From: Captain(E) D A Wardell CEng CSci CMarEng CPhys RFA



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## MATERIEL STATE ASSESSMENT

Reference:

A. BR875 Vol 3 Part 2 (CEOs Supersession Report Template)

**Please find below notes from Annex C** – Chief Engineer Officers Supersession Report Form. (paragraph numbers below refer to Note No's in Annex C)

1. Unable to maintain full speed due to overheating of propulsion motors and transformers. DEFREP ME 01-11 refers.

The lack of natural ventilation in the transformer rooms is a constant cause for concern. The fan coil units (FCU's) fitted to cool the rooms cannot cope when the ship is operating at higher speeds, especially when in higher sea temperature conditions. Any loss of supplies to the FCU's will result in the transformers overheating. A natural vent would funnel the hot air out of the rooms and the FCU's could then become a secondary means of cooling.

The running of equipment at near maximum temperatures on a regular basis will likely cause early failure of the motors and transformers.



The issue regarding the discharge of combustion products in the engine exhaust cooling water discharge overboard continues. The problem appears to be worse on start up of the V12 engines when the load demand in high. Ships staffs are managing the problem in sensitive ports and it is understood that AfSup-D have a new exhaust design solution for the first RP.

Port Aft generator is the subject of DEFREP ME05-11, Wartsila are investigating the continuing problem of air entrained in the LT cooling water circuit on sustained loads greater than 3.1MW (86%). This appears to be a class issue and following investigation on CARDIGAN BAY, Wartsila appear to have admitted that this has occurred on other engines of the same type and is corrected by fitting a redesigned seal in the charge air cooler.

All four main generators are approaching major service intervals:

Port Aft	11,863 hrs	(12,000)
Stbd Aft	11,688 hrs	(12,000)
Port Fwd	19,537 hrs	(24,000) (less use due to Pt DG Rm fans proximity to gangway)
Stbd Fwd	22,967 hrs	(24,000)
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And all have been tested by Doctor Diesel demonstrating satisfactory performance.

- 3. Main fire pumps experience severe water hammer on start up which will cause future joint or pipe failure in the fire main system. Fire pump non return valves and fitting of expansion loop were addressed in CSP 09 (S2022-4191000009), but the issue remains unresolved. OPDEF ME 02-07 refers. The risk of water hammer is accepted during automatic start up of a fire pump for emergencies, but for routine operations SS start a main fire pump against a closed discharge valve which is then slowly opened.
- 4. The air compressors are poorly situated within the engine rooms with little ventilation and the compressor fans blowing onto the fwd bulkhead.

The units are not suitable for large volume duties, such as operating hand tools and inflation of Yokohama fenders. An A&A, which was raised to fit an independent GS compressor and air bottle, has been rejected and a portable compressor has been allocated to the ship. This remains unacceptable; a letter from SO2 RFA ME to RFA SIPT CMG ME4 dated 18.09.07 refers.

- 5. Generator pre-lubricating oil priming pumps are not connected to the emergency 440V supplies however a temporary cable has been prepared for plant recovery following an extended blackout. S2022 4191000006 refers.
- 6. All steering pump couplings have been upgraded with the new spiders that are white with green flanks and these are performing well. The issue regarding the lack of driving fit between the pump shaft and coupling half still remains to be addressed. S2022 4191 000035 refers.
- 7. The ships hot fresh water system becomes heavily scaled with calcium deposits when loading water in UK South Coast ports due to the high degree of hardness. This has required all three heat exchangers to be cleaned routinely. This is a continuing problem.
- 8. Boiler water and Chilled water circulating circuits do not have any form of chemical treatment and long term problems with degradation of system pipes and the boiler internals is anticipated. S2022's 4191 000030 & 31 and S1182 008-08 refer. Two pipes have previously failed in the main service duct, leading to a flood in the Galley via spiral wound ventilation trunk.

2.

UPS batteries (200 x 17Ah and 64 x 24Ah) are due for renewal in April 11: experience indicates that they will begin to fail within months of this date.

Ref: Paragraph No 25 of Annex C - Other equipment: a. Radars / ECDIS /Integrated Bridge system (IBS)

10. Original fit Radar's still not functioning correctly as part of IBS and stand alone Sperry Radar's fitted as a stop gap solution. DEFREP WE 01-11 Refers.

11. Windlass gear wheels inspected with no further deterioration of gear feeth recorded and satisfactory lubricating oil test returns (noting the expected molybdenum additive content). Robustness of both windlasses remains a concern and will continue to be monitored by ships staff. DEFREP ME 02-11 remains extant on both port and stbd chain stoppers alignment with the windlasses, this misalignment was recorded during the original investigations into the windlass gear teeth damage and thought to be a possible cause of the damage.

Drainage of the hatch covers on one deck for the provisions and the ammunition lifts 12. remains a problem. The drains block easily due to their poor design (W/Os 2087 & 2088 for repair) and water then runs into the lift shafts on opening the hatches. This damages the control gear and hoist chains, causing the chains to jump off the sprockets and misalign the lift car. The lack of bilge wells at the bottom of the shaft means that the lifts cannot be pumped totally dry.

13. The Hydraulic plant for the Vehicle lift gets very hot when operated for extended periods, especially in high ambient temperatures. Historically this has already caused significant damage to hydraulic component and pumps, with associated degradation in the condition of the operating oil. The lack of cooling in the hydraulic circuits and compartment remains an issue, along with the underrating of the pumps for the required duty - this has resulted in the lift being downgraded to 10 Tonnes SWL on instructions from AfSup-D, DEFREP ME 04-11 refers.

The main Cargo Crane boom hydraulic rams continue to suffer significant dechroming, particularly in the position of the exposed outer seal area which does result in damaged seals. Due to the long lead time for re-chroming this was not conducted in CSP09 and will need to be reprogrammed at a later date. W/O 1039 refer.

The Air Handling Unit on 05 deck has suffered several belt drive failures and the intake into the unit from 04 deck is extremely noisy. A proper design analysis and solution is required as the noise in the adjacent cabins is excessive and may well exceed reasonable levels.

2 deck alleyways and mess areas suffer from strong Diesel Fuel odours which require further investigation. Additionally the Hospital and POSA Office can suffer from exhaust fumes when there is a strong wind from directly astern

Air Handling Units (AHU's) on 05 Deck and 2 Deck operate under a vacuum which stops the condensate from the cooled air draining out of the units. This apart from the material damage being done to the AHU's could cause respiratory problems amongst the crew and passengers - In particular Legionnaires Disease. This remains a design issue.

A temporary solution has been adopted to reduce this risk by disconnecting the fixed condensate drains and connecting a plastic hose to direct the condensate close too. but not in the drains thus reducing the risk of air contamination.

14.

9.

Condenser end cover corrosion has been an ongoing (class) issue. New domes and trouser legs have been received and will be fitted on an opportunity basis or during a maintenance package (To prevent damage to the ceramic coating the three trouser legs on each plant must be replaced together). Early indications are that the corrosion / erosion issue is much improved where ceramic domes and trousers are fitted.

There is only one Sea Water pump for each plant, with a single sea strainer, such that blockage of the strainer or failure of the pump renders that plant inoperative. The emergency cross over SW supply is totally inadequate and tends to flood the compartment if used, this remains a design issue.

In high ambient air and sea temperatures both plants and all six compressor units need to be operational in order to maintain habitability and full propulsion speed.

16. Flight deck flush fitted boundary lights are a continual problem with regard to water ingress and this has now resulted in cable and supply junction box damage.

The Flight deck Telebrief system has been problematic since build with poor communications between the deck and helicopter. A recent survey and test of the system by Rohde & Schwarz, has highlighted the need for an improved amplifier. S2022 4191 000041 refers.

The Ground Power unit has a partial earth on it which is being investigated and a S2022 was raised to cover the problem of switching off the GPU whilst still connected to the helicopter causing problems with fluctuating voltages on the helicopter 28V DC systems. The OEM has a simple fix for this which is still to be fitted. S2022 4191 000031 refers. RTEM gives guidance on operational procedures to mitigate.

17. Upper deck preservation is generally good. Bridge wings, aft face of the accommodation block and the upright fittings on 1 deck such as RAS posts, cranes and goal post all need attention. W/O raised for RP action.

Ref: Paragraph No.s 60 to 62 of Annex C - Statutory and Class Certification

All statutory and class certification is due renewal from late April 11 when LRGS was originally due to be in RP11.

- 18. Both AMR's have corrosion appearing on machinery skids FOST MASC pick up. W/O raised for RP action.
- 19. The vent fan compartment air inlet terminals have no filters fitted. This results in the compartments becoming dirty very quickly. Contaminant's also pass straight through the engine room supply fans into the engine rooms. The fan shut off flaps need regular attention as they seize from the accumulation of dust and salt in the air. This may affect the shutting down of the engine rooms if they needed to be CO2 smothered. S2022 4191 000034 and W/O 2076 & 2135 refer.

20. Both EMF ammunition holds have been flooded in the past due to failures of the rapid reaction spray systems. This has resulted in damage to the deck paint and gratings. W/O 1778 refers.

21. Internal accommodation doors are problematic throughout the ship with hinges and door handle mechanisms failing. Although rectified during and post ACP 10 (& ACP 09) both main galley doors have again failed and required further work to keep them

operational. This issue has been recorded for HQ action during ISM Audit and is a constant drain on resources. The MCA surveyor who attended during both ACPs was very frustrated at the lack of progress over this long running design issue! Self help and work orders are raised as required to rectify.

The Galley floor tiles are currently reasonably secure, with only slight evidence of water getting under the tiles. Although clean the tiles are all mismatched following the numerous repairs. In areas where tile repairs have been made, the steel deck beneath the screed remains well preserved.

## Conclusion

My top six concerns in order of precedence:

- a) Failures of the Main ER intake shut down vents this is a significant safety issue.
- b) Fragility of the Chilled water plants limited capacity with both plants in the same
  - compartment and only one SW pump to each plant
- c) Fragility of all cargo lift systems
- d) Fragility of the vacuum toilet system (usually, but not only when EMF embarked)
- e) Azimuth Steering pump fragility (improving) and system oil degradation (high temp).
- f) Lack of chemical treatment in the (closed) Chilled & boiler water systems.

(Signature)

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Annexes:

A Ni

B. Nil

C. BR 875 Form: Chief Engineer Officer's Supersession Report