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DEPARTMENT OF THE NAVY
COMMANDER NAVAL AIR FORCE
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FINAL ENDORSEMENT on CAPT (b) (6), USN ltr 5830 of 10 Nov 22

From: Commander, Naval Air Force, U.S. Pacific Fleet
To: File

Subj: COMMAND INVESTIGATION INTO THE INCIDENT INVOLVING BACTERIA AND OTHER CONTAMINANTS WITHIN THE POTABLE WATER SYSTEM ABOARD USS ABRAHAM LINCOLN (CVN 72) ON OR ABOUT 21 SEPTEMBER 2022

1. This command investigation was convened to inquire into the circumstances surrounding the incident involving the presence of bacteria and other contaminants within the potable water system aboard USS ABRAHAM LINCOLN (CVN 72) on or about 21 September 2022 while the ship was underway in the Southern California Operating Area.

2. After review of the investigation and endorsements, I concur with and hereby approve the findings, opinions, and recommendations of the investigating officer. The potable water contamination was caused by a hole in the potable water vent header in the bilge compartment. As the contamination of potable water issue was identified, the Commanding Officer took expert advice from her CVN Heads of Department (HODs), made appropriate decisions to isolate the problem, rapidly develop and implement plans to make/test and distribute CVN generated water, and provide clean water at sea until potable water conditions were fully resolved. These actions, including the communication of real-time conditions and actions to the crew, were commensurate with the rights and absolute responsibility of a Commanding Officer.

Action Update: As of 1 November 2022, I have directed the establishment of an Aircraft Carrier Potable Water Working Group, to review all incidents within the past year involving potable water on Aircraft Carriers. This group is specifically chartered to issue a CVN class advisory message and propose changes as required to: 1) potable water maintenance requirements; 2) potable water technical manuals and drawings; 3) shipboard potable water specifications; 4) shipboard water analysis capabilities; 5) shore facility water analysis capabilities; 6) CVN 68 and CVN 78 Class potable water system design; and 7) shipboard and shore preplanned response actions to resolve petroleum product or chemical contamination of the shipboard potable water system. Final message and proposals are due no later than 31 January 2023.

3. I direct all CVN Commanding Officers, Executive Officers, Reactor Officers, Assistant Reactor Officers, and Chief Engineers to review this investigation and provide feedback to the Aircraft Carrier Potable Water Working Group through my Assistant Chief of Staff for Maintenance and Material, CAPT (b) (6).

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4. This investigation is forwarded to Naval Sea Systems Command Naval Engineering & Logistics (NAVSEA 05), Naval Facilities Engineering Command, Bureau of Medicine & Surgery, and Naval Surface Warfare Center Philadelphia Division (NSWC PD) for review and action as deemed appropriate.

5. This investigation and enclosures will be maintained in my Force Judge Advocate office, which may be reached at (619) 545-2778

K. R. WHITESELL

Copy to:
NAVFAC
COMNAVAIRLANT
BUMED
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NAVSURFWARCENDIV PHILADELPHIA PA
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Ref: (a) JAGINST 5800.7G, Chapter II
(b) NAVMED P-5010-6, Manual of Naval Preventative Medicine Chapter 6 Water Supply Afloat
(c) NAVSEA 0989-036-0000 CVN68 Class Steam Plant Manual Chapter 22 Potable Water Fill, Transfer and Stowage Systems

Encl: (1) Appointing Order of 11 Oct 22
(2) CNAF N9 Site Visit Report
(3) USS ABRAHAM LINCOLN (CVN 72) Commanding Officer Underway Standing Order 8
(4) USS ABRAHAM LINCOLN (CVN 72) Main Propulsion Assistant MFR
(5) USS ABRAHAM LINCOLN (CVN 72) Automated Project Data Log (APDL) Watchstander Summary
(6) USS ABRAHAM LINCOLN (CVN 72) Monthly Preventive Medicine Reports
(7) USS ABRAHAM LINCOLN (CVN 72) Two year summary of potable water tanks with positive bacteria samples
(8) USS ABRAHAM LINCOLN (CVN 72) Machinery Division Startup Checklist
(9) Summary of Interview/Email, CVN72 PSNS APS (b) (6)
(10) Summary of Interview/Email, CVN 72 MPM (b) (6)
(11) Summary of Interviews, N9 Watchstander Summary
(12) Summary of Interview/Email, Main Propulsion Assistant
(13) Summary of Interview/Email, Reactor Electrical Assistant
(14) Summary of Interview, LT (b) (6) (17-22) EOOW
(15) Summary of Interview/Email, HMC (b) (6) Preventive Medical Tech
(16) Summary of Interview, USS ABRAHAM LINCOLN (CVN 72) Senior Medical Officer
(17) Summary of Interview, USS ABRAHAM LINCOLN (CVN 72) Reactor Officer
(18) Summary of Interview, USS ABRAHAM LINCOLN (CVN 72) Executive Officer
(19) Summary of Email, USS ABRAHAM LINCOLN (CVN 72) Force Deputy Surgeon
(20) Summary of Interview, N9 Bilge Inspectors
(21) Commander Navy Air Force, U.S. Pacific Fleet MTT3 Report
(22) USS ABRAHAM LINCOLN (CVN 72) Zone 7 Bilge Inspection Report
(23) USS ABRAHAM LINCOLN (CVN 72) Tagout Record Sheet
(24) USS ABRAHAM LINCOLN (CVN 72) Maintenance Control TSIMs Report
(25) USS ABRAHAM LINCOLN (CVN 72) Site Visit Header Pictures
(26) USS ABRAHAM LINCOLN (CVN 72) Equipment Deficiency Log

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(27) Temporary Reactor Officer's Standing Order 22-57

Preliminary Statement

1. This investigative report is submitted as required by enclosure (1) and is in compliance with reference (a). In summary, I found that corrosion of a carbon steel pipe in USS ABRAHAM LINCOLN's potable water system allowed bilge water to contaminate the water supply of the ship. Programmatic failure coupled with watchstanding practices impeded early identification and implementation of controlling actions by Ship's Force. I am not recommending any individual administrative or disciplinary action.

2. After initial investigative steps, I requested additional time and resources from the convening authority to review logs and conduct interviews as well as the opportunity to consult with subject matter experts on relevant issues. I received support in this form from Commander Naval Air Force, U.S. Pacific Fleet (CNAP) N9, CNAP N43, CNAP N01M Force Surgeon, and the Puget Sound Naval Shipyard (PSNS) San Diego Detachment.

3. I consulted with LCDR (b) (6), JAGC, USN in preparing this report. USS ABRAHAM LINCOLN (CVN 72) provided open access to the ship, personnel, and records to ensure that this investigation could proceed. I encountered no difficulties in conducting this investigation and was able to review the relevant records as needed to make this determination.

Findings of Fact

Chronology of Events

1. Sometime in spring 2022, corrosion produced a hole in a vent header of Potable Water (PW) Tank (b) (3) (A) onboard USS ABRAHAM LINCOLN (CVN 72), hereinafter "LINCOLN." This hole was about 6 inches off the low point in the bilge in (b) Main Machinery Room (b) (MMR) and allowed bilge water to flow into PW Tank (b) (3) (A) whenever bilge levels were high enough.

2. LINCOLN was scheduled to get underway from Naval Air Station North Island Pier Lima on 18 September 2022. [Encl (5)]

3. On 16 September 2022, LINCOLN Reactor Department set watches and started up (b) Reactor in support of their 18 September 2022 underway. On 17 September 2022, (b) Reactor was shut down to support repairs, delaying LINCOLN's underway until 21 September 2022. During this delay, LINCOLN was unable to lower bilge levels after the normal accumulations of startup as they were restricted in pumping due to their proximity to land. [Encl (5)]

4. Between 19-21 September 2022, Bilge levels in (b) MMR exceeded 6 inches. [Encls (2), (5)]

5. On 17 September 2022, PW Tank (b) (3) (A) (located in (b) Main Machinery Room) experienced an unaccounted for change in level adding approximately 2000 gallons to this tank. [Encl (5)]

6. On 18 September 2022, (b) (3) (A) Lower Level Starboard Watch (b) LLS) identified that PW Tank (b) (3) (A) was high out of specification, but no corrective actions were taken. [Encl (5)]

7. (b) LLS attributed this high level to overfilling from pier PW risers. (Encl 2, 5)

8. LINCOLN was not aligned to fill PW tanks from shore between 17 and 21 September 2022. [Encl (2)]

9. On 21 September 2022 at 1129, PW Tank (b) (3) (A) was placed on service, through a common header with PW tanks from both plants, to the ship with PW in support of a 1300 underway. [Encl (5)]

10. Shortly after placing PW Tank (b) (3) (A) in service, the (b) Plant Upper Level Starboard Watch (b) ULS) informed the (b) Plant Chief Machinery Operator (b) CMO) that the water "tastes weird." [Encl (11)]

11. (b) CMO did not inform the operational or administrative chain of command of any issue with PW based on perceptions that transferring from shore to ship PW sources may result in a brief change in taste. [Encl (11)]

12. (b) CMO informed the Water Control Watch (WCW) that "the tank is bad," without elaborating. The WCW understood this statement to mean the free available chlorine (FAC) measurements were out of specification and then shifted PW Tanks in (b) Plant. PW Tank (b) (3) (A) (b) (3) was briefly taken off line but was put back online after sampling. [Encl (11)]

13. At 1503 the ship transited beyond 12 Nautical Miles from land. At this point, LINCOLN's Commanding Officer's Standing Orders allow for transferring water from Distilling Units to PW Tanks. In addition, the Oily Waste Separator may be aligned overboard to support bilge dewatering. [Encl (3)]

14. At 1528 LINCOLN carried out the immediate response actions for a chemistry casualty (b) (b) (3) (A) Although unrelated to the spread of contamination in the PW system, these actions are watch stander intensive, impacting ability to identify PW contamination. [Encl (5)]

15. At approximately 1900, the Engineering Officer of the Watch (EOOW) began to receive reports of PW being possibly contaminated. This included reports that PW had a JP-5-like smell, abnormal taste, and discoloration. [Encl (14)]

16. After these reports, the EOOW directed watchstanders to identify and isolate all PW Tanks that were online at the time of reporting. [Encl (14)]

17. EOOW did not log the contaminated PW casualty but reported it to the Main Propulsion Assistant (MPA). [Encl (5), (14)]

18. At 1926, the ship was greater than 50NM from land and thus was able to pump bilge water overboard. [Encl (5)]

19. At 2054, as a part of the tank shifting ordered by the EOOW in an effort to recover the PW system, PW Tank (b) (3) (A) was placed back in service, reintroducing the source of the contaminated water to the ship's PW system. [Encl (5)]

20. At 2100, the Executive Officer (XO) was informed that there were concerns about PW. XO engaged the Supply Officer (SUPPO) and Chief Engineer (CHENG) to address the issue. [Encl (18)]

21. Around this time, XO noticed a run on the bottled water at the ship's store. XO verified with SUPPO the quantity of bottled water on hand and suspended bottled water sales to ensure adequate bottled water for the crew would be available during the recovery of the PW distribution system. [Encl (18)]

22. At 2129, Medical took the first bacteriological (BACT) sample on PW Tank (b) (3) (A). BACT samples were taken through the night on PW Tanks. BACT samples require an 18 hour incubation time before results are available. [Encl (15)]

23. At 2143, LINCOLN for the second time carried out the (b) (3) (A) secondary chemistry response actions in (b) Propulsion Plant. [Encl (5)]

24. At 2230 XO briefed the Commanding Officer (CO) on the current status of PW contamination. The decision was made for the CO to make a 1MC announcement at cleaning stations the next morning at 0745 to update the crew with the best known information. [Encl (18)]

25. At 2234, (b) (3) (A) PW was taken offline, isolated at the plant riser valve, with (b) (3) (A) PW supplying the ship. [Encl (4)]

26. At 2234, (b) (3) (A) PW system was traced hand-over-hand and no discrepancies were found. [Encl (4)]

27. In the evening of 21 September 2022, the MPA directed chlorination of all (b) (3) (A) PW Tanks to 2 ppm after medical captured the BACT samples in (b) (3) (A). [Encl (4)]

28. On 22 September 2022, the following BACT samples returned positive [Encl (4)]:

a. (b) (3) (A) (Wardroom 3): Coliform
b. (b) (3) (A) (b) (3) Plant): E-Coli, Coliform
c. (b) (3) (A) (b) (3) Plant): E-Coli, Coliform
d. (b) (3) (A) (b) (3) Plant): E-Coli, Coliform

e. (b) (3) (A) Plant): Coliform
f. (b) (3) (A) Plant): Coliform
g. (b) (3) (A) Plant): Coliform

29. On the morning of 22 September 2022, the XO met with the Senior Medical Officer (SMO), CHENG, Reactor Officer (RO), CNAP N9 and SUPPO to discuss the plan going forward. [Encls (16), (17)

30. On 22 September 2022, Caution Tags were hung on the (b Plant PW Tanks that tested positive for BACT to prevent the spread of contaminated water. [Encl (23)]

31. On 25 September 2022, the XO met with leadership to verify current PW configuration were sustainable, conduct root cause analysis, and initiate follow-on recovery. [Encls (4), 18)]

32. On 27 September 2022, LINCOLN commenced PW Tank inspections. The PW Tank covers and gaskets were inspected. There were no discrepancies of the tanks identified in this inspection: all fasteners were properly torqued, approved gasket materials were used, and gasket condition and seating surfaces were all verified. [Encl (4)]

33. RO was on station to verify the openings. XO also observed. [Encls (17), (18)]

34. PW Tank (b) (3) (A) was missed during this inspection. It was mistaken for the aft access to (b) (3) (A) and was not inspected until PSNS opened it on 15 October 2022. [Encl (4)]

35. Ship's Force utilized manual batch adds of (b) (3) (A) to chlorinate (b propulsion plant PW Tanks. FAC samples were pulled from the online PW Pump. A Temporary Reactor Officer Standing Order (TROSO) was issued on 26 September 2022 that provided guidance for (b Propulsion Plant PW operations while PW in (b Propulsion Plant was not available for consumption. [Encls (2), 27)]

36. The WCW Logs and the Maintenance Control Trouble Log on 21 September 2022 show no reports of ship's crew calling in for the water issues. [Encls (14), (24)]

37. There were no reported waterborne illness from LINCOLN's PW contamination on the 21 September 2022 underway. (Encls (15), 16)]

Material Condition and Configuration of Plant

38. On 15 October, PW Tank (b) (3) (A) was opened and inspected by Puget Sound Naval Shipyard (PSNS) Shop 99. Upon opening, the bottom of the tank had a visible black substance layer. [Encl (4)]

39. On 18 October, PSNS Shop 99 discovered the hole in a vent header of PW Tank (b) (3) (A). [Encl (9)]

40. The vent header hole is approximately 1 inch x 3 inches and about 6 inches above the low point of the bilge in [redacted] MMR. The hole was covered with rotten material and was about 1-inch wide before the final excavation of the pipe. [Encls (9), (25)]

Figure 1: Hole in Vent Header to Tank [redacted]

41. PW Tank [redacted] was last painted in Refueling Complex Overhaul (RCOH) and inspected during the FY20 Planned Incremental Availability (PIA), where it received a "Good/Normal" inspection result. [Encl (10)]

42. The [redacted] MMR bilge was painted during the RCOH and inspected during the FY-20 PIA. [Encl (10)]

43. There is no indication the vent header has been replaced since LINCOLN's construction. [Encl (10)]

44. The Ship's Bilge and Carbon Steel Inspection Program were evaluated as satisfactory during the most recent type CNAP inspection [Encl (21)]

45. PSNS reported that the PW Tank [redacted] vent header is carbon steel and is primed and painted in accordance with the bilge schedule. [Encl (10)]

46. This vent header was last inspected by ship's force on 28 March 2022 and was found to be satisfactory. [Encl (22)]

47. This vent header is not reflected in drawings provided by the local Propulsion Plant Engineering Activity (PPEA) that identifies any sections of the PW system sounding tubes and vent lines as carbon steel as required in accordance with the Steam Plant Manual MP4 for carbon steel inspections. [Encl (2)]

48. Review of the A4W PW system shows a single header for both fill and suction in each plant. [Encl (2) and Ref (c)]

49. Review of the LINCOLN PW system shows that it does not have a chemical addition vessel for batch additions of (b) (3) (A) from a common header to all tanks. [Encl (2) and Ref (c)]

50. When a single plant is configured to provide PW to the ship, normal recirculation and sampling of the PW tanks in accordance with the Steam Plant Manual is not possible before placing the PW tank in service. [Encl (2) and Ref (c)]

51. The Mixed Electrolytic Disinfectant Generators (MEDG), which provides in-line water treatment to the PW Tanks being filled from the distilling units, were not operational during LINCOLN's September to October 2022 underway. [Encls (13), (26)]

52. There are no Casualty Reports (CASREPS) that document the MEDGs material condition [Encl (2)]

Watchstander Practices

53. Review of LLS logs show that LINCOLN watchstanders do not make log entries when performing batch adds to chlorinate the PW Tanks. This results in no logging of the amount of (b) (3) (A) added, which tanks were recirculated, and whether FAC samples were positive or negative. [Encl (2)]

54. Prior to LINCOLN's recent deployment, WCW performed all (b) (3) (A) batch additions to the Potable Water tanks. Responsibility shifted back to LLS during the deployment. No training was documented as a part of this shift. [Encl (2)]

55. During interviews, it was discovered LLS watchstanders were not recirculating and sampling PW tanks in accordance with Steam Plant Manual procedures prior to placing the tanks in service due to not being able isolate from the plants PW riser isolation valve. [Encls (2), (11)]

56. The Machinery Division Startup Checklist requires all PW tanks to be recirculated and sampled 48 hours prior to startup to ensure the FAC is within specification and correct as needed. [Encl (8)]

57. Cold Iron Watch logs do not contain any entries for the completion of the 48 hour PW check, nor do the logs indicate PW Pump operation supporting PW Tank recirculation. There are also

no logs entries with FAC sample results from the Machinery Division startup checklist. [Encl (2)]

58. The Machinery Division Startup Checklist was not retained upon completion. [Encl (2)]

59. A new Machinery Division Startup Checklist was not issued after the shutdown on 17 September 2022. [Encl (2)]

60. LINCOLN Medical Preventive Medicine Technician utilized the Colilert-18 system for bacteriological examination of PW in accordance with Chapter 6 of NAVMED P-5010-6. The Colilert-18 BACT test detects Total Coliforms and E-Coli or Fecal Coliforms in water. The results are available after 18 hours. [Encl (15) and Ref (b)]

61. Review of LINCOLN's Monthly Preventive Medicine Reports, show five PW Tanks tested positive for BACT in January through March of 2022. The SMO routes this report through the Food Service Officer (FSO), SUPPO, CHENG, RO, and XO to the CO for review. After each of the positive indications, LINCOLN treated, recirculated, and tested the PW tank of concern. At no point after these indications did LINCOLN put unsafe water into general use. [Encl (6)]

62. LINCOLN does not have a Ship's Instruction for a Water Sanitation Bill, which, though not required by instruction, is a best practice. [Encls (15), (16)]

63. A review of all active CVN's Water Testing Reports found that no other PW Tanks have tested positive for BACT in the past 2 years. [Encls (7), (19)]

64. Ship's Force did not conduct a formal fact finding and critique for the contamination of the PW system. [Encl (2)]

Opinions

1. The primary root cause of LINCOLN's PW system contamination was material. Specifically, bilge water in [redacted] MMR was introduced into PW Tank (b) (3) (A) through a hole in its vent header located a few inches above the bilge deck. When bilge levels were high there was a free flow of bilge water into the tank. The regularly occurring seawater, contaminated with oils and greases that collect in the bilge after normal ship operation resulted in the positive bacteriological results and visual indications observed when PW Tank (b) (3) (A) was opened and inspected by PSNS. Once PW Tank (b) (3) (A) was put online, contamination was then able to spread to other parts of the PW System. [FF (1)-(50)]

2. The MP4 Propulsion Plant Piping and Bilge Inspection Program should have been tracking this piping, but wasn't. This vent header was identified as (b) (3) (A) by PSNS. (b) (3) (A) [redacted] Located in the bilge, the (b) (3) (A) vent header was susceptible to corrosion, leading to premature failure in an operational environment with higher

than normal bilge levels. If covered under the (b) (3) (A) program, this vent header would be inspected as "high interest" piping. The (b) (3) (A) program's inspection scope and periodicity would be more detailed and more frequent. The most recent inspection was in March. If this header had been classified as high interest piping, the next inspection would have occurred in September and a proper inspection likely would have discovered the hole in the vent header and limited the contamination of PW Tank (b) (3) (A). [FF (37)-(45)]

3. The Bilge Inspector for (MMR performed a satisfactory inspection of the Bilge Zone that contains the vent header. PW Tank (b) (3) (A) was reported to be in acceptable condition. Current condition of the tank indicates that the leak into the tank is likely a recent event. Though a nascent through-pipe leak may have existed in early 2022, it is unlikely that it was large enough to be discovered in the standard ship's force inspection. [FF (37)-(45)]

4. The Colilert-18 system used for medical surveillance testing afloat of the PW Tanks is not viable. The Colilert-18 system is not timely enough to support emergent decision-making. This system requires 18 hours to incubate the sample before it can be evaluated. When testing online PW Tanks at sea, multiple tanks may be expended before the results alert a positive sample. [FF (21), (23), (27), (59)]

5. Basic watch standing principles would have prevented or minimized the spread of the contaminated water in this case. Specifically, there were four missed opportunities for watch standers to identify and address the PW contamination before it spread throughout the ship.

a. Indications of bacterial contamination were available to LINCOLN as early as January of 2022 and in total, 5 PW Tanks tested positive for BACT in early 2022. LINCOLN allowed this deviation to normalize without clearly bounding the problem or taking corrective action. As no other CVN has had a PW Tank test positive for BACT in the past 2 years, this should have been a warning sign. Though LINCOLN was able to address each PW Tank that tested positive before putting that PW Tank back into service, thorough investigation of these results could have provided an opportunity for early root cause identification. [FF (59)-(63)]

b. There is no evidence the PW Tanks were recirculated and sampled 48 hours prior to getting underway in accordance with the startup checklist to verify the quality of the PW. The unexpected 2000 gallon change in PW Tank (b) (3) (A) level on 17 September 2022 was not adjudicated divisionally nor amongst the several duty section watch teams. If it had been, the PW contamination likely would have been discovered before getting underway. [FF (4)-(7), (52)-(58)]

c. There is no evidence PW Tank (b) (3) (A), the first PW Tank placed in service on 21 September 2022, was recirculated and sampled prior to placing online. An unsatisfactory sample would have prevented placing that tank online. [FF (8), (52)-(58)]

d. There were immediate indications of PW contamination when watch teams placed the contaminated PW Tank in service as the taste and texture of the water changed. A questioning

attitude would have allowed for immediate response and minimized the spread of contaminated PW throughout the ship. [FF (8)-(16)]

6. A4W PW system design aggravated the spread of the contaminated water. The recirculation line for each PW Tank combines into a single line which discharges into one of the tank manifolds. Normal operation with recirculating and shifting PW Tanks will shift that contaminated water in the header through the header and PW Tanks recirculated. When contamination of a PW Tank is suspected, there is no way to clear the header without risking contamination of another PW Tank. [FF (46)-(49)]

7. The MEDG units (In-Line Chlorinators) were not available for use during most of the deployment. If available, it would have improved the ability to treat the system when the ship was providing PW from (b) Plant only. The MEDG is the primary method to treat PW on LINCOLN. The secondary method to treat PW is to perform a manual batch add of (b) (3) (A) through the sounding tubes by removing the Tank Level Indicators (TLIs), which exposes the PW Tank being treated. There is higher risk of contamination to the PW Tank using this procedure and system design with the single header does not provide adequate mixing of the chemicals. Additionally, adding (b) (3) (A) through the sounding tube will erode the inner wall of the sounding tube if not properly flushed following the chemical addition, leading to premature failure of the tube and contamination into the PW Tank from the bilge. LINCOLN does not have the ship modification that installed a chemical addition vessel for batch adding (b) (3) (A) to the PW Tanks. When MEDGs are not available, this modification allows for proper mixing of chemicals while filling the PW Tanks. LINCOLN had learned to live without working MEDGs but if they had been present and online, they would have significantly mitigated this issue. [FF (50), (51)]

8. Though not required, a Water Sanitization Bill is a best practice that allows clear delineation of responsibilities to ensure adequate coordination of actions across multiple departments. If LINCOLN had a Water Sanitation Bill in place, early indications of an issue would be more easily identified and addressed. [FF (61)]

9. Once the contamination issue was identified, LINCOLN properly assessed risk to ship force and put the PW system in a safe and known condition while conducting operations at sea. Given the information they knew at the time, they executed corrective actions in a scenario not covered by the relevant engineering and medical manuals. Despite missed opportunities in preventing or mitigating the contamination, the response demonstrated proper risk assessment and aggressive response. [FF (14)-(36)]

Recommendations

1. LINCOLN conduct a formal critique, separate from this investigation, to fully bound the scope of inactions that if taken may have prevented the event. Use the information obtained from the critique in developing the department and division's changes to day-to-day operations.

2. LINCOLN Reactor Department Leadership at all levels should canvas their Sailors for any procedures that they believe cannot be performed as written or required (i.e. not being able to recirculate and sample due to ship's PW demand) to ensure leadership is fully aware of any further TROSOs or Steam Plant Liaison Inquiry's (SPLI) that may be required to ensure the reactor and propulsion plants are operated in accordance with instructions.

3. LINCOLN should ensure events that occurred regarding contaminated PW being distributed throughout the ship for approximately 24 hours are properly documented, so that engineering logs are a true record of all events for the history of the ship. Correct log entries should include all events that occurred pertaining to PW contamination and actions taken in accordance with the Engineering Department Manual.

4. LINCOLN Reactor Department and Divisions should conduct extensive and detailed watch standing principle and operational expectations training. This should be conducted in small group seminar settings to address deficiencies noted by this investigation and supporting CNAP N9 visit, starting with all Principal Assistants and Division Leading Chief Petty Officers, then Propulsion Plant Watch Officers and Propulsion Plant Watch Supervisors before conducting training with the rest of the department to ensure leadership is trained to enforce standards. Recommended focus areas:

a. Log Taking. To include expectations for what is required to be logged and applicable references. Include input from divisions for specific watch stations, as well as departmental leadership for plant events, performance of trend analysis, questioning attitude regarding out of specification entries, supervisory log reviews, and divisional chain of command log reviews.

b. Watch turnover. Develop a formal requirement of specific pre-watch brief topics to assure all appropriate plant conditions, maintenance, and abnormal conditions are understood by all watch stations for both Condition I and Condition II watches.

5. LINCOLN should assess statements of watch standers regarding the inability to keep up with ship PW demand and perform recirculation's and samples in accordance with the Steam Plant Manual. If found to be valid, write a TROSO to direct actions expected of watch standers in operation of PW. Determine the reason PW demands are above design limits that prevented execution of required procedures. Submit a Steam Plant Liaison Inquiries (SPLI) regarding the inability to operate in accordance with the Steam Plant Manual for CNAP review and technical evaluation.

6. LINCOLN should submit CASREPs for the MEDGs that are not operational. Additionally, verify any other steam plant and reactor plant components that may be degraded and have removed redundancy from plant design.

7. LINCOLN Reactor Department should evaluate the Machinery Division Startup checklist. Consider revising to have each PW Tank listed, identifying current FAC levels, and annotated by a separate initial per tank.

8. LINCOLN Reactor Department should develop a formal standard to use in tracking the status for treatment and testing of PW Tanks.

9. LINCOLN Reactor Department should evaluate the proper level of responsibility for adding chemicals to and sampling PW. If adequate to stay at the LLW level, recommend the following:

a. Create a LLW addendum to include a system checkout pertaining to batch addition of chemicals and recirculating and sampling of PW Tanks as well as a practical factor that includes the demonstration of proper batch treatment utilizing (b) (3) (A) in accordance with Steam Plant Manual tables to PW Tanks.

b. Conduct training with Reactor Propulsion Division Sailors and Propulsion Plant Watch Officers and Propulsion Plant Watch Supervisors on PW chlorination to include: 1) How it is performed with both the MEDG and through batch adding; 2) How it is recirculated and sampled in accordance with the Steam Plant Manual; 3) Expected log entries; 4) Formal processes put in place regarding PW; and 5) Medical's role in ensuring properly chlorinated PW is provided to the ship's crew.

c. Recommend review the Reactor Department Organizational Manual to ensure responsibility is clearly delineated to the appropriate watch station.

10. LINCOLN should consider developing Water Sanitation Bill to clearly delineate responsibilities in accordance with chapter 6 of reference (b).

10. CNAP should coordinate with PPEA to ensure all sections of piping listed as (b) (3) (A) [redacted] are identified and tracked for all CVNs. The PPEA should provide updated drawings to all CVNs and incorporate in Reactor Mechanical's and Reactor Propulsion's division (b) (3) (A) program inspections.

11. Bureau of Medication and Surgery (BUMED) should develop specific ship's medical department PW testing requirements to ensure PW Tanks are tested, prior to removal of shore PW, with adequate time for sample results to be provided for review.

12. Naval Sea Systems Command (NAVSEA) should conduct an all-class review of PW systems. Specifically address the ability of CVN propulsion plants to support :

a. Conducting chemical treatment by both automatic and manual methods.

b. Conducting PW Tank recirculation and mixing.

c. Drawing and performing representative testing for samples of individual PW Tanks when chemically treating and prior to use.

d. Drawing and conducting bacterial samples directly from individual PW Tanks prior to use.

13. NAVSEA should, due to inadequacies identified in the piping configuration for the NIMITZ Class configuration, provide a revised procedure, to:

a. Manually conduct chemical treatment of PW Tanks, ensuring effective mixing in PW Tanks.

b. Recirculate, mix, and provide a representative sample of individual PW Tanks for chemical and bacterial analysis, without risk of spreading contamination to the PW distribution system.

14. NAVSEA should identify and provide adequate testing equipment to verify FAC to levels required by all references for PW Tank recovery. Current analytical test equipment available to ship's force is inadequate in this regard. On board equipment is presently limited to an upper level of 2 parts per million (PPM) (b) (3) (A)

15. NAVSEA should provide procedures for ship's force to isolate and recover contaminated PW Tanks while underway, without risk to contamination of any section of the PW distribution system. In this respect, contamination is anything other than PW that does not meet drinking water criteria.

16. NAVSEA should coordinate with BUMED to determine if procedures are adequate for restoration of PW Tanks following extended non-use periods, such as extended periods in port, and provide any additional procedural requirements, chemical treatment, or testing, for PW Tanks prior to restoration.

17. NAVSEA should develop shipboard sampling test kits for sampling and testing for hydrocarbon contamination in PW while underway.

18. Based on the facts presented in this investigation and my conclusions, I do not recommend any additional administrative or disciplinary action.

(b) (6)