itself in a sea state as low as sea state 4. As a consequence this can only be viewed as a significant design related shortcoming, at least relative to the CONUSE described parameters.

5. As the COI identifies, the propensity for such circumstances to occur has been known to Navy, the Acquisition Authority and the Prime Contractor for some time with the agreed way forward seemingly unresolved. The commentary in paras 44, 51 and 52 is germane.

6. To date the information gleaned from various studies (largely instigated by Navy it would seem) has not yet been condensed into an agreed appreciation of legacy risks at delivery with corresponding mitigation strategies. As a consequence it is my view that all the residual risk associated with this particular (design related) shortcoming (para 51) had been transferred to CO CAN.

[Comment: In the prevailing weather conditions the lack of a safe haven on the weather coast was a further constraint to alternative risk mitigation strategies].

7. The Court has also ascertained that CO CAN's ability to manage this specific risk was significantly constrained by the need to manage two other design related risks - bow slamming and propeller emersion.

8. There is nothing to suggest from the COI that CO CAN was focused on execution of the navigation plan and adherence to maintaining his ETA Auckland ahead of preserving mission capabilities, in fact the COI findings indicate that the reverse was the case.
[Comments:

(1). The COI mentions the (Project Team's) recommendation to monitor the 'water ingress' issue in order to gain leverage for resolution with the prime contractor. Due to the inherent design shortcomings, the consequence of this was clearly increased exposure of the RHIBs to conditions which would compromise their integrity.

(2). This may have arisen through focusing on the risk of water ingress into the vehicle deck rather than the risks posed to the RHIBs by wave action (swamping and gouging) within the RHIB alcoves.

(3). With the benefit of hindsight it would have been prudent to relocate the RHIBs to a less vulnerable location. That option had not been provided to Command and post-incident staff advice has been that this is not an option under SOLAS constraints – this must be properly validated.]

9. Consistent with the TOR the COI comments regarding technologies available to enhance situational awareness and decision-making. This is a leanly manned ship and thus where practicable technology should be fully exploited to maximise the effects that can be delivered from this ship and to manage residual system risk. There is in fact much information available from various systems and sensors within the Protector Fleet that is not effectively integrated as one would expect from a contemporary ship, particularly one of a commercial heritage. Consequently I consider that Recommendation f is too narrow.
[Comment: In my view the integration of such information to assist situational awareness and decision-making has rated too low a priority to be of any assistance to CO CAN on this occasion].

10. Nothing from the Court's reporting suggests that the contributing factors pertaining to the loss of this aspect of maritime military capability were other than those related to the legacy design deficiency regarding the location of the RHIB alcoves.
[Comment: In relation to para 61 of the report I consider there is noting further to be gained by monitoring water ingress. In my view there is more than enough information to determine where accountability lies and that it behoves the MOD Projector to cause this issue to be resolved expeditiously].

11. Insofar as the recommendations are concerned:

a. Recommendations a-c. - fully endorsed, noting the open query above regarding compliance with SOLAS requirements;

b. Recommendation d. - will be mandated however in the short-term the intent is that the level of residual risk left for the CO to manage will be reduced by programming the ship for operations and trials well inside the operating limits sought from the contractor and specified within the CONUSE;

c. Recommendation e. – request CFS be tasked with conducting this investigation with the results forwarded to MCC through Cdr MOET;

d. Recommendation f. – as discussed above it is considered that this recommendation is too narrow; and

e. Recommendation g. – The significance of this issue is considered to be over-stated however the lack of the safety chain at the davit head may have compounded damage to the davits and slowed related repairs.

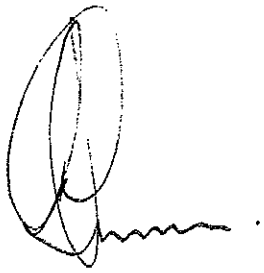
12. Furthermore the following actions are required:

a. A copy of the full investigation report is to be forwarded to CN;

b. A copy of the report (only) should be forwarded to CDF and SECDEF as CN requires; and

c. A definitive distillation of the various tank-testing, sea-keeping studies and safety cases and the various risk mitigation strategies to be adopted is urgently required.

Dated at Trentham this 24th day of August 2007



D.V. ANSON
Commodore, RNZN
Maritime Component Commander