

Subj: COMMAND INVESTIGATION OF THE APPARENT SUBMERGED GROUNDING
OF USS SAN FRANCISCO (SSN 711) APPROXIMATELY 360 NM
SOUTHEAST OF GUAM THAT OCCURRED ON 8 JANUARY 2005 (U)

[REDACTED]
[REDACTED] . [encls (79), (114)]

BC Chart Specifications

494. (U) The Product Specification for Bottom Contour Charts (All Series) provides the basic guidelines used in the preparation, design, and content of all series of Bottom Contour Charts. [encl (227)]

495. (U) In accordance with SUBPAC Nautical Chart and Publications Allowances (COMSUBPACINST S3530.2E), submarines and their parent commands are not required to hold product specifications for Bottom Countour Charts (All Series). [encl (228)]

496. (U) CAPT [REDACTED] NGA Chief, NGA Maritime Division, states, "The NGA specification for the Bottom Contour chart does not require "discolored water" to be included on the chart." [encl (232)]

497. (U) The Product Specifications for Bottom Contour Charts (All Series), states, "The area between land and the first 183 meter (100 fathom) contour is void of all hydrography except as noted in paragraph 402.C and is referred to as the "Blue Area." [encl (227)]

498. (U) The Product Specifications for Bottom Contour Charts (All Series), states "Both doubtful and confirmed shoal soundings are included. Doubtful shoal soundings are those which carry designations such as ED, PA, PD or Rep." [encl (227)]

499. (U) The Product Specifications for Bottom Contour Charts (All Series), states "reefs, ledges, and other hydrographic dangers outside the blue Area are in black and are symbolized according to U.S. Chart No. 1; however, notations for dangers which do not uncover are shown in blue. Type is 8-point Techno Medium Italic caps and lowercase. Danger areas will show the least depths, when available, or the letter H." [encl (227)]

500. (U) NGA reports "Limited Distribution BCs are compiled from soundings (some discrete, some continuous) from available random track lines. It is likely that much of the data was

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(See Figure 12). [encl (246)]

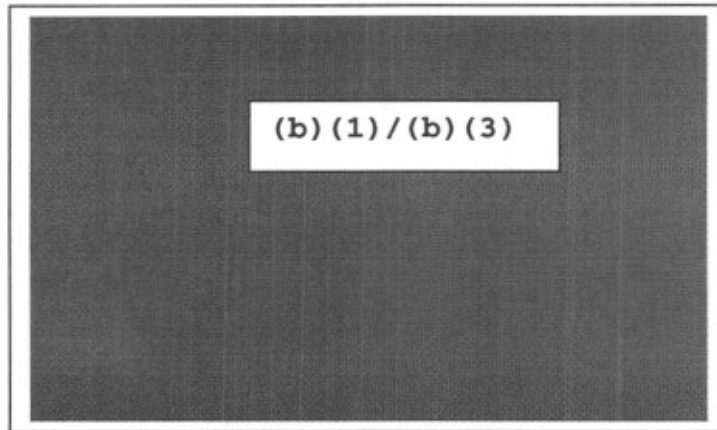
(See Figure 12). [encl (246)]

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E2405
Figure 12 (C)

506. (U) The Product Specifications for Bottom Contour Charts (All Series) used for the 1st edition of chart E2202 has been updated to the fourth edition. The edition used during the construction of chart E2202 was not available for review. [encl (248)]

Chart Cautions and Accuracy

507. (U) NGA reports that "None of the depicted track lines [on E2202] appear to have ensonified the feature in question." [encls (43), (232)]

508. (S) A [REDACTED]
[REDACTED] [encls (137), (247)]

509. (S) The [REDACTED]
[REDACTED]. [encls (137), (247)]

10. (S) The [REDACTED] a
[REDACTED]. [encls (137), (247)]

511. (S) The [REDACTED]
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512. (C) NGA reported on 13 January 2005 that, "[REDACTED]
[REDACTED]. Imagery was analyzed on 10-11 January 2005. Based on appearance in multiple optical bands, [REDACTED]
[REDACTED]. " [encl (232)]

513. (C) [REDACTED], NGA Spectral Scientist, states, that "[REDACTED]
[REDACTED]
[REDACTED] " [encl (249)]

514. (C) NGA reported the [REDACTED]
[REDACTED]. [encl (248)]

515. (U) Chart E7102, which the ship would have used further down its SUBNOTE transit, shows three cautions in the vicinity of the CSG-7 assigned SUBNOTE track. Specifically, they state:

a. For Tanga Islands, "CAUTION: Tanga islands are reported to lie about 5 miles 025° from their charted position;"

b. For Nuguria Islands, "CAUTION: The SW extreme of Nuguria is reported to lie about 5 ½ miles 250 ½° from its charted position (1944);

c. For New Ireland "CAUTION: The east coast of New Ireland is reported to be inaccurately charted" (See Figure 13)

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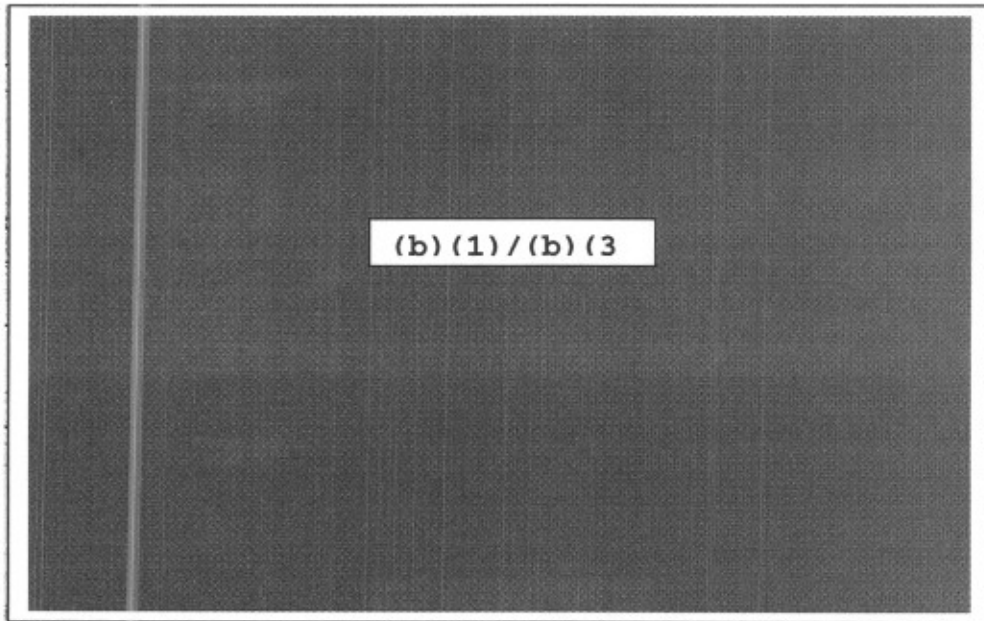


Chart E7102
Figure 13 (C)

516. (U) Sailing Directions, Pub 126 states the following in reference to the cautions on chart E7012:

a. "It was reported that the Nuguria Islands are about 5.5 miles WSW of their charted position;"

b. "The outline of the Tanga Islands is reported to be incorrectly defined on the charts and they were reported to be 2.75 miles WNW of their charted position;"

c. "Caution. - Vessels should pass outside of the islands off-lying New Ireland, or to the S of it due to the uncertainty of the depths off the island's NE coast." [encl (237)]

Squadron Support

517. (U) Per the Activity Manpower Document, CSS-15's Naval Submarine Support Command (NSSC) DET (UIC 3687A) is billeted for one 14NV ETCM OPS ASST and one 14NV ETCS OPS ASST. Additionally, CSS-15 (UIC 43709) is billeted for one 14NV ETCS AOPS. The CSS-15 AOPS billet is currently filled by ETC(SS) [REDACTED]. ETC(SS) [REDACTED] stated that the two CSS-15 NSSC DET OPS ASST billets have never been filled. [encls (196), (252)]

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518. (U) ETC(SS) [REDACTED] and LCDR [REDACTED] said that the manning shortage at CSS-15 burdens them with a large workload, especially when visiting submarines are in town. Many functions that would otherwise be taken care of by NSSC have to be done by CSS-15. As a result, they have scarce time to conduct training for their boats. [encl (196)]

519. (C) Due to [REDACTED]
[REDACTED]. [encls (4), (253)]

520. (U) Since January 2004, CSS-15 has supported every SAN FRANCISCO underway with at least one rider. This included sending the Squadron Engineer to sea for the [REDACTED]
[REDACTED]. [encls (198), (253)]

Operational Risk Management

521. (U) SAN FRANCISCO has no ship's or departmental notice or instruction covering Operational Risk Management. [encl (254)]

522. (U) The CO described his personal process to evaluate the hazards inherent in this transit and put risk mitigation factors into place: "I remember with a nearly 20-mile lane, I know it's not 20 miles everywhere around the ship's track, but with nearly a 20-mile lane through here, I felt good. I had considered operational restrictions and limitations in the time prior to this. But at that time, prior to the ship going to sea, and having reviewed the chart and the track, the thought--I don't know that I stood up, looked in the mirror and made a decision, "I shall not impose any operational restrictions for the portion of track through the Caroline Islands," but I recall thinking that this is going to be okay. That was my thought process." [encl (4)]

523. (U) When XO was asked in his post-grounding interview, "How does the ship incorporate operational risk management with respect to voyage planning, specifically in this SUBNOTE?" He replied, "I have no idea." [encl (5)]

524. (U) During the XO's interview, he was asked, "was there anything about the transit to the Caroline Island chain that caused yourself or anybody, during the review process, the voyage planning process, to want to implement mitigating factors associated with risk management?" He replied, "When I looked at

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where we're going in the SUBNOTE, the only part that concerned me at all was this part here [Caroline Islands]. I expected that a Navigation Supervisor would be required, just knowing it was there. So I looked at it, and realized that based on my understanding of the requirements, that it wasn't required." [encl (5)]

525. (U) SAN FRANCISCO does not have an Operational Risk Management program and does not overtly use this terminology or process in planning and executing operations. In CO Standing Order 2, Submerged Operations, and CO Standing Order 4, Navigation, the word "risk" appears only once, and neither "Operational Risk Management" nor "ORM" appear at all. [encls (4), (6), (93), (207)-(213)]

OPINIONS

1. (U) Failure of the ship's leaders and watchteams to develop and execute a safe voyage plan caused this grounding. The CO is ultimately responsible for the safe navigation of the ship in accordance with Navy Regulations. The CO failed to recognize that the SUBNOTE required the ship to transit a region hazardous to navigation in the vicinity of the Caroline Islands. Had the CO considered all available navigation products, he would have been compelled to operate his ship differently. If prudent measures had been taken based on an assessment of the risks, the ship would have most likely avoided grounding. At the very least, even if not wholly avoided, the severity of the grounding would have been significantly lessened and loss of life may have been prevented. [FF 19-24, 32, 35-37, 39, 40, 43, 44, 48, 51-53, 55, 56, 78, 191-196, 210, 212, 235, 247, 271, 272, 275, 277, 282, 290, 391-397, 413, 414, 416, 422-424, 477, 478, 481-483, 485, 487-489, 491, 492, 521, 522, 525]

2. (U) The XO, NAV and ANAV share in the Commanding Officer's responsibility for the safety of the ship. They prevented him from making a fully informed safety of ship decision by failing to submit a safe voyage plan. [FF 23-27, 32-41, 45-48, 51-53, 55, 67, 81, 177, 178, 195, 211-214, 216-223, 231, 233-235, 402, 403, 473, 474, 477, 478, 481-485, 487-489, 491, 492, 515]

3. (U) Manning aboard SAN FRANCISCO provided sufficient qualified QMOWs and OODs, and did not detract from the planning and execution of the voyage plan. [FF 404-410]

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Operational Risk Management

4. (U) The CO, XO, NAV and ANAV failed to consider all available navigation information throughout voyage planning and execution. The best case scenario was assumed vice the worst case. SAN FRANCISCO saw this as a "business as usual open ocean transit" through a perceived "40 NM wide highway." The CO's own Standing Orders specifically point out the danger of unquestioning reliance on a single item for safe navigation. Chart E2202 and several other indicators in the Control Room were available to the CO and his watchteam showing the ship was heading into dangerous waters. [FF 23-26,27,29,32-34,36,37,39,45,46,48,49,50-52,54,57,67,78,183,186,191,192,193,194,195,203,207-211,213,218,247,254,255,257,260,261,271-273,277,424,473,474,477,478,482,483,515,521-525]

5. (U) SAN FRANCISCO failed to incorporate Operational Risk Management in voyage planning and execution. Choices of speed, depth band, sounding interval, and the watchbill did not take into consideration all available navigation information (charts, sailing directions, VMS, etc.). The Plan of the Day was executed with no regard for navigational safety. The higher speeds at impact resulting from these misplaced priorities led to greater damage and loss of life. [FF 23,24,29,32-35,37-39,42,45,48,51-53,59,60,78,182-184,186,240,241,258,471,472,492,521-525]

6. (U) The CO and XO failed to properly evaluate the accuracy of sounding datum on chart E2202. They ignored marginalia data. This blind faith in the accuracy of Echo charts, combined with their cursory review of chart E2202, directly contributed to the grounding. [FF 32,49,207-210,218,222,223,254]

7. (U) Although the NAV and ANAV reviewed marginalia data on chart E2202, they failed to properly evaluate the accuracy of sounding datum in relation to the expected track. [FF 32,195,220,221]

8. (U) Despite numerous islands and shoal areas surrounding the MHN, as well as significant divergence in bathymetry in the vicinity of the Caroline Islands, the CO, XO, NAV and ANAV failed to appreciate potential hazards and take a conservative approach. Instead, they agreed to operate at maximum speed. This combined with not taking any additional precautions such as stationing additional watchstanders, establishing more

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restrictive limits on speed and depth, and reducing the sounding interval, directly contributed to the grounding. [FF 32,182, 192,195,220,221,255,257,258,261,266,271-273]

9. (U) The CO, XO, NAV, and ANAV assumed that CTF-74 SUBNOTE 001 reflected a standard route navigated previously by other submarines. This incorrect and unfounded assumption created an unwarranted sense of safety throughout the chart approval process. [FF 138,181,186,193,194,257]

10. (U) The OOD (the NAV) and QMOW (ET2(SS) [REDACTED]) failed to recognize and appreciate navigational uncertainties of chart E2202. [FF 32,63,64,74,75,77,79,81,85,86,192,195,220,221,255, 257,258,261,266,271-273]

11. (U) Several crewmembers expressed isolated points of concern with the voyage plan during planning and execution. Unfortunately, these concerns were rationalized away or never acted upon by the individual, or dismissed as irrelevant by more senior supervisors. This not only was a missed opportunity, but also illustrates a culture within the crew of readily accepting answers to operational questions without critical thought or analysis. [FF 39,50,52,53,57,58,59,60,64,66,67,69,81,88,91,195, 414,423]

a. Although the XO was initially concerned about the need to station a Navigation Supervisor during the transit of the Caroline Islands while conducting his review of chart E2202, he failed to assess the prudent measures needed to transit this region. He posed a rhetorical question to the NAV and ANAV to ensure that "restricted water" requirements were not necessary. When they agreed with him, he asked no further questions nor did he require them to explain the basis of their opinion. [FF 23, 24,32,50,57,73,218,219,222,233,250,259,261]

b. The CO went through a similar mental process when he dismissed his initial concern about the nature of this transit. When he initially looked at the chart of Caroline Islands, he thought he would be sailing in "restricted waters," but convinced himself by measuring with dividers that his initial instincts were mistaken. He placed total reliance in the accuracy of the Echo charts, and convinced himself he was driving down a clear lane 20 NM on either side of his track and none of the prudent measures required in "restricted waters"

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were needed. [FF 32,50,57,73,192,203,228,236,250,255,259,261,269,270]

c. ET2(SS) [REDACTED] questioned whether a Modified Piloting Party would be needed to transit the island chain as he was relieving as QMOW the night before the grounding. The OOD did not critically evaluate this concern. ET2(SS) [REDACTED] readily accepted the OOD's response. [FF 57,74,75,260]

d. LTJG [REDACTED] (the JOOD) intended to take a sounding as the ship changed depth from 500 feet to 525 feet four minutes prior to grounding. The OOD (the NAV) dismissed this concern based on his incorrect understanding of the CO's Standing Orders. The OOD failed to take a prudent approach to safe navigation. ET2(SS) [REDACTED] failed to provide the OOD backup regarding the sounding requirement for this depth change. [FF 63,68,74,75,268,279,281]

Procedural Compliance

12. (U) The ANAV and chart preparer (ET1(SS) [REDACTED]) were negligent in voyage planning. They failed to: (1) adequately review all applicable publications to glean all navigation hazards and information for consideration by the CO, XO, and NAV; (2) closely look for hazards to navigation on all available charts along the SUBNOTE route; and (3) identify a hazard/shoal marking in the vicinity of the grounding that existed on charts 81023, INT 506, and INT 507. As a result, they did not transfer this hazard to chart E2202 and directly contributed to the grounding. [FF 27,29,32-34,36-38,47-49,52,53,55,56,180,182,197-201,212,213,216,217,221,224,226-229,231,240,241,457,473-481]

13. (U) The NAV was negligent in voyage planning. He failed to: (1) adequately review all applicable publications to glean all navigation hazards and information for consideration by the CO and XO; (2) closely look for hazards to navigation on all available charts along the SUBNOTE route; and (3) identify a hazard/shoal marking in the vicinity of the grounding that existed on charts 81023, INT 506, and INT 507. As a result, he did not ensure that this hazard was transferred to chart E2202 and directly contributed to the grounding. [FF 26,29,32-34,36-38,40,45-48,52,53,55,56,180,182,212,213,216,217,221,228,229,231,240,241,457,473-481]

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14. (U) The XO was negligent in voyage planning. He failed to:
(1) adequately review all applicable publications to glean all navigation hazards and information for consideration by the CO;
(2) closely look for hazards to navigation on all available charts along the SUBNOTE route; and (3) identify a hazard/shoal marking in the vicinity of the grounding that existed on charts 81023, INT 506, and INT 507. As a result, he did not ensure that this hazard was transferred to chart E2202 and directly contributed to the grounding. [FF 23,24,29,32-34,36-38,40,46,48,52,53,55,56,202,203,207,212,213,218,219,222,228,229,240,241,457,463,464-469,484-487,490-493]

15. (U) The CO was negligent in voyage planning. He not only failed to review the necessary charts and publications for the Caroline Islands during his approval of the voyage plan on chart E2202, but he also failed to ensure his team properly executed voyage planning, which directly contributed to the grounding. [FF 19-22,26,29,32-34,36-38,40,44,46,48,52,53,55,56,202,203,207,212,213,218,219,222,228,229,240,241,457,463-469,484-487,490-493]

16. (U) The CO, XO, NAV and ANAV were negligent in that they uniformly dismissed Sailing Direction Pub 126 based on their mindset that this was an open ocean transit. This action precluded the consideration of crucial navigation information that highlighted inaccuracies of charted features in the vicinity of the Caroline Islands. [FF 19-25,29,33,34,37,45,48,57,230,231-235,482,483]

17. (U) The CO, XO, NAV (the OOD), ANAV and QMOW (ET2(SS) [REDACTED]) established and employed an inappropriate sounding and position plotting interval of [REDACTED] minutes while at All Ahead Flank in the vicinity of the Caroline Islands. These conditions did not allow three soundings prior to entering within 1,000 yards of dangerously shoaling waters as required by OP 61-17. [FF 19-25,29,52,53,59,60,63,74,75,78,85,86,240,241,272] (b)(2)

18. (U) The QMOW under instruction watch (ET2(SS) [REDACTED], a qualified fathometer operator) failed to look at all available indications on the fathometer per CO Standing Orders while taking a sounding during the morning watch. Additionally, he and the qualified QMOW (ET2(SS) [REDACTED]) failed to recognize the 0645K sounding did not check with charted water depth. Consequently, this discrepancy was not reported to the OOD. These lapses prevented the watchteam and command leadership from

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recognizing inaccuracies of water depth on chart E2202 and
deprived them of the opportunity to take appropriate measures.
[FF 61,74,75,79,80,83,84,265,273]

19. (U) The lack of review and scrutiny of QMOW practices
during the morning watch by the OOD (the NAV) likely contributed
to the poor watchstanding performance exhibited by this QMOW
(ET2(SS) [REDACTED]). [FF 62,77,87,97,98,265,252,273]

20. (U) Although the current NODORM checklist is adequate, it
could be improved to aid its user by:

a. (U) Requiring all personnel conducting voyage planning
sign or initial for review of all applicable references;

b. (U) Requiring all applicable charts are reviewed for
hazards to navigation along the ship's track;

c. (U) Reflecting the OPORD 2000 warning regarding possible
disparity in navigational information among charts and emphasis
that all available navigation safety information must be used
for voyage planning;

d. (U) Specifying a maximum number of charts that can be
used per checklist; and

e. (U) Formalizing chart preparer procedures and
accountability.
[FF 48]

21. (U) OP 61-17 requires improvement. Although OP 61-17
Section 2.3.4.f provides clear instruction to "review other
charts covering the same area . . . to verify all known hazards
are in fact identified", it should be updated to ensure "all
identified hazards are plotted on the chart to be used for
navigation." [FF 37-39]

Command Leadership and Culture

22. (C) Having completed a recent deployment, receiving an

[REDACTED]
[REDACTED] Although he realized he [REDACTED]

[REDACTED] Instead, he [REDACTED]

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[REDACTED] [FF
1,236-238,240-242,250,255,256,258,259,261,262,267,270,279,281]

23. (U) The CO placed excessive faith in the Navigation Division, believing he had a "stacked deck" of ETs. Accordingly, he focused on other areas at the expense of the Navigation Division. [FF 46,51,202,204-206,211,212,228,236,237,244,245,254,413-417,419,422,423,441-443,445,454,455]

24. (U) The CO did not feel confident in his own navigation skills, not having served as a Navigator himself. He depended on the XO to mentor, train and supervise the NAV. This led him to overlook the fact that Navigation Division was not preparing charts and voyage plans as required. [FF 46,51,191,196,202,203,206,211,212,228,254,255,258,271,272,432-435,437-439,445,455]

25. (U) Although a served navigator, the XO failed to meet his responsibility to oversee the ship's navigational safety. He provided the NAV little assistance in upgrading performance standards in open ocean navigation. There are no records of his participation in any monitored evolutions of Navigation Division associated with open ocean navigation. The XO did not monitor the NAV to ensure Navigation Division used all applicable instructions, guidance and checklists for open ocean voyages. [FF 47,193,206,218,219,222,228,233,239,431,433,441,443-445,523,524]

Poor Watchstanding Practices

26. (U) The CO, XO, NAV and ANAV failed to establish and uphold watchstanding formality and standards as evident by persistent administrative errors and a lack of attention to detail. [FF 56,58,61,65,66,70-72,74,75,82,85,86,97-100,251,252,263,264,280]

27. (U) Although the CO's Night Orders provided extensive direction, cursory reviews by the watchteam were commonplace. This reflects a command culture where a lack of attention to detail and procedural compliance were the norm. [FF 59-61,253,258,262,420,421]

28. (U) SAN FRANCISCO Navigation Division did not use VMS effectively during open ocean navigation despite the fact that this was pointed out as a recurring deficiency. [FF 76,89,90,92-95,276,277,290,414,443-447,449,453,488,489]

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29. (U) Preparations for the crossing of the equator Shellback ceremony and Field Day did not contribute to the grounding. [FF 249,274]

SUBNOTE Generation

30. (C) CSG-7 provided SAN FRANCISCO a SUBNOTE [REDACTED] [REDACTED] As a result the SUBNOTE was adequate and met all requirements of OPORD 2000. [FF 28,101-104,109,110,113,143,154]

31. (C) [REDACTED]
[REDACTED]
[REDACTED] Moreover, CSG-7 [REDACTED] While this did not contribute to the grounding, [REDACTED] [FF 117,118,132,133,138-140,162-165,178-181,185]

32. (C) The Waterspace Management (WSM) program that CSG-7 uses to track navigational anomalies reported by operating units is [REDACTED]
[REDACTED] [FF 109,134,145-147]

33. (C) Although the SUBNOTE 001 [REDACTED]
[REDACTED]
Even though the CO, XO, NAV and ANAV stated [REDACTED]
[REDACTED] [FF 30,31,44,108,115,117,118,170-175,177-181,185,187-191,225,244-246,253]

34. (C) The guidance in CSG-7 OPSOP 302 and WESTPAC Deployment Guide for SUBNOTE delivery [REDACTED]
[REDACTED]
[REDACTED]

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[FF 30,31,172-176]

35. (C) The lessons learned system at CSG-7

[FF 127,128,
130,131]

36. (C) Qualification requirements for personnel involved
Currently
there are

[FF 108,119-127,129,133,136,137,150-153]

37. (C) No consideration is given to the

Individuals associated in generating the SUBNOTE 001 stated that

Although this did not

The SUBNOTE was

[FF 104,105,
111,112,114,116,143,144,148-153,161]

38. (C) CSG-7 should

[FF 108,135-137,141,142,144,148-153,155-
161]

Casualty Response

39. (U) The ship's response to the grounding was proper in all
critical attributes of the operation and casualty procedures and
directly resulted in the ship's safe return to port. [FF 278,
283-289,292-303,322,411,412]

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40. (U) Any deviations or omissions from standard casualty procedures did not affect overall recovery of the ship and were understandable, given the severity and suddenness of the initial impact and contradictory operating/casualty procedures between the Collision and Emergency Surfacing procedures in the SSM and actions in the CO Standing Order for Red Sounding. [FF 301-310, 312,317-319]

41. (U) The SAN FRANCISCO immediately took actions which enhanced the ship's ability to minimize the effects of the grounding. The ship appropriately conducted an emergency surfacing and subsequently sustained the low-pressure blow continuously until return to port, maintaining post-grounding stability. [FF 301-312,316-319]

42. (U) The OOD ordered the Helmsman to resume steering course 090 at approx 1143:30K, about 80 seconds after the grounding. All Ahead 2/3 was ordered. No fathometer was in operation. The ship proceeded further down the original track for approximately 15 minutes, then reversed course at 1202K and passed over the area where the ship had grounded. The OOD should have considered reversing course to known good water sooner. [FF 317-319]

43. (U) Since only chart E2202 was prepared, the ANAV ordered all positional information removed to facilitate plotting ship's position for its return to Guam. The ship then went over the same spot where it grounded. This ship should have considered avoiding this spot. [FF 282,319]

44. (U) Once surfaced, SAN FRANCISCO transited over the area of the grounding. This proves the CO could have avoided the grounding by transiting this area on the surface, which his SUBNOTE allowed. [FF 106,107,282,292]

Medical Opinions

45. (U) The severe head injury to MM2(SS) Ashley was inevitably fatal. Earlier evacuation or arrival of medical officers would not have changed the outcome for MM2(SS) Ashley. The deterioration of MM2(SS) Ashley's medical condition after his initial injury is consistent with the injuries noted at autopsy. [FF 315,324,326-330,334,336,338,339,341,343,344,349-354]

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46. (U) Petty Officer Ashley's death was in the line of duty and not due to misconduct. FF [324]

47. (U) Earlier evacuation or arrival of medical officers would not have changed the outcome for any other injured crewmember. The injuries of the remainder of the crew were in the line of duty and not due to their misconduct. Risk of permanent disability for those crewmembers ranges from minimal to moderate (one case). The risk of Post Traumatic Stress Disorder is indeterminate at this time. Some cases should be anticipated. [FF 290,297-300,313,320,324,325,327,332,333,334,335,345,389] (Individual line of duty misconduct determinations are documented on Standard Form 600 and are provided for all injured crewmembers in enclosure (143)).

48. (U) A review of the medical records and interviews with the Ship's Control Party, XO and Control Room watchstanders revealed no medical conditions or medication usage factored in the grounding. The CO's illness did not impair his ability to execute his command responsibility. [FF 248,347,348]

49. (U) The medical care delivered by the HM1(SS/SW) [REDACTED] met or exceeded the standard of medical care for pre-hospital trauma life support. This care was delivered under very difficult conditions. Other crewmembers provided critical medical support. Without the additional medical skills of the crew, HM1(SS/SW) [REDACTED] would have been overwhelmed by the number and severity of the casualties. Training and medical oversight of HM1(SS/SW) [REDACTED] provided by CSS-15 prior to the grounding was at or above standards. [FF 324-336,345,349-354,361,362,389]

50. (U) The composition and training of the EMAT team met the requirements of COMNAVFORINST 6000.2A. Additional EMT-level training for the EMAT team members would have been valuable. The continuity of the EMAT team should be maintained. Consideration should be given to augment the submarine Independent Duty Corpsmen (IDC) with two EMT trained crewmembers. Drills involving multiple casualties and evacuation should be part of submarine training. [FF 325, 333-336,345,346,361,389]

51. (U) The medical equipment onboard, the design of the submarine, and the IDC training were not optimal for this unique casualty. These factors did not have an adverse effect on the medical outcome of the crew. Equipment and submarine

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configuration limitations were largely overcome with exceptional creativity and initiative by the crew. The Jacobs ladders and diver's recovery ladder on SAN FRANCISCO were in good material condition. [FF 324-366,385,386,389] (Additional discussion of this opinion can be found in enclosure (261)).

52. (U) BUMED should provide Advanced Cardiac/Advanced Trauma Life Support (ACLS/ATLS) training to submarine IDCs. Specific protocols for remote physician assistance to IDCs in advanced airway management should be developed. Equipment should be selected and provided to support these capabilities. [FF 327-329,336,341,343,362] (Additional discussion of this opinion can be found in enclosure (63)).

53. (U) Medical evacuation of a critically injured crewmember using a Reeves Sleeve stretcher through the Sail is not possible without modifying the submarine. [FF 327,338-340,342,343,359]

54. (U) Fleet response in support of SAN FRANCISCO was rapid and appropriate. A full range of medical evacuation and assistance options were explored and only the practical options were used. Contingency planning for evacuation and aftercare rapidly adapted to the dynamic circumstances. The medical care provided by personnel transferred to SAN FRANCISCO via helicopter was excellent under less than ideal conditions, including open cricothyrotomy and Advanced Cardiac Life Support. FF [325,335,336-339,343-345,367-376,378-382,388-390]

55. (U) Medical advice provided to HM1(SS/SW) [REDACTED] was based on appropriate consultation with specialists. FF [375]

56. (U) Medical support communication after the grounding was not optimal between HM1(SS/SW) [REDACTED] and medical personnel outside of SAN FRANCISCO due to a combination of factors. Communication between the On Scene Commander and other units involved in medical assistance was hampered by the ship's internal configuration, limited connectivity and limited interoperability. These deficiencies did not affect the medical outcome for any crewmember. Communication protocol should be a required part of operational medical officer training. Discussions of lessons learned from incidents with injuries to multiple crewmembers should be added to training schedule for operational medical officers, and other medical personnel that could be tasked to respond. [FF 324,325,330,336-339,343-345,363-384,388,389]

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57. (U) The shift of the medical communication, while appropriate, was not seamless. Major command centers should be staffed by two physicians during significant casualties. Continuity of, and direct communication with, the unit's IDC should be a priority. Major command centers should ensure the presence of, and regularly update, contact and resource lists and suggested protocols for possible multiple casualty situations. [FF 332,335,336,365,376,377]

58. (C) EHF capability was [REDACTED]

[REDACTED]
[REDACTED] Communication capability, [REDACTED]

[REDACTED]. [FF 332,335,336,365,376,377,398,399]

59. (U) Exceptional outside support was provided by a disparate group of units, including Coast Guard, USS FRANK CABLE (AS 40), Naval Special Warfare, Naval Aviation, Military Sealift Command ships, and shore stations. [FF 337-339,343-345,367-387,389]

60. (U) Evacuation of MM2(SS) Ashley through the Sail by helicopter was the only viable option given the sea state and the operating condition of the submarine (low freeboard due to damage to the main ballast tanks). [FF 321,369,372,378-381]

61. (U) Local medical support was excellent and timely, allowing the deployment of two medical teams. The redundancy of the medical teams provided critical flexibility for the On Scene Commander. On scene support by elements of the Coast Guard, FRANK CABLE, Military Sealift Command, HC-5 and Naval Special Warfare Unit ONE was outstanding. Naval Hospital Guam provided exceptional care and support during SAN FRANCISCO's transit to Guam following the grounding and after the return to port. [FF 322,370,372,374,378-381,388,389]

62. (U) Although not covered by any existing multiple casualty procedures, SAN FRANCISCO wisely used the Crew's Mess as a medical triage treatment area, which proved to be extremely effective. Prolonged oxygen therapy and evacuation of a patient after spinal immobilization from the Wardroom would have been nearly impossible. Additional space and access to the oxygen bleed tube was available for injured personnel in Crew's Mess.

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The use of the Crew's Mess and access to the oxygen bleed station was critical in caring for multiple casualties.
[FF 325-335,338,356,359]

Material

63. (C) Although the grounding caused some [REDACTED]

[REDACTED]
[FF 310,314,400,401]

64. (U) The ship's EHF Communication System could have been restored at sea and used following the grounding. After the ship returned to port, the problem was attributed to an equipment line up error. Although the ship had technical documentation onboard to troubleshoot and restore EHF communications, that material may not have provided enough clarity to allow the operators to restore the EHF system while at sea. [FF 398,399]

Training

65. (U) The CO, XO, NAV and ANAV failed to implement and oversee an effective training and self-assessment program for voyage planning and open ocean navigation. Although the ship had quarterly training goals, a 'Top 5' self assessment program, and a monitored evolution program, none of these processes provided a critical look at recurring deficiencies in these areas with substantive corrective actions. [FF 23,24,96,413-450]

66. (U) The CO, XO, NAV and ANAV failed to adequately upgrade poor practices in open ocean navigation and voyage planning following the 2004 TRE, POMCERT and Navigation Evaluations, to include use of VMS, selection of Red and Yellow Soundings, OOD supervision of the Navigation Plot, and accomplishment of hourly compass checks. Similar poor practices were repeated on 7 and 8 January 2005. [FF 23,24,85,86,96,413-423,433,436-450]

67. (U) The current Prospective ANAV course curriculum covers topics related to voyage planning chart preparation. However, OPORD 2000 is not listed as a reference in the lesson plan for topic 3.1 (Nautical Computations and Open Ocean Chart Cross-Checks), and it is not obvious that prospective ANAVs are taught the mechanics of reviewing "classified, unclassified, bottom

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contour, general bathymetric and other available charts and information" and plotting "known dangers . . . on the chart actually being used to navigate the ship." Additionally, the Prospective ANAV curriculum does not sufficiently cover submarine collision and grounding briefs. Only one collision brief is discussed for Topic 1.1 (Rules of the Road).
[FF 37,38,451]

68. (U) The current Submarine Officer Advanced Course (SOAC) curriculum for Department Heads covers topics related to voyage planning and chart preparation for Department Heads. A 2-hour topic titled 'Navigation-The Third Dimension' references OPORD 2000 and covers chart selection and comparison. However, this topic does not teach prospective Department Heads the mechanics of reviewing "classified, unclassified, bottom contour, general bathymetric and other available charts and information" and plotting "known dangers . . . on the chart actually being used to navigate the ship." Additionally, the SOAC curriculum does not sufficiently cover submarine collision and grounding briefs. Only the GREENEVILLE grounding brief is discussed.
[FF 37,38,452,453]

69. (U) The current Submarine Command Course curriculum (formerly Prospective Commanding Officer Course) adequately covers topics related to the risk management of voyage planning and chart preparation for Commanding Officers and Executive Officers. [FF 424,454,455]

70. (U) Since January 2004, CSS-15 has supported every SAN FRANCISCO underway with at least one rider. This included sending the Squadron Engineer to sea for the [REDACTED] during the Fall of 2004. Squadron assistance played an important role in improvements seen on SAN FRANCISCO, particularly in Engineering. [FF 243,519,520]

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71. (U) CSS-15 is not manned adequately to provide navigation oversight and mentoring. Manning deficiencies at CSS-15 have resulted in one squadron ANAV (14NV) doing the job of three for the previous year. The current squadron ANAV has never gone to sea to observe navigation practices on SAN FRANCISCO despite being assigned to the job for over a year. The lack of squadron ANAV deck plate presence may have led to missed opportunities to correct the poor practices in open ocean navigation that contributed to the grounding. [FF 517,518]

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Chart Management

72. (U) The chart products onboard SAN FRANCISCO were sufficient to identify the existence of navigation hazards along the SUBNOTE track. [FF 456-462,464,465,469,470,472-479,481-486,488,489]

73. (U) The extent of the navigation hazard on which SAN FRANCISCO grounded cannot be definitively known until a comprehensive bathymetric survey of the area is completed. It is most likely that the feature upon which SAN FRANCISCO grounded is the same feature associated with the discolored water spot and the shallow area that was imaged by LANDSAT. [FF 477,490-492,507-509,512,513]

74. (U) The omission of the reported navigation hazard on the E2202 directly contributed to the grounding in that it is reasonable to assume that had the feature been added to the E2202, it would have influenced the CSG-7 SUBNOTE generation process and provided the SAN FRANCISCO's navigation team another opportunity to identify the navigation hazard near their track. [FF 166-169,459,473-476,478]

75. (U) Adding the Product Specification for Bottom Contour Charts to the allowance lists of all submarines and SUBOPAUTHS would better enable submariners to properly train on how the bottom contour charts are constructed and how the hydrographic information is selected for incorporation on these charts. [FF 155-157,207,208,215,220,222,494,495,500,501,503,505]

76. (U) Although NGA reported that the Product Specification for Bottom Contour Charts does not specifically require inclusion of "discolored water" on Echo series charts, it does not forbid including this hazard. Consequently, all critical information regarding navigational hazards should be included on Echo series charts. [FF 496-499,502,505,506]

77. (C) Chart products are [REDACTED] For example, [REDACTED] [FF 457,462-465,483,504,508-511,514-516]

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RECOMMENDATIONS

1. (U) That CO, CDR [REDACTED]
[REDACTED] SAN FRANCISCO
grounding on 8 January 2005.
2. (U) That XO, LCDR [REDACTED]
[REDACTED] SAN FRANCISCO grounding on 8 January
2005.
3. (U) That NAV and OOD, LCDR [REDACTED]
[REDACTED] SAN FRANCISCO grounding on
8 January 2005.
4. (U) That ANAV, ETCS(SS) [REDACTED]
[REDACTED] SAN FRANCISCO grounding
on 8 January 2005.
5. (U) That the Chart Petty Officer, ET1(SS) [REDACTED]
[REDACTED]
6. (U) That the on-watch QMOW, ET2(SS) [REDACTED]
[REDACTED]
7. (U) That the off-going QMOW, ET2(SS) [REDACTED]
[REDACTED]
8. (U) That the off-going Fathometer Operator, ET2(SS) [REDACTED]
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9. (U) That COMNAVSUBFOR take the following actions:

a. (U) Review the NODORM for improvements considering the information provided by this investigation. (Opinion 20)

b. (C) Review OPORD 2000 and other associated instructions for appropriate changes to include, but not limited to:

[REDACTED] Opinions 21, 31, 33, 34-38)

c. (U) Evaluate all material problems resulting from the grounding identified in this investigation for improvements and possible design change. (Opinions 51, 53, 63)

d. (U) Evaluate improvements required to provide reliable voice and data communications between submarine medical personnel and supporting organizations ashore during patient care in treatment areas. (Opinions 58, 64)

e. (U) Evaluate SSM OP 61-17 for all submarine classes, for appropriate change requiring transfer of navigational hazards from all available navigation products to the chart being used for navigation. (Opinion 21)

f. (U) Review SUBOPAUTH routing processes (including the qualification program for those who create and approve SUBNOTES, and associated checklists). (Opinions 31-38)

g. (U) Evaluate submarine medical procedures for immobilized patient evacuation, and adequacy in handling multiple injured crewmembers, including requirements for Emergency Medical Assistance Teams, to include team composition and training. (Opinions 50, 52, 62)

h. (U) Provide the lessons learned from this incident to the submarine force regarding voyage preparations (including open ocean use of VMS), and that this incident be added to the submarine force grounding/collisions briefing materials. (Opinions 1-28, 33, 42-44, 64, 67-69, 75)

10. (U) That COMNAVSUBFOR and OPNAV (including, at a minimum, OPNAV N7C (Oceanographer)) work with NGA to evaluate the procedures and specifications used to update charts, ensuring

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all available sources are included and the accuracy is clearly
portrayed. (Opinions 73-77)

11. (U) That BUMED review the material and training issues
identified in this report and take appropriate action.
(Opinions 51,52,56)

12. (U) That COMSUBPAC in coordination with COMPACFLT evaluate
the personnel detailing practices for submarine staff manning at
CSS-15 and other associated commands at Guam to avoid gaps in
critical manning areas, and address needed policy changes with
NAVPERSCOM (PERS 4). (Opinion 71)

13. (U) That CSG-7 assess SAN FRANCISCO Navigation Team
proficiency and compliance with standards regarding chart
preparation and open ocean navigation, and implement a training
and certification plan as warranted. This assessment should also
include VMS utilization for all facets of navigation. (Opinions
1-28,33,42-44,65,66,75)

14. (U) That COMNAVSUBFOR and BUMED provide the lessons learned
from this incident to the submarine force and appropriate
medical personnel regarding multiple casualty procedures.
(Opinions 45-62)

[REDACTED]

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