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RNAD COULPORT

JETTY MISSILE LOADING INCIDENT

3 DECEMBER 1987

REPORT OF THE BOARD OF INQUIRY

SDG 9003A

DATED 14 DECEMBER 1987

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INTRODUCTION

1. At 1215 hours on Thursday, 3rd December 1987 whilst outloading a missile to HMS Repulse the missile in its liner was raised from the erection trailer whilst the trunnion blocks were partially engaged and locked. This action forced open the locked trunnion block causing damage to the trailer and subjecting the missile to adverse shock.

2. Superintendent directed (Encl 1) that Board of Enquiry be established to investigate the circumstances of the incident and report the findings with appropriate recommendations.

3. The Board consisted of:-

MR [redacted], Grade 7, HIFE (Chairman)
B.Sc C. Eng MIMechE MBIM RCNC

Lt Cdr [redacted] RN Dockmaster Faslane (Member)
C. Eng MRINA MBIM

Mr [redacted], Grade 7, SE(C) (Member)

Mr [redacted], HEO (Secretary)

AIM

4. To enquire into the events prior to, during and immediately after the incident and to examine the competence and training of those concerned, the adequacy of procedures and documentation, the timing of the operation and environmental conditions.

BACKGROUND

5. The operation being undertaken on the morning of the 3rd December was to exchange Missile 2734 because of a series of test failures. The replacement was Missile 2691 in Liner Serial Number 187 with Westinghouse Hoist Number 35 fitted. The weather was dry, temperature 45 degrees fahrenheit, with a light wind and relative humidity of 69%.

6. Management control of the operation was vested in Mr [redacted], SOG'B', SD2 the Jetty Controller with Mr [redacted], SOG'C', SD12 as Crane Director. Support Divisions on site were Fleet Chief [redacted], ROS and CPO [redacted] QC(P).

7. Missile movement commenced at approximately 1030 hours with an uneventful removal of Missile 2734 from the submarine. For this operation the crane driver was LWEM [redacted]. At approximately 1130 hours crane drivers were exchanged for the outload of Missile 2691, LWEM [redacted] took over crane driving duties. The Missile in its liner on Erection Trailer 13898RN was moved from Building 19 to the south end of the jetty at approximately 1200 hours.

8. The Missile in its liner was raised into the vertical position following the requirements of:-

a. Processing Log TK 994, Sequence 06, Line B, (Encl 4).

b. OP3487 procedure 5-4-5.4, (Encl 5).

c. Coulport Operating Instructions (Stores) No. 3/1/B/3, (Encl 6).

9. The Missile in its liner was raised satisfactorily into the vertical position and the two quick release locking pins removed from both security blocks on the trailer supports, (Encl 7). The security blocks were slid out of the way of the liner trunnions. The Crane Director then instructed the crane to slowly raise the load. No upward movement of the load occurred.

10. The crane driver indicated to those on the jetty that he could not raise the load. This was observed by several people. After consultation between the Support Division personnel and the crane director it was decided to lower the load into the horizontal position on the erection trailer and investigate the crane.

11. The Crane Director gave the order to replace the security blocks on both sides of the trailer and insert the locking pins to within one inch of full engagement in accordance with procedure OP3487 5-4-6.5 step 24 (Encl 5) as advised by ROS. One block was replaced and as the other locking pin was being inserted the load began to rise.

12. Sufficient movement occurred to cause the rear wheels of the trailers prime mover to be raised 2 to 3 inches off the ground. The load being applied to the trailer support and security blocks caused the block that was partially closed to be released and the support that was closed and partially locked to be forced open (Encl 7). This action released the trailer and caused the load to twist and oscillate and then collide with the trailer supports. The personnel holding the tag lines were then able to bring the load under control.

13. Under the direction of the ROS representative the prime mover was moved forward approximately six feet and the missile in its liner was lowered onto the bed of the trailer in a vertical attitude and the load on the crane partially removed. Action was then taken to inform Senior Management of the Incident.

14. Mr [redacted], Chief Engineer, Cdr [redacted], NOIO and Mr [redacted], HROS arrived at the incident site at approximately 1245 hours and took control of the incident. Meanwhile DEHQ was manned and activated. Chief Engineer declared the situation safe and stable at 1330 hours. Recovery action then took place.

FINDINGS

Safety

15. The Board concluded that personnel in the immediate vicinity of the erection trailer and particularly the liner supports were subjected to a high risk of injury. One operator was winded but others could have had toes or fingers crushed by the movement of the load and erection trailer.

Procedures

16. Procedures listed in paragraph 8 have been reviewed and are considered by the Board to be complete, unambiguous and if followed, provide for a safe system of working.

Training

17. It was established that extant Certificates of Competence were available for all personnel involved in the operation with the exception of LWEM [redacted] the crane driver. He did not have a valid certificate but the Board were satisfied that action had been taken in October 1987 to obtain one. Evidence was available to show that he had completed the required training and that ROS were satisfied with his level of competence. The delay in obtaining a Certificate was due to a change in management procedures.

18. It was clear that naval manning of the jetty has produced a separate work ethic within the Establishment. The approach to the established roles in the organisation was markedly different to that expected in a processing building. The Board considered that more effort was required to integrate new naval staff into the Establishment. Records show that no one from the jetty party had attended the Depot induction course within the last six months although the board interviewed people that had arrived within that timespan. The Depot induction course imparts to a new person essential safety information.

19. The procedures and managerial control of work for the jetty area contained in CGCP's, CPCP's and COI (Stores) particularly for crane operation were clear and unambiguous, however the Board considered that their intent was not understood or transmitted to the working level.

Hardware

20. The hardware used during the operation was examined and reviewed. All was within maintenance and considered to be in a satisfactory condition for the intended purpose with the exception of the 40 ton crane.

21. The Board were very concerned about the condition and maintenance records of the 40 ton crane used for the operation. It was established early in the enquiry that two major safety features were inoperative. The most serious and subject to a letter to the Superintendent (Encl 2) was that a button ("dead mans handle") on the top of the joystick that controlled main hoist, auxiliary hoist and crane travel and immobilises the crane should the driver become distressed or incapacitated did not work. The second fault was that an indicator known as the WYLIE was inoperative. This shows the driver the load that he is lifting and is a major indicator of safety at variable jib settings. No record of these faults being reported could be found.

22. The Board also considers that the level of acceptance of the crane as being satisfactory for lifting fully configured Polaris missiles is too low. It would appear that the current practice is for the crane driver to accept the crane based on a successful static test of 25 tons prior to polaris operations. This is generally carried out during silent hours by the crane driver and members of the jetty party. No record of this important safety and serviceability check is made. No higher level management check is carried out, neither are QC(P) or ROS involved. The Board consider that a corporate decision should be taken by cognizant Divisions.

23. The Board considers that the static test alone is insufficient to fully accept the crane for Polaris operations. CPCP 25B paragraph 9.3.1 places a requirement on the user to undertake a dynamic test. This is not being carried out.

24. The Board recognises that the operation being undertaken is inherently high risk. Therefore, the equipment required to undertake the task has to be in good condition. It was established that 37% mechanical and 25% electrical weekly preventative maintenance routines had not been completed and 50% mechanical and 42% electrical monthly preventative maintenance routines had not been completed in the last 12 months. The Board considers that the controls applied to crane acceptance, maintenance, defect reporting and defect rectification are inadequate and consider that the system of control be reviewed:

25. No central authority exists to plan and co-ordinate the operation and maintenance of the major craneage at the jetty. A system of control is operated for process buildings to define the exact nature of the maintenance task, the defects to be rectified and the timeframe available to do the work. The Board consider this method of control should encompass the jetty area.

26. The crane being used has suffered a long history of unreliability, however no evidence was available to categorically identify the reason why the crane did not lift the missile and liner. Two possible areas of failure have been identified:-

a. Low setting of the direct current control power.

b. Defect in the joystick control.

27. Trials conducted during the Boards investigation showed that variations in direct current power which provides both winding and control power caused unpredictable operations of the crane. The normal setting is 460 Volts D.C and is set by the driver. When the voltage was lowered to 430 Volts the main hoist failed to operate. Normal operations were restored when the voltage was restored to 460 volts. It was also observed that the voltage setting varied by up to 20 volts downwards without adjusting the setting. The meter for observing this power setting is outside the drivers cabin and requires him to turn round and peer through a glass panel in the door to see it. The Board considers this function should be repeated in the drivers cabin in a more accessible position.

28. Evidence is available from the 18 month inspection by Babcock plc. in May 1987 that to achieve creep hoist the joystick had to be moved into the creep lower position and then into the creep hoist setting before any movement took place. No record was found that this defect had been repaired.

29. A more comprehensive report of the findings with regard to the jetty 40 ton crane is at Enclosure 11.

Other Factors

30. The operations on the morning of the 3rd December resulted from an urgent need to exchange a missile. The Board considers that excessive pressure was put upon staff at the establishment to undertake this option rather than fully understand and agree the nature of the perceived missile problem. The technical decision process took place on board at the Depots jetty between the Naval Staff of HMS Repulse and RNAD(C) staff at 1000 hours on the morning of the 3rd December. An empty liner had been loaded to the launch tube and operations were stopped pending the technical debate on the problem and the decision on the best option. The Board considers that the decision process in the case of missile problems needs to be reviewed to ensure that the best technical option is identified in a timely manner.

31. The Board considers that whilst the speed of the operation was not a major factor in the incident it did heighten the pressure on operatives to undertake the work speedily. In this environment the probability of an accident is greater and should be recognised by line management.

CONCLUSIONS

32. It is the Board's conclusion based on the evidence from interviewing the people involved and reviewing the relevant documentation and controls that the cause of the accident was a combination of three principle factors and to a lesser extent a fourth.

Human Error

a. The crane driver LWEM [redacted] having declared that he could not operate his crane in the hoist mode caused his crane to operate in that mode when no longer receiving directions to do so.

Material Aspects

b. Over a 12 month period an average of 40% of mechanical and electrical weekly and monthly preventative maintenance routines were outstanding. Had these been completed and had the defects in control and instrumentation been reported and rectified it is highly probable that the incident would not have occurred.

Procedural

c. The absence of a comprehensive formal pre-use procedure to certify the 40 ton crane fit for a Polaris Missile lift is considered by the Board to be a significant omission. Had such a procedure been in force the crane would not have been cleared for use at the time of the incident.

Pressure to Complete the Missile Exchange

d. There was clear evidence of delay, frustration and an urgency to complete the operations quickly. This environment was not conducive to the safe exchange of missiles.

33. In view of all the various aspects associated with the incident the Board does not consider that any one person should be the subject of praise or censure.

RECOMMENDATIONS

34. The following recommendations are made:-

1. Review the induction training of naval staff who join RNAD Coulport.

2. Ensure the purpose and intent of Management Control Documents are fully understood by all naval staff.

3. Increase to managerial level acceptance of the crane for Polaris Missile operations and record its accomplishment.

4. Ensure all cognizant Divisions are associated, as appropriate, with the cranes acceptance.

5. Provide a detailed acceptance procedure for the user to accept the crane for Polaris operations and formally record its completion.

6. Improve the system of control for crane maintenance, defect reporting and defect rectification.

7. Install a system of control, similar to that operating in process buildings, that identifies the exact nature of the maintenance task, the defects to be rectified and the timeframe to do the work.

8. The improved acceptance, testing and control methods are to be applied to the 50 ton crane.

9. Install a repeater panel on the drivers cabin for monitoring and adjusting the direct volt power supply for the crane.

10. Make the 50 ton and 40 ton cranes pieces of defined support hardware in accordance with CPCP 16E.

11. Provide a more structured and disciplined approach between SM10 and RNAD(C) for assessing and agreeing options for embarked missile problems to prevent unnecessary operation as that investigated.

ENCLOSURE 1

TERMS OF REFERENCE FOR BOARD OF INQUIRY

RN ARMAMENT DEPOT
Coulport Helensburgh Dunbartonshire G84 0PD

Telephone Helensburgh 4321
Coulport } ext 212

Your reference

Our reference S 1917.

Date 4 December 1987

Mr [redacted]
HIFE
RNAD(C)

MISSILE LOADING INCIDENT 3 DECEMBER 1987

Reference: BR1029(1) Art 0335 and Annexes 3.3 and 3.4

In accordance with the Reference, you are required to chair a Board of Enquiry into the Missile Loading incident at the RNAD Coulport Jetty on 3 December.

2. Your enquiries should seek to establish the cause and include establishing the state of competence and training of those concerned, the materiel state of all the equipment used and the adequacy of procedures and documentation. Consideration should also be given to the timing of the missile loading and whether environmental conditions played a part.

3. You should also look into the response to the incident up to the point at which it was declared safe and stable by Chief Engineer Coulport at 1330 on 3 December.

4. In your enquiry you will be assisted by:

Lt Cdr [redacted] Dockmaster Faslane

Mr [redacted] SE(C)

and you should submit a written report to me by Monday, 14 December 1987 which should identify any individuals deserving of censure or praise and also make recommendations which might prevent a recurrence. You are not required to consider recovery actions to restore the Missile to the stockpile.

5. Mr [redacted] is available as Secretary to the Board.

[redacted]

[redacted]
Superintendent

Copies to: DST(AS), COMCLYDE, CSM, CSE, Board Members, Secretary, Staff Side Secretary, TU Side Secretary