~~COVERING - RESTRICTED - INVESTIGATIONS~~

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SNW/784/0159/03

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18 January 2007

INVESTIGATION INTO THE INCIDENT ON 29 DECEMBER 2006 INVOLVING USS MINNEAPOLIS-ST PAUL

We have the honour to report the findings of the Investigation into the fatal incident on 29 December 2006 involving the USS MINNEAPOLIS-ST PAUL.

We have the honour to be,
Sir,
Your obedient Servants

Signed on original

[redacted]
Lieutenant Commander Royal Navy

Signed on original

[redacted]
Commander Royal Navy

Signed on original

[redacted]
Captain Royal Navy

ROYAL NAVY

~~COVERING - RESTRICTED - INVESTIGATIONS~~

INVESTIGATION INTO THE INCIDENT ON 29 DEC 06 INVOLVING USS MINNEAPOLIS-ST PAUL

EXECUTIVE SUMMARY

1. On Friday 29 December 2006 as the USS MINNEAPOLIS-ST PAUL (MSP), a Los Angeles 688 Class SSN, was exiting the Dockyard Port of Plymouth (DPoP) 2 crew members, Senior Chief Petty Officer Thomas Higgins and Petty Officer 2nd Class Michael Holtz, were washed from the submarine's casing and killed. Three other crew members washed overboard were recovered without significant injury. During the incident the submarine came close to grounding in heavy seas on an ebb tide 500yds South of the Breakwater and took on a significant volume of water through a hatch that remained open for some time. Naval Base Commander (Devonport) ordered an immediate investigation into this incident. This was conducted in parallel with Devon and Cornwall Police who subsequently passed the matter to the US Naval authorities.

2. On 29 December the forecast was for winds of 40 knots and a very rough sea state. This investigation determines that it was however safe for MSP to sail and that the exit could have been completed safely. The incident occurred because of an error by the Commanding Officer of the MSP. This investigation concludes that the CO was unaware of the rapid change in sea conditions from relatively benign inside to life threatening outside the Breakwater.

3. Without sufficient layered safeguards in place and a suitable culture of 'safety intervention' the NBC movements team supporting MSP were unable to act to break the error chain. This was compounded by the failure of appropriate authorities to adequately disseminate the lessons identified from a previous very similar incident. There are also indications of the lack of some aspects of an appropriate safety culture within the community associated with the movement of ships and submarines in the DPoP.

4. This investigation finds that a fundamental change in culture amongst all those involved in the conduct of moves is required to put safety at the centre of their considerations. Inherent in this will be a formalised process for risk assessment and alleviation. Furthermore all those involved in the planning and execution of moves must be both empowered and willing to voice safety related concerns, and receptive to such prompts from others. Similarly the mechanisms for sharing knowledge and identifying lessons must be critically reappraised.

5. The findings of this investigation should be given wide distribution and close contact maintained with US authorities in order to gain any further lessons from this tragic and wholly avoidable incident.

INVESTIGATION INTO THE INCIDENT ON 29 DEC 06 INVOLVING USS MINNEAPOLIS-ST PAUL

OVERVIEW

1. The Naval Base Commander (Devonport) instructed that an immediate investigation be conducted into the incident involving USS MINNEAPOLIS-SAINT PAUL (MSP) on Friday 29 December 2006 that led to five crew members being washed from the submarine casing resulting in the deaths of Senior Chief Petty Officer Thomas Higgins and Petty Officer 2nd Class Michael Holtz[1]. The investigation benefited from close liaison with the Devon and Cornwall Police (DCP), the US Naval Criminal Investigation Service (NCIS) and the US Navy (USN) JAGMAN and Safety Investigation teams. In addition [redacted] Royal Navy (DEVFLOT Captain SM) assisted with peer reviewing of the completed report.

2. The investigation team was directed to ensure that the following points were fully examined.

a. The decision-making process leading to sailing the submarine.
b. The advice provided to the Commanding Officer of the submarine by members of NBC's organisation in relation to the exit route and clearing the Pilot from the submarine.
c. The impact on the outcome of the incident of issues relating to equipment used by either US or UK personnel.

Points a and b have been examined but it was considered that an investigation into point c could not be properly conducted as this would require detailed discussion with USN personnel and examination of equipment which was not available.

CONDUCT OF THE INVESTIGATION

3. The investigation team was initially limited in what it could achieve as DCP retained primacy whilst collating evidence to pass to the Crown Prosecution Service (CPS). The CPS subsequently instructed that the whole matter be passed to US authorities. DCP were then able to give access to all witness statements, notably including that of the Admiralty Pilot. Combined with the port radar and associated VHF/Video recordings this allowed accurate reconstruction of MSP's movements and an impression of what was happening onboard MSP. It should be noted that the pilot's statement and those of the two USN survivors recovered ashore are the only sources available to the team with respect to events onboard MSP and a complete picture of events will only be possible if this investigation and the US JAGMAN investigation are studied together.

4. An examination has also been conducted of documented safety cases, processes and procedures that are relevant to the conduct of nuclear submarine movements within the Dockyard Port of Plymouth (DPoP). Two incidents that occurred in 2006 were also studied; the seamanship incident involving HMS SOVEREIGN on 16 Feb which led to personnel being trapped in a rope locker as the submarine exited the lee of the breakwater and the navigational incident that occurred on 29 Mar where HMS SOVEREIGN lost a

[1] NBC(D) unreferenced letter dated 29 Dec 06.

[redacted] in Plymouth Sound. Both incidents, but particularly the first, have important parallels to this one.

5. The cause of the incident was MSP exiting the lee of the western breakwater in a SSW 30-35 knot wind and 3-4m swell with men still on the casing. This led to 3 men, Higgins, Holtz and [redacted] being washed overboard in their harnesses and being dragged alongside at up to 9 knots. 2 men who came topside to assist were also swept overboard but, as they were unable to secure their harnesses to the rail, were swiftly recovered by attendant vessels. [redacted] appears to have managed to regain the casing and get below at some stage during the incident.

6. A list of personnel interviewed is at Annex A

NARRATIVE

7. USS MINNEAPOLIS-SAINT PAUL (MSP), a US Los Angeles Class 688 SSN conducted a visit to Devonport 22-29 Dec 06. At 281400Z a leaving harbour brief was conducted onboard MSP in the Crew's Mess. All key MSP personnel and [redacted] the Admiralty Pilot assigned to the exit, attended this brief. [redacted] has 25 years experience in Devonport and has completed more than 2000 exits and entrances as an Admiralty Pilot with 10% being submarine moves and had conducted "4-5" US SSN moves but none for "*probably two years or more.*[2]" The [redacted] United States Navy, ran through a full exit brief with his team after which the Pilot was given the opportunity to discuss the exit during which he highlighted that RFA CARDIGAN BAY (CARD) was at 'C' buoy. The weather forecast was also discussed after which the CO and Pilot agreed to conduct the boat transfer to land the latter "*at a point within Plymouth Sound.*" The Pilot agreed with the CO that he would leave the submarine "*once I was satisfied that the ship was on the correct bearing for departure and was travelling at a safe transfer speed.*" Prior to leaving the submarine the Pilot was given a tour "*to familiarise myself with the layout of the vessel*" but this did not include the route he would take to disembark the next day.

8. On 29 Dec the Pilot discussed the move with the Chief Admiralty Pilot at 0800Z who agreed that it was the Pilot's call as to whether the move should take place. The Pilot then called Longroom Port Control Station (PCS) to discuss weather conditions in the Sound. He also spoke to the master of the tug FORCEFUL who was standing by CARD at 'C' buoy who informed him that the wind was currently SSW 40-45 knots but would reduce for MSP's move. He then spoke to MSP's Navigator and both agreed that conditions were suitable for the move.

9. The Pilot arrived onboard at approximately 1030Z and examined ship's drawings of underwater fittings to ensure he placed tugs clear of protrusions then proceeded to the bridge. He discussed tug employment with the CO and agreed to conduct the transfer off at between 8 and 9 knots. The Pilot notes that this could be deemed as excessive but believed that it was necessary given what he believed to be the slow speed handling characteristics of the submarine and the need to maintain the correct heading. However, [redacted], the Pilot who had assisted MSP's entry on 22 Dec, stated that his boat transfer was conducted at 6 knots[3]. The move was planned to start one hour before high water (HW 29 Dec was 1225Z) which is standard for SSN moves in Devonport and MSP slipped

[2] Statement of [redacted], Outbound Admiralty Pilot of MSP.
[3] Statement of [redacted] Inbound Admiralty Pilot of MSP.

at approximately 291130Z with 2 tugs (CAREFUL and FAITHFUL) assisting her off 9 wharf and into the Hamoaze. This was completed at approximately 291145Z after which MSP proceeded down harbour at 9 knots. During this procedure the Pilot discussed the state of tide, weather conditions and positioning of tugs. Of note MSP did not receive the immediate weather forecast signal sent by NAS Culdrose at 290700Z that predicted SSW gusting 40-45 knots but easing to 35 knots and showing:

"sea:	inside breakwater:	slight(3) to moderate (4)
	outside breakwater:	rough(5) inv (sic) v. rough(6) offshore. [4]"

This is exactly as reported by the Master of FORCEFUL operating in the Sound.

10. During the exit the Pilot provided a standard service to the CO with respect to track assessment, when to alter course and navigation mark/aid identification. Both tugs remained on each quarter throughout the exit [redacted]. Showers were reducing visibility to less than 2000 yards in the Sound. CARD, lying into wind secured to 'C' buoy with her stern approximately 60 yards south of the 250 exit leg[5], was not sighted by the Pilot until MSP was on the 169 leg putting visibility 1500-2000 yards. The Pilot had also previously decided that as MSP was a foreign submarine and her CO unfamiliar with Devonport that he would remain onboard considerably longer than where he would normally depart a UK submarine (start of the 169 leg) to ensure that MSP was correctly positioned for the departure. This decision was re-enforced through the CO asking "*What's that?*" whilst pointing at the Breakwater; this did nothing to allay the Pilot's fears that the "*CO and NO were not at ease with departing the harbour unaided.*" As MSP closed the point to alter course to 250 the Pilot had a discussion with the CO about the transfer with the CO asking what side he wanted the ladder and where he planned to get off. The Pilot responded that he wished the ladder to be rigged on the starboard side and he would get off during the 250 leg but did not specify where. MSP then turned to starboard and was steady on the 250 leg at 291221Z (Figure 1):

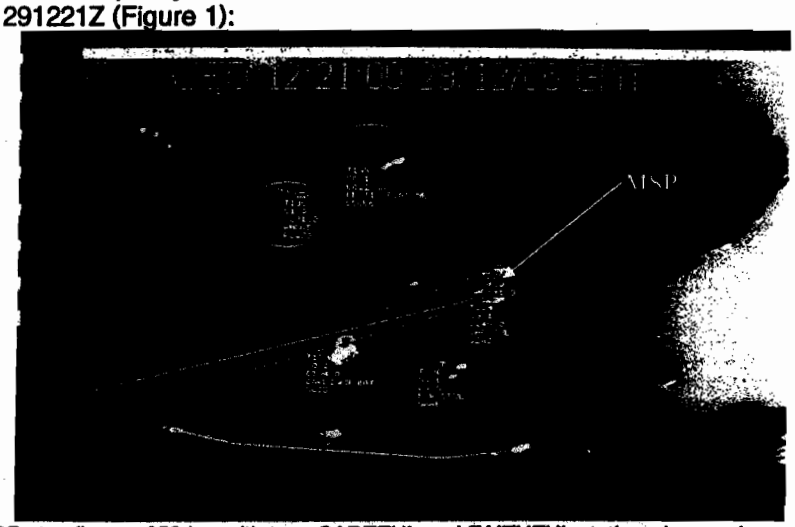

Figure 1. MSP steadies on 250 leg with tugs CAREFUL and FAITHFUL stationed on each quarter. At this point MSP is increasing speed out of the turn to 9kts and is 700 yards from the stern of the RFA at C Buoy.

[4] NAS CULDROSE JMG 290700Z Dec 06 to AIG 1041, GENAT PLYMOUTH. Not received by MSP. (Enclosure 1)

[5] A generic exit plan is at Enclosure 2.

11. The Pilot assessed that MSP would pass close to the rear of CARD and did so, approximately 50 yards clear of her stern at 291223:31Z (Figure 2) still proceeding at about 9 knots and now 800 yards from exiting the lee of the breakwater. All of this information was obtainable from Longroom PCS radar displays. As MSP passed the stern of CARD the Pilot told the CO that he would leave as MSP once he was content that MSP was clear of CARD and set-up correctly for the remainder of the exit. However, the Western Breakwater light was still obscured by CARD and the Pilot thus further delayed his departure until the CO could see it and all of the other navigation marks. The Pilot left the bridge once the CO convinced him that he was happy. An escort met the Pilot at the bottom of the tower and proceeded to the Crew's Mess hatch for disembarkation. It is assessed that this short walk from the base of the tower, forward along the command passageway, down the ladder to 2 deck then aft to the Crew's Mess took about 90 seconds. At 8-9 knots the submarine would have covered another 400-450 yards leaving a little as 350 yards, or 70 seconds, until it would lose the lee. The CO can be heard to call the pilot launch on VHF at 291223:50Z.

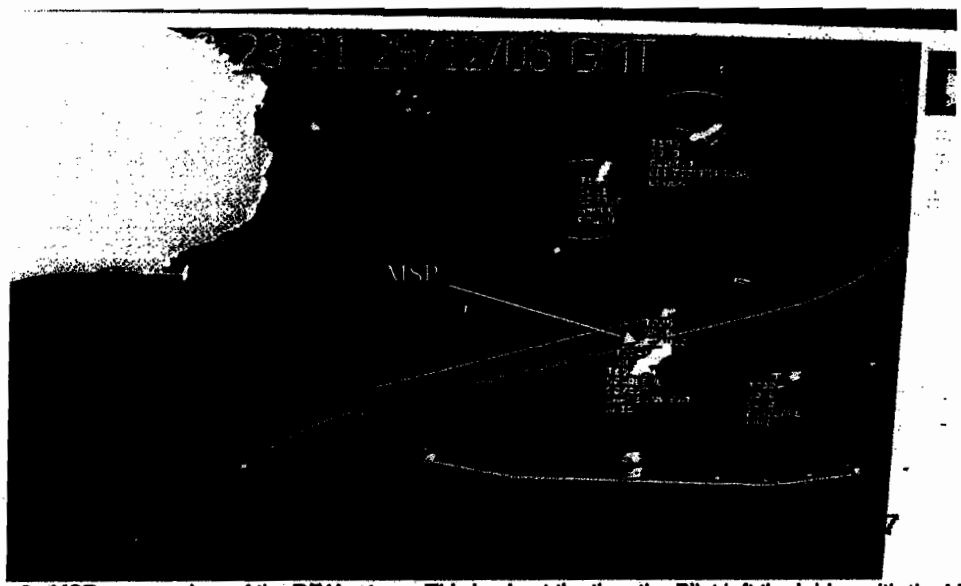

Figure 2. MSP passes clear of the RFA's stern. This is about the time the Pilot left the bridge with the MSP still proceeding at 9kts with 800 yards until she lost the lee of the breakwater.

12. At the same time as the Pilot was leaving the bridge, personnel in attendant vessels were becoming concerned at MSP's speed and her proximity to the end of the breakwater. The police coxswain of 'WATCHFUL' stated, "*this was going to be déjà vu. I commented that I had been in this situation before when everything was left to the last minute and three French submariners had been swept off a submarine.*[6]" 'OPAL's' coxswain stated that his speed was 8.4 knots and he was aware that "*the nearer we got to the western entrance the harder it would be to get the pilot off, as the weather and sea would be rougher.*[7]" His crewman stated that at 8.5 knots they were rapidly closing open sea and as MSP passed CARD's stern he said to his Coxswain, "*If he (the Pilot) doesn't get off now he isn't getting off.*[8]" The master of

[6] Statement of [redacted]. No further evidence regarding this incident has been identified by this investigation.
[7] Statement of [redacted]
[8] Statement of [redacted].

'CAREFUL' states "*In my opinion as a professional mariner, I felt that it was too late to deploy the pilot ladder.... and that it had been left too late to get the pilot off at that stage.... the effect of the swell had worsened as the submarine had reached the western entrance.*[9]" All of these personnel fully appreciated that the sea state would change dramatically as the lee of the western Breakwater was lost and were clearly concerned as to MSP's proximity to the Breakwater but none chose to communicate these concerns.

13. Once permission had been gained from the bridge, the Pilot climbed the ladder out of the Crew's Mess and waited at the top of the hatch. He had a clear view of men working on the casing getting the ladder ready for his transfer and could see the pilot launch close by to starboard. He also became aware of a large wave approaching from the port side but had no time to react before it broke over the submarine, several feet above his head and forced him down the hatch.

14. The Pilot regained his position at the hatch top realising that he had been cut on the lip just in time to witness a second large wave sweep down the casing from ahead and wash 3 sailors over the starboard side which left them dangling on their harnesses just below the level of the casing. This second wave also caused the inflation of the pilot's life jacket. He believed that the CO must have altered course to port to put ship's head into sea but this removed the lee of the fin which the men on the casing had probably sheltered behind as the first wave hit. The Pilot raised the alarm then went below into the Crew's Mess. As he struggled below 2 crewmen, one the swimmer of the watch, went to the casing to try to assist but they were subsequently swept overboard. Both were reported recovered by OPAL over VHF at 291233Z. [redacted] one of the original casing party, was recovered below.

15. On the VHF recording at 291225:33 there is a clear keying tone which is followed at 291226:14 by the CO calling the pilot boat to "Come on over." It is assessed that the men were swept overboard during this period when MSP was 440 yards north of the breakwater and exiting the full lee (Figure 3).

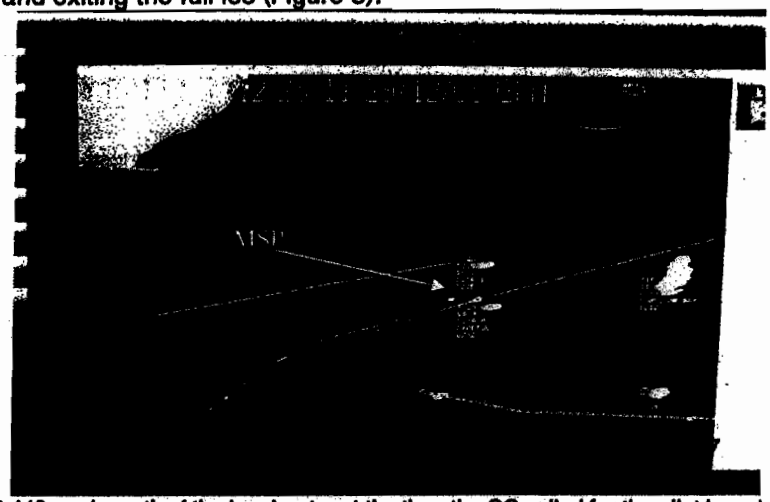

Figure 3. MSP 440 yards north of the breakwater at the time the CO called for the pilot launch to close him. This is about 30 seconds after the men were washed overboard.

[9] Statement of [redacted] Master Tug Careful.

16. At 291228:25Z MSP asks the pilot launch to "*come in and get our guys*" but by this time she is to the west of the breakwater and facing the full force of the sea and wind; 35 knots of wind and a 3-4m swell. With her crew's mess hatch still open and in heavy seas MSP took a significant volume of water inboard: the pilot recalls a depth of some 18 inches in the crew's mess. Between 291228-1233Z the Pilot was summoned to the bridge via Main Broadcast (he can be heard talking to Longroom on VHF at 291237:38). He was told by the CO that he was turning to head back into the Sound and could see that 2 men still secured to the casing "*were being thrown around like rag dolls.*" As MSP conducted the turn she came within less than her own length of the Panther Shoal which, given the height of tide (4.8m) and sea state, was close to grounding the submarine. The Pilot saw a man washed overboard and reported this via VHF at 291242Z. This was the casualty whose harness broke and the CO manoeuvred to port to keep the stern clear of the man. At around this time the pilot asked Longroom PCS to summon search and rescue helicopter support with the coastguard also being activated by Longroom shortly thereafter. Unfortunately it was too late for either to have any bearing upon the incident.

17. Between approximately 291233-1245Z when MSP was back in the lee of the Breakwater valiant attempts were made by the MDP RIB to cut the harnesses of the men on the casing. The RIB was operating outside of its normal safe envelope with the crew displaying considerable courage in trying to free the trapped men. 'OPAL' and the 2 MDP launches also assisted as best they could outside the Breakwater displaying fine seamanship skills in doing so.

18. By 291252Z the last man was recovered and all 4 casualties were rapidly transported ashore for medical treatment. Unfortunately the 2 men who had been trapped in their harnesses, one for 16 minutes and the other for 27 minutes, were pronounced dead on arrival at a local hospital. The 2 men who were swept overboard received light injuries. The Pilot disembarked after using the tugs to assist MSP to turn inside the Sound after which the submarine then proceeded to sea.

DISCUSSION

19. This was a severe incident with multiple loss of life. There was a very real possibility of the boat grounding in very rough seas and on an ebb tide some 500 yards south of Plymouth Breakwater. In addition the crew's mess hatch remained open in these conditions allowing a considerable volume of water into the submarine. Tragic as the loss of the lives of Holtz and Higgins was, the outcome could have been so much more catastrophic and thus must be regarded as at the less serious end of the potential spectrum of consequences.

20. This incident occurred because the MSP's casing was manned as she lost the lee of Plymouth Breakwater. A full explanation of why this happened may only be gained by taking evidence from the US Commanding Officer and his team; an avenue that has not been covered by this investigation but which it is anticipated will be covered in full by the US JAGMAN. The investigation has concluded that the CO MSP was unaware of the rapid change in sea conditions from relatively benign inside to life threatening outside the lee of the Breakwater. He therefore failed to slow the submarine on its 250 leg in order to complete the transfer and clear the casing before leaving the shelter of the Breakwater. While personnel well acquainted with the DPoP may consider such understanding intuitive there is evidence from previous incidents that this is not the case.

21. There is anecdotal evidence of a similar incident occurring with a French SSN some years ago. More recently a directly comparable event took place on 16 Feb 06 as HMS SOVEREIGN was exiting Plymouth Sound. Conditions inside the Breakwater were considered safe for casing operations however a swell of approximately 1.5m was running South of the Breakwater. While North of the Western Breakwater Light a wave swept over the boat imperilling the lives of 3 men working on the after casing. In forwarding his subsequent Ship's Investigation to CinC's staff CO SOVEREIGN wrote that the incident "*was caused by the Commanding Officer not sufficiently anticipating the conditions in the vicinity of the Western edge of Plymouth Breakwater and planning accordingly...*"[10] Lives were not lost as a result of this incident but the inescapable conclusion must be that had lessons been correctly learned and promulgated the 2 subsequent deaths might have been prevented. A 'Near Miss' report has not however been produced for this incident and the detailed investigation was not received in Devonport until 9 January 2007 when it was sought, on hearsay, to support this investigation. The opportunity to raise the awareness of the movements team[11] of potential weaknesses in COs' appreciation of the local environment was thus missed.

22. A further opportunity to prompt awareness of differing conditions inside and outside the Breakwater was the weather signal. Had this been received and carefully read onboard MSP it may have triggered greater awareness of sea conditions. It is therefore a significant failure that the signal was not received by MSP.

23. There are further parallels between the MSP episode and a second recent incident. Personnel supporting MSP's move have stated that they felt concerned that the transfer of the pilot would not be complete before the submarine left the relatively benign environment in the lee of the Breakwater and noted the rough conditions outside Plymouth Sound[12]. These concerns were not however communicated to the CO or pilot onboard MSP. On 29 Mar 06 an interaction in Plymouth Sound between HM Ships SOVEREIGN and YORK resulted in the loss of SOVEREIGN's [redacted][13]. Analysis of the subsequent investigation by NBC(D) [14] noted significant evidence of assumptions that a third party would act to mitigate potential difficulties and a reluctance to make adjustments to the plan to accommodate real time developments.

24. A number of common themes emerge from this and previous investigations: a breakdown in the effective dissemination of lessons identified; failure to adequately identify hazards and risks; and a marked reluctance to raise concerns or intervene to mitigate developing problems that are considered the province of another.

25. This investigation has therefore concluded that human failure is at the heart of this incident.

26. It is thus apparent that a more effective Safety Culture is required across all authorities that operate in the DPoP if further such incidents, perhaps with even more severe outcomes, are to be avoided. This will need to achieve effective commitment and

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[10] HMS SOVEREIGN's 520 dated 3 Mar 06 (Enclosure 3).

[11] For the purposes of this investigation the Movements Team is defined as all those who have a role in the planning and execution of ship movements. It includes, but is not limited to, QHM staff, Pilot launch and Tug crews, MDP officers afloat.

[12] Statement of [redacted] Master Tug Faithful "*..as I was observing the submarine before she made her turn to exit I would (sic) see the water coming over Plymouth Breakwater.*"

[13] HMS TIRELESS' 520/03/01.

[14] NBC(D)/6/1/1 dated 26 Apr 06.

support at the highest levels of all relevant organisations if the competing operational and commercial pressures are to be resisted, and risks are to be driven As Low as Reasonably Practicable.

27. In the sphere of nuclear facilities operations, human error rates are usually held to be at best, for the most suitably qualified and experienced personnel, 1 in every 1000 operations, while events that lead to loss of life are normally expected to be driven down to 1 in 100,000 operations or better. Safeguards, which are consistent with the operation of a military base and busy commercial port, must therefore be introduced to close this gap. Fundamentally it must be accepted that the potential exists for all COs to make errors of judgement. It is therefore incumbent upon all involved to wrap further safeguards around them to mitigate both the probability and impact of the inherent risk and to ensure that the proper balance is achieved between operational commitments and safety.

28. An effective knowledge sharing process is a key component of a safety culture. At the highest levels there must be support for a robust mechanism to ensure that relevant lessons identified by any authority are adequately disseminated to all who can contribute to the delivery of safety. The causes of the lessons identified system's apparent failure in this instance have not been considered by this investigation. Locally a formal procedure is necessary to ensure the effective sharing of relevant information across the whole movements team. It is vital to ensure that critical information is shared between critical personnel at the time when it can make a difference.

29. Careful risk analysis and briefing must be at the core of this process. A more structured analysis of the variables that would have an effect on MSP's exit may have served to mitigate subsequent events: aggravating factors such as the relatively poor weather, the rough to very rough sea state outside of the Breakwater, MSP's perceived inability to manoeuvre at less than 8 knots and her CO's unfamiliarity with the DPoP could then have been considered and mitigated. A shared understanding of the potential risks must be gained by all key players in the movements process including the unit, pilot and his launch crew, Harbour Control Officer, tug masters, and assigned MDP units.

30. Armed with an understanding of the possible complexities of an evolution all involved must be positively empowered to highlight developing difficulties as early as possible. Such prompts must not be received as a criticism of a CO's or indeed the Pilot's competence but rather part of a layered safety system designed to drive down potential risks. The reaction to third party warnings must be the same as that to an engineered mechanical alarm: acceptance of the indication; consideration of its causes and impact; then implementation of an appropriate response. This necessitates a change in culture, not just amongst the movements team but also among the community they support.

31. The impression gained of both QHM's staff and the wider movements team during this investigation is one of pride in high professionalism and respect for the authority, responsibility and knowledge of Commanding Officers and civilian vessels' Masters. While there is much that is good in this it can have the drawback of inhibiting those who might speak or act to correct an unexpected mistake by creating an assumption of correctness. This is particularly so of military units whose response is often anticipated to be dismissive and further aggravated, rightly or wrongly, by the wide spread belief that Commanding Officers will enjoy the automatic support of their operating authorities. QHM's staff, as a customer-facing organisation, is faced with many often conflicting pressures ranging from tide and weather constraints to operational and indeed commercial imperatives. It is

natural for them to be the focus for a unit's reproach when unable to fulfil their requests. This leads to a fear of blame and an associated reticence to intervene.

32. This investigation has received from QHM a detailed portfolio of the work he already has in hand to address many of the points above[15]. The investigation is satisfied that the progress he has achieved has been reasonable within the constraints of his resources and authority.

33. Aside from human error it is possible that equipment design and methods of operation were contributing factors to the actual loss of life. Although this was included by NBC in the scope of this investigation it has not proved possible to find the level of information required to make firm judgements in this area. Notwithstanding, it is understood that staff of CinCFleet is liasing with US authorities to seek any lessons identified. Furthermore, the UK Submarine Safety Working Group has been alerted to this incident and will be copied on the distribution of this report.

CONCLUSIONS

34. The cause of this severe and wholly avoidable incident was an error on behalf of the Commanding Officer of the USS MINNEAPOLIS-ST PAUL who was at all times responsible for the safety of his unit and ship's company. Without sufficient layered safeguards in place and a suitable culture of 'safety intervention' the movements team were unable to act to break the error chain. This was without doubt compounded by the failure of appropriate authorities to adequately disseminate the lessons identified from a previous very similar incident. There are also indications of the lack of some aspects of an appropriate safety culture within the community associated with the movement of ships and submarines in the DPoP.

RECOMMENDATIONS

35. The key recommendations from this investigation are broad in scope: Not withstanding QHM's clear progress, a fundamental change in culture amongst all those involved in the conduct of movements within DPoP, from CO to able seaman, Pilot to deckhand and NBC to rigger, is required to put safety at the centre of their considerations. Inherent in this will be a formalised process for the risk assessment of all moves and detailed mechanisms to alleviate high risk. Some suggestions that have been garnered during the course of this investigation and which may prove useful in taking this work forward are included at Annex B. (Para 26,27,29,31)

36. All those involved at whatever level in the planning and executing of moves must be both empowered and willing to voice safety related concerns. Those in Command must be encouraging of, and receptive to, such prompts. They must also fully acknowledge the role, responsibilities and authority of QHM's Pilots and Harbour Control Officers. (Para 30, 31)

37. A considered reappraisal of the mechanisms for sharing knowledge and identifying lessons is required at both Headquarters level and locally. (Para 28)

[15] QHM's LM 220/1 dated 12 Jan 07.

38. Close contact should be maintained at an appropriate level with US authorities to gain any further lessons identified. Similarly this report, or where appropriate the Executive Summary, should receive wide distribution including but not limited to the following: Staff of CinCFleet (ComOps), FOST, Chairman Submarine Safety Committee, BNA Washington, Naval Base Commanders and all 3 Flotilla staffs. (Para 33)

39. Finally, COMCEN Devonport should investigate the delivery of the weather signal to MSP and identify and learn any subsequent lessons. (Para 22)

Annexes:

A. Personnel interviewed in course of the investigation into incident On 29 Dec 06 involving USS MINNEAPOLIS-ST PAUL.

B. Avenues believed worthy of further consideration.

Enclosures:

1. NAS CULDROSE JMG 290700Z Dec 06 to AIG 1041, GENAT PLYMOUTH

2. Generic DPoP exit plan.

3. HMS SOVEREIGN's 520 dated 3 Mar 06.

ANNEX A TO
SNW/784/0159/03
DATED 18 JAN 07

PERSONNEL INTERVIEWED IN COURSE OF THE INVESTIGATION INTO INCIDENT ON 29 DEC 06 INVOLVING USS MINNEAPOLIS-ST PAUL

Personnel interviewed by Devon & Cornwall Police and statements made available:

[redacted], Outbound Admiralty Pilot of MSP.
[redacted] Inbound Admiralty Pilot of MSP
[redacted] Master Tug Careful.
[redacted] Master Tug Faithful
[redacted] Master Tug Forceful
[redacted], Coxswain [redacted].
[redacted], Coxswain [redacted].
[redacted], Able Seaman [redacted].
[redacted], Retired Businessman, Witnessed events from ashore.
Machinist Mate [redacted] USN, USS MSP
[redacted] USN, USS MSP

Personnel directly interviewed:

[redacted] Queen's Harbour Master DPoP.
[redacted] Chief Admiralty Pilot DPoP

ANNEX A TO
SNW/784/0159/03
DATED 18 JAN 07

AVENUES BELIEVED WORTHY OF FURTHER CONSIDERATION

1. The following suggestions, garnered during the course of this investigation, may prove useful in taking subsequent work forward:

a. Review ability of QHM to conduct remote pilotage /lead through.

b. Introduce a formal, appropriately weighted, risk assessment mechanism for moves including but not limited to:

- Type of unit.
- Weather, sea state, tide.
- Familiarity of CO with DPoP.
- Assessed experience and competence of unit.
- Density of traffic.

c. Introduce a formal and mandatory geographical and environmental brief to be given to all COs prior to sailing.

d. Ensure QHM receives copies of submarine 'Near Miss' reports and their Surface Flotilla equivalents.

e. For non-Devonport units, offer the CO a 'walk-through' of his exit track by boat.

f. Introduce declared 'tripwire' positions for potentially higher risk evolutions, agreed by all concerned and briefed to the wider movements team. To prevent loss of flexibility tripwires should be variable and take account of prevailing circumstances and conditions. For example the last permissible position for pilot transfer should be agreed prior to departure.

g. It is recommended that CoB conduct an analysis of the wider responses to this incident once an emergency was apparent. Formatted

h. QHM should consider the applicability of a local Notice to Mariners and chart amendment. Formatted

~~UNCLASSIFIED~~

Enclosure 1 to SNW/784/0159/03 dated 18 Jan 07

PLY
LIVE NAS CULDROSE
at 290700Z DEC 06

ACTION copy 1 for LONG ROOM OP1
NBC DEV DQHM
PLY LONG ROOM

Prec Act IMMEDIATE Info: IMMEDIATE
DTG 290700Z DEC 06
From NAS CULDROSE
To AIG 1041
GENAT PLYMOUTH
Exempt 3 CDOBDERM DEPLOYED
UKLFCSG DEPLOYED
SICs JMG

RM STONEHOUSE FAO 3 CDOBDERM REAR AND UKLFCSG REAR
PLYMOUTH HARBOUR FORECAST FOR 29 DECEMBER 2006
WARNINGS: GUSTS, GALES, (UKMO S'LY SEVERE GALE 9 IN PLYMOUTH)
GENERAL SYNOPTIC SITUATION AT 0000Z:
COMPLEX AREA OF LOW PRESSURE, MAIN CENTRE 964MB 56N 26W, DEEPENS AND TRACKS N, EXPECTED 951MB 250NM SW OF ICELAND TOWARDS MIDNIGHT.
ASSOCIATED COLD FRONT LYING N/S DONEGAL-ST GEORGE'S CHANNEL-SEA AREA SOLE CROSSES THE AREA DURING THE FORENOON, WITH ASSOCIATED WRAP AROUND OCCLUSION AND FRONTAL SYSTEMS LYING N/SW 200NM W OF IRELAND INFLUENCING THE LOCAL AREAS TOWARDS MID EVENING. THE AREAS LIE IN A FRESH TO STRONG, GUSTY, UNSTABLE, MOIST SSW'LY AIRFLOW
FORECAST FOR THE 5NM RADIUS OF PLYMOUTH VALID 0800Z TO 2359Z:
WIND: SSW'LY FRESH TO STRONG WITH GUSTS TO 40-45KT. WINDS EASING FRESH GUSTING 35KT FOR A TIME TOWARDS MID AFTERNOON
WEATHER: CLOUDY TO OVERCAST SKIES WITH OUTBREAKS OF LIGHT TO MODERATE, ISOLATED HEAVY RAIN OVER UPSLOPES SPREADING FROM THE W EARLY PERIOD. PPTN EASING FROM MID AFTERNOON, REMAINING CLOUDY TO OVERCAST. MODERATE TO HEAVY RAIN AND/OR DRIZZLE WITH ASSOCIATED MIST PATCHES SPREADING FROM SW TOWARDS MID EVENING
VISIBILITY: GOOD, REDUCING MODERATE TO POOR IN PPTN AND MIST PATCHES
MAX TEMP: 12-13C
SEA: INSIDE BREAKWATER: SLIGHT(3) TO MODERATE(4)
OUTSIDE BREAKWATER: ROUGH(5) INV V. ROUGH(6) OFFSHORE
OUTLOOK TO 0800Z TOMORROW: VEERING AND DECREASING WSW'LY MODERATE TO FRESH. BREAKING PARTLY CLOUDY AND PPTN/MIST DISSIPATING. IMPROVING MAINLY GOOD

Action Distribution

Addressee	Code	Action-Officer	Retrieval
QHM PLYMOUTH	JMG	NBC DEV NBFCC OPS	QHMDISTSG

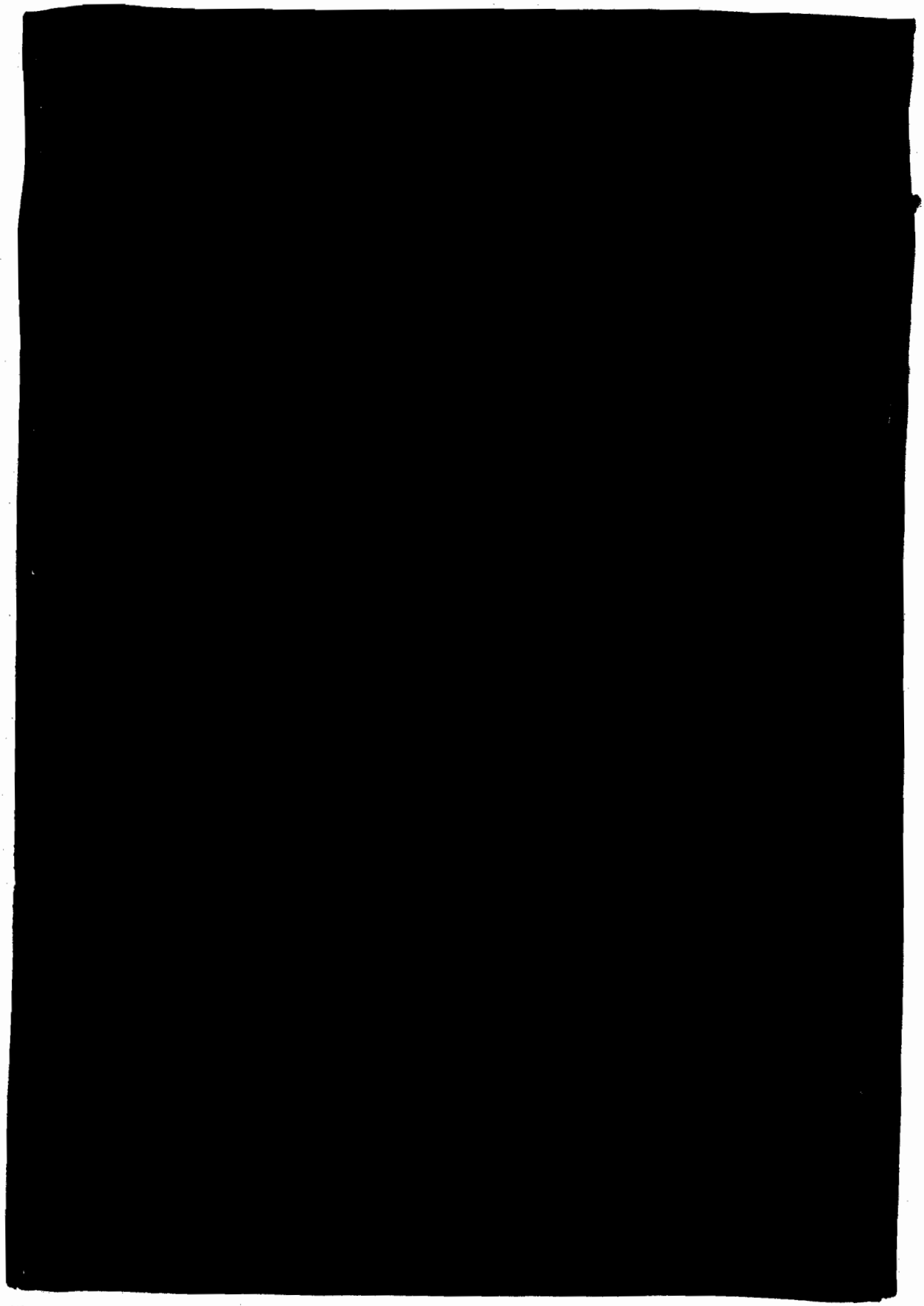
Information Distribution

NBC DEV MOVO NBC DEV DQHM

Information Distributees Excluded from Delivery

Enclosure 2 to
SNW/784/0159/03
dated 18 Jan 07

DPOP SCHEMATIC GENERIC EXIT PLAN



SCHEMATIC NOT TO BE USED FOR NAVIGATION

Enclosure 3 to
SNW/784/0159/03
dated 18 Jan 07

~~RESTRICTED MANAGEMENT STAFF~~

Fleet Command

Commanding Officer
HMS SOVEREIGN
BFPO 390

520

SO1 N7 NAV/SEA
Commander in Chief Fleet
Fleet Headquarters
MP 2-4
Leach Building
Whale Island
Portsmouth

03 Mar 06

SHIP'S INVESTIGATION INTO THE SEAMANSHIP INCIDENT ON 16 FEB 06

References:

A. QRRN Ch 57.
B. CINCFLEET's H5H/LAL 161711Z FEB 06 (Seamanship Incident).
C. CAPFASFLOT ABA/LAL 171336Z FEB 06 (Seamanship Incident).
D. SOVEREIGN ABA/LAL/H5H 161507Z FEB 06 (Reporting Seamanship Incident).

INTRODUCTION

1. A Ship's investigation as directed by Reference B and in accordance with the References is forwarded at the Enclosure.

OVERVIEW

2. On completion of trials of Tregantle, SOVEREIGN entered Plymouth Sound on the morning of the 16 Feb to conduct [redacted] and a boat transfer whilst at "E" Buoy. On completion of the boat transfer SOVEREIGN slipped from the buoy and proceeded to [redacted] and clear the casing as it made its way slowly out towards the Sound entrance. Having [redacted], and with all the casing secured with the exception of three personnel and the after rope locker hatch, a wave washed over the after casing. The three personnel remained in the after rope locker as the casing was further washed over until the submarine could be safely turned around and returned to the Sound after a delay of 27 minutes.

3. The personnel were recovered into the submarine and after medical examination they where subsequently landed for observation and released the next day.

~~RESTRICTED MANAGEMENT STAFF~~

NARRATIVE

4. The entry into Plymouth Sound had been planned initially to conduct [redacted] only. However, due to the expected poor condition in the vicinity to Falmouth Bay it was also decided that it would be appropriate to conduct the boat transfer for fourteen riders at the buoy in Plymouth Sound. The procedures for both the [redacted] coming to and leaving the buoy and the approach and departure to the Sound where discussed at length during the entering harbour brief on the night of 15 Feb 06. Tugs, line handling vessels, [redacted] vessel and Pilot had all been requested prior to entry. The only anomaly on entry into the sound was the absence of a Pilot; after discussion with the tugs and Longroom, and in view of the prevailing favourable conditions, it was decided to continue with the approach to E Buoy which occurred uneventfully.

5. Departure from "E" Buoy, with both tugs utilised, and the subsequent [redacted] was conducted satisfactorily while at the same time the casing was being secured and cleared for sea. Despite the delay in securing the after rope locker, neither the Command, or XO, foresaw any difficulties ahead as SOVEREIGN proceeded slowly keeping head way towards the entrance.

6. At 161018Z Feb 06, while abeam Western Breakwater Light a wave swept over the after casing while three personnel were in the vicinity of the after rope locker; the XO directed the three personnel to remain in the rope locker while the Command, now committed by navigational constraints, manoeuvred the submarine down the exit track before turning in less confined waters and returning to the Sound. The personnel were subsequently recovered at 1045 when conditions allowed for their safe transfer along the casing. A Seamanship Incident report was raised and Ship's investigation convened on landing of personnel for observation.

DISCUSSION

7. The underlying cause of this seamanship incident was the lack of understanding of the conditions likely to be experienced in the entrance to the Sound. The previously favourable conditions on the approach, coupled with what appeared visually from the bridge to be acceptable sea and swell state for work on the after casing, led the Command to make an erroneous decision about continuing slowly on the exit from the Sound.

8. While the Ship's investigation makes reference to the poor communications caused by continued faults with command open line and helm lines it is not believed that these issues directly contributed to the incident. Bridge communications have been subject to subsequent OPDEF action.

9. In subsequent discussion with COMDEVFLOT(SM) it is now fully realised by the Command that the appropriate course of action would have been to hold SOVEREIGN within the Sound while the casing was fully cleared.

RECOMMENDATIONS AND CONCLUSIONS

10. The recommendations and conclusions at the Enclosure are fully supported. Following established COMDEVFLOT(SM) [redacted] would probably have prevented this incident; control room response has been addressed and communications issues have been subject to a higher grade OPDEF.

11. In addition a near miss report will be forwarded to FOST (North) on the conclusion of this Ship's investigation.

COMMAND COMMENT

12. The responsibility for this regrettable seamanship incident that occurred on the casing of SOVEREIGN on the 16 Feb 06 lies solely with the Command. In the final analysis this was caused by the Commanding Officer not sufficiently anticipating the conditions in the vicinity of the Western edge of the Plymouth Breakwater and planning accordingly; knowledge of, and following COMDEVFLOT(SM) best practice could have prevented this incident.

[redacted]

Cdr RN
CO

Enclosure:

1. Ship's Investigation into the Seamanship Incident dated 16 Feb 06.

Copy:

CAPFASFLOT fao CAPT(SM)

Fleet Command

HMS SOVEREIGN
BFPO 390
Telephone: [redacted]
Military Network: [redacted]

520

[redacted]
Commanding Officer
HMS SOVEREIGN
BFPO 390

02 March 2006

SHIP'S INVESTIGATION INTO THE CIRCUMSTANCES WHICH LED TO THE SEAMANSHIP INCIDENT ON 16 FEBRUARY 2006

1. We have the honour to present our findings of the Ship's Investigation into the circumstances that led to the Seamanship Incident on 16 February 2006.

2. Our findings are at the Enclosure.

We have the honour to be,
Sir,
Your obedient Servants

[redacted]
Lieutenant Royal Navy
Tactics and Sensors Officer

[redacted]
Lieutenant Commander Royal Navy
Marine Engineer Officer

Enclosure:

1. Ship's Investigation into the circumstances which led to the Seamanship Incident on 16 February 2006.

ENCLOSURE 1 TO
HMS SOVEREIGN'S 520
DATED 02 MAR 06

SHIP'S INVESTIGATION INTO THE CIRCUMSTANCES WHICH LED TO THE SEAMANSHIP INCIDENT ON 16 FEBRUARY 2006

References:

A. CO's Letter dated 16 Feb 06.
B. FLOOs Vol 2.
C. QRRN ch 57.
D. SGM 5321 (Access to the casing at sea).

INTRODUCTION

1. At 1011Z on 16 Feb 06 whilst SOVEREIGN was at sea exiting Plymouth Sound a number of waves washed over the casing effectively trapping 3 members of the casing party [redacted] and [redacted] in the casing access area to the aft rope stowage. The continual flow of water over the casing prevented the three men from making their own way back to the fin and they were subjected to thirty minutes of being washed over before the submarine returned inside the breakwater (BW) and the men were able to clear the casing.

2. The aim of this ship's investigation it to attempt to establish the sequence of events leading to the incident and identify procedures or precautions that can be implemented to avoid a similar event occurring in the future.

3. In the course of the investigation the following personnel were interviewed:

a. [redacted] Royal Navy
b. [redacted] Royal Navy
c. [redacted] Royal Navy
d. [redacted] Royal Navy
e. [redacted] Royal Navy
f. [redacted] Royal Navy
g. [redacted] Royal Navy
h. POMA [redacted]
i. LOM [redacted]

BACKGROUND

4. On 16 Feb 06 HMS SOVEREIGN was at sea en-route to Plymouth Sound to conduct a boat transfer to embark Pre-Deployment Training (PDT) personnel, FOST riders and Ship's Company. Thereafter, SOVEREIGN was to conduct [redacted] in the sound and proceed to the South Coast Exercise Areas to commence PDT. Initially the boat transfer had been planned for Falmouth Bay, however, the weather forecast and previous experience of the transfer vessels limitations in larger swells precluded this and the transfer was re-arranged for Plymouth Sound.

NARRATIVE

5. At 0615Z HMS SOVEREIGN reported to Longroom (LRM) as required at Ref B and requested a pilot for the entry to the Sound as this was the CO's first entry. LRM reported it would be approximately one hour before a pilot was available and it was agreed, with consent from DQHM, to continue the entry without a pilot and secure to E buoy using the tugs under the control of the XO [redacted]. The SM went to harbour stations at 0645 and proceeded towards the sound. The weather on entry was from the SW and it was noted that there was a significant 1.5m swell though as it was running with the submarine there was no impact on the working environment for the casing party. The SM continued the entry using a standard Plymouth Entry as shown on the Admiralty Chart for deep draught vessels and secured to E buoy having been escorted from the breakwater [redacted]. The boat transfer took place at the buoy without incident.

6. As a pilot had not been available for the entry, no request was made for a pilot during the departure and the tugs would be manoeuvred again under the direction of the XO and N2. The SM slipped from E buoy at 0944Z and moved into the channel using tugs. Whilst stowing ropes from the buoy evolution the [redacted] was started. Four members of the casing party were directed to undertake the [redacted] leaving three personnel, with the CASO supervising, to stow the hawser in the rope locker under the aft casing. [redacted] commenced at 0953Z and was complete by 1000Z. At this time the SM was still in the lee of the BW and making approx 2.5 kts head way. The order to increase speed to 6 kts was passed and as the SM exited the lee of the BW the first of a number of large waves broke over the casing knocking the CASO, who was then by the fin, off his feet and confining 3 personnel in the rope locker. They were told to remain there by the XO for their own safety.

7. Waves continued to break over the casing preventing the personnel from returning to the safety of the fin as the SM manoeuvred to the south in order to gain sufficient navigable water to turn to re-enter the breakwater and safely recover the personnel below. The XO at this time immediately informed the tugs of the evolving problem and recalled them to the SM position to assist with the turn. LRM also received this transmission and allocated [redacted] to standby should any

personnel be washed overboard. The SM transited some 5 cables to the south of the western breakwater light before turning and returning to the north and into the lee of the BW.

8. Whilst the SM manoeuvred preparations were taking place below to receive hypothermic casualties and to supply ice rail clips, harnesses and a team to the casing for retrieval of the trapped personnel. However, at 1045Z the three personnel made their own way back to the fin along the casing and proceeded below where they were attended to by the medical party. A pilot was offered by QHM at this point to Command, however, it was deemed unnecessary and the SM was turned round C buoy and proceeded past the BW and back out to sea.

9. [redacted] briefed Command on the status of the casualties, who were in his opinion at risk of secondary drowning and hypothermia. Given the proximity to proper medical facilities the SM proceeded to a holding box in the vicinity of Whitsand Bay where arrangements were then made to conduct a further boat transfer and the casualties to Plymouth RNSQ for assessment and observation.

10. The SM returned to Plymouth Sound, going to Harbour Stations at 1205Z and on passing the western BW a pilot was embarked and the three casualties landed to the pilot boat for onward transfer to RNSQ. The pilot remained on board whilst the SM turned around C buoy and disembarked prior to exiting the breakwater. The pilot remarked on the excessive pitch he observed as the SM made its approach to the BW. The SM then proceeded to sea and commenced PDT.

DISCUSSION

11. Safety Harnesses are not regularly worn by all members of the casing as they are seen to hamper movement and the ice rail does not allow all areas of the casing to be reached. They are particularly cumbersome when entering or exiting restricted access areas such as the rope locker.

12. There was a division in manpower and a change in focus, which was forced upon the Casing Officer as the [redacted] was started before the ropes from securing to the buoy were stowed. This resulted in the casing not being fully secured before the S/M exited the lee of the BW.

13. When the men were trapped in the access to the rope locker the only option available to affect their rescue was to send another man in full harness along the ice rail to deliver further harnesses to the casualties. This was discounted as the men were secure in their position and although uncomfortable they were not under risk of being washed overboard. It was considered unwise to subject a further man to this risk.

14. The control room should provide support to the bridge during such an incident and was slow as the circumstances began to unfold. Although all records are ready to go at harbour stations there needs to be a concerted effort to ensure that the required

support and recording of events is maintained. As such a dedicated event was not started and the reconstruction of the incident has required more time and effort than should be necessary. With no Rice comms available the voice pipe and a single stanaphone were the only method of passing conning orders and sitreps. This is insufficient to support an entry into the Sound followed by a number of evolutions.

15. The CO and XO had assessed the conditions ivo of the BW as tenable for personnel working on the casing. The sudden increase in swell as the S/M cleared the lee of the BW was not anticipated and personnel on the casing were not sufficiently briefed or prepared. This assessment of the conditions was influenced by the relative benign conditions as the S/M entered the BW running with the sea.

16. Once the [redacted] the submarine was committed to leaving the BW to prevent damage to [redacted].

CONCLUSION

17. All precautions iaw Ref D were correct before personnel were allowed access to the casing and the appropriate PPE was in place with the exception of sufficient ice rail harnesses which were deep stowed and not readily available.

18. It was not possible to recover the men any earlier. The conditions precluded any more personnel being deployed out with the fin even with safety harness and ice rail clips.

19. Response and support from the control room was initially sluggish and the gravitas of the situation not immediately apparent. This was due in part to lack of a bridge open line or broadcast and communications were limited to a single stanaphone line and voicepipe.

RECOMMENDATIONS

20. The casing should be clear of all equipment and personnel before exiting the protective lee of the BW.

21. In future [redacted] should undertaken in such a manner to allow for the completion of the evolution long before the effects of weather outside the BW become the dominant factor.

22. Investigations need to be conducted into the design of a less restrictive harness for casing work as the present ice rail and clip arrangement whilst providing security precludes safe working practices with regards to rope handling.

23. The rescuing of personnel using the ice rail and harness should be exercised, including full records and all equipment required for this evolution needs to be readily available.