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DEPARTMENT OF THE NAVY
COMMANDER NAVAL AIR FORCE
UNITED STATES PACIFIC FLEET
BOX 357051
SAN DIEGO CALIFORNIA 92135-7051

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4 Nov 22

FINAL ENDORSEMENT on CAPT (b) (6) USN Itr 5830 of 26 Oct 22

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

Subj: COMMAND INVESTIGATION INTO THE INCIDENT INVOLVING JET
PROPELLANT-5 WITHIN THE POTABLE WATER SYSTEM ABOARD USS
NIMITZ (CVN 68) ON OR ABOUT 16 SEPTEMBER 2022

1. This command investigation was convened to inquire into the circumstances surrounding the incident involving the presence of Jet Propellant-5 (JP-5) in the potable water system aboard USS NIMITZ (CVN 68) on or about 16 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.

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 and standard operating procedures; 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 contamination of 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)
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.

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K. R. WHITESELL

Copy to:
NAVFAC
COMNAVAIRLANT
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NAVSEA PEO AIRCRAFT CARRIERS
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NAVMCPUBHLTHCEN

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26 Oct 22

From: CAPT (b) (6), USN
To: Commander, Naval Air Force, U.S. Pacific Fleet

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Ref: (a) JAGINST 5800.7G, Chapter II
(b) NAVMED P-5010-6
(c) S9086-SE-STM-010/CH-533
(d) NAVSEA 0989-LP-036-0000

Encl: (1) Appointing Order, 3 October 22
(2) Summary of Witness Interview, CAPT (b) (6), USN
(3) Water Control Watch Out of Service Tank Tracking Sheet
(4) Summary of Witness Interview, MMNC (b) (6), USN
(5) Summary of Witness Interview, LCDR (b) (6), USN
(6) Sequencing Document
(7) Summary of Witness Interview, MMN2 (b) (6), USN
(8) Summary of Witness Interview, LT (b) (6), USN
(9) Summary of Witness Interview, MMN1 (b) (6), USN
(10) Summary of Witness Interview, LTJG (b) (6), USN
(11) Summary of Witness Interview, LCDR (b) (6), USN
(12) Summary of Witness Interview, LCDR (b) (6), USN
(13) Summary of Witness Interview, LT (b) (6), USN
(14) Excerpt from (b) MMR Lower Level Starboard Logs (**Confidential Enclosure**)
(15) Summary of Witness Interview, MMN2 (b) (6), USN
(16) Summary of Witness Interview, MMNFN (b) (6), USN
(17) Summary of Witness Interview, MMN2 (b) (6), USN
(18) Summary of Witness Interview, MMN2 (b) (6), USN
(19) Summary of Witness Interview, MM1 (b) (6), USN
(20) Potable Water System Drawing
(21) Summary of Witness Interview, MM1 (b) (6), USN
(22) Summary of Witness Interview, MM1 (b) (6), USN
(23) Excerpt from (b) MMR Lower Level Starboard Logs (**Confidential Enclosure**)
(24) Excerpt from EOW Logs
(25) Summary of Witness Interview, CAPT (b) (6), USN
(26) Summary of Witness Interview, CAPT (b) (6), USN
(27) Summary of Witness Interview, CDR (b) (6), USN
(28) Excerpt from Ship's Deck Log
(29) Excerpt from Water Control Watch Log (**Confidential Enclosure**)
(30) Reactor Department Tank Remediation Plan
(31) Summary of Witness Interview, CDR (b) (6), USN

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- (32) Orange Coast Analytical, Inc. California ELAP Accredited Fields of Testing
- (33) Potable Water Sample Analysis Results
- (34) NAVSEA 05V Timeline of Events
- (35) SPAR CVN 68-0022-22
- (36) Summary of Witness Interview, CDR (b) (6), USN
- (37) Odor Test Results
- (38) SPAR CVN 68-0022-22 Rev A
- (39) SPAR CVN 68-0022-22 Rev B
- (40) SPAR CVN 68-0022-22 Rev C
- (41) WAF CVN 68-2P22-001322(0)
- (42) Summary of Witness Interview, MM2 (b) (6), USN
- (43) Space Tour Observation
- (44) Notes from Telephone Meeting 1 October 22
- (45) Main Drainage System Drawing

Preliminary Statement

1. Pursuant to enclosure (1) and in accordance with reference (a), a command investigation was conducted to inquire into the circumstances surrounding the incident involving the presence of Jet Propellant-5 (JP-5) in the potable water system aboard USS NIMITZ (CVN 68), hereafter "NIMITZ", on or about 16 September 2022 while the ship was underway in the Southern California Operating Area.

2. This reports completion of the command investigation conducted in accordance with reference (a) and enclosure (1) into the incident involving JP-5 in the ship's potable water system and documents resulting recovery actions. All reasonably available evidence was collected. The Convening Authority's directives were met. LCDR (b) (6), JAGC, USN assisted the Investigating Officer (IO) with legal advice. An extension of time to complete the report was requested and granted on 18 October 2022 by the Commander Naval Air Forces Chief of Staff.

3. The Investigating Officer (IO) interviewed 24 individuals and was provided access to all relevant documentation, policies, technical drawings, and ship spaces. Those individuals called on by the IO were professional and cooperative. The timing of events varies slightly from witness to witness. When exact times are not known approximations based on witness interviews are used.

4. Enclosures (14), (23), and (29) are marked with a classification level of confidential. Upon removal of these enclosures, the report should be handled as controlled unclassified information/NOFORN. This document should not be discussed, disclosed or shared with individuals unless they have a direct need to know in the performance of their official duties. In addition to security requirements which must be met, this document is subject to special export controls and each transmittal to foreign governments or foreign nationals may be made only with prior approval of the Naval Sea Systems Command and Commander, Naval Air Forces.

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Findings of Fact

1. In February 2022, the Reactor Officer discovered eight of the ship's twenty-six potable water tanks were out of service and not used to supply the ship with potable water. His investigation revealed the eight tanks had been out of service since at least September 2020. The tanks had caution tags hanging on the suction and fill valves to prevent watch standers from aligning the tanks to supply potable water to the ship. (b) (3) (A) [REDACTED]. The only record of deficiency with the tanks was an informal tracking sheet maintained at the Water Control Watch desk. The tracking sheet listed tank (b) (3) (A) [REDACTED] was out of service for an inoperative tank level indicator (TLI), tank (b) (3) (A) [REDACTED] was out of service due to potential bilge contamination, and tanks (b) (3) (A) [REDACTED] and (b) (3) (A) [REDACTED] were out of service due to seawater contamination. The Reactor Officer directed Reactor Propulsion Division to make plans to clean, inspect, and restore the tanks to service prior to the ship's upcoming deployment. (Encl 2, 3)
2. In March 2022, the ship requested assistance from Puget Sound Naval Shipyard and Intermediate Maintenance Facility (PSNS) to empty several potable water tanks in preparation for inspecting, cleaning, and restoring the tanks to service. PSNS emptied tank (b) (3) (A) [REDACTED] for the ship. The tank was subsequently cleaned, inspected, sanitized and restored to service by Reactor Department. PSNS was unable to empty additional tanks during the ship's in port period due to limited time and resources available. (Encl 2)
3. Concerned there would be insufficient time to restore the remaining seven tanks to service, the Reactor Officer directed Reactor Propulsion Division to develop plans to empty and restore the remaining tanks without the assistance of the shipyard. Reactor Propulsion Division developed a sequencing document with procedures to empty the desired tanks by pumping the contents overboard via a hose connected to the potable water system utilizing the ship's installed potable water piping and pumps. The sequencing document included steps to isolate the affected propulsion plant potable water pumps and piping from the ship's potable water distribution system. After isolating the system, the sequencing document directed the system aligned to pump liquid from the desired tank to the hose connection. After the desired tank was empty, a second tank was aligned to flush the system pumps and piping with 1,000 gallons of potable water known to be clean. The purpose of flushing 1,000 additional gallons was to restore system cleanliness before realigning the potable water system for normal operation. The sequencing document was reviewed and approved by the Reactor Officer. The sequencing document was titled, "Sequencing Document to Strip PW Tanks of Unknown Purity using PW Pumps." (Encls 2-6)
4. By 15 September 2022, Reactor Propulsion Division used the sequencing document to empty four additional potable water tanks, (b) (3) (A) [REDACTED]. These tanks were subsequently cleaned, inspected and restored to service with the exception (b) (3) (A) [REDACTED] (b) (3) [REDACTED]. During inspection, the ship identified the internal coating in tank (b) (3) (A) [REDACTED] was degraded and the tank remained isolated pending further evaluation. (Encls 2-5)

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5. On 16 September 2022, the (b) (3) (A) Reactor Propulsion Leading Chief Petty Officer directed the (b) (3) (A) Chief Machinery Operator (CMO) to empty potable water tank (b) (3) (A) using the ship's sequencing document. (Encl 4)
6. The Engineering Officer of the Watch (EOOW), Propulsion Plant Watch Officer (PPWO), and Propulsion Plant Watch Supervisor (PPWS) were not briefed prior to the CMO and Lower Level Watch emptying tank (b) (3) (A). The EOOW, PPWO, and PPWS did not participate in, direct, or track the evolution. (Encls 4, 7-13)
7. On 16 September 2022, between 1140 and 1550, liquid in potable water tank (b) (3) (A) was pumped through the (b) (3) (A) potable water system to the dirty drain system via a hose connected downstream of (b) (3) (A) using (b) Potable Water Pump. The (b) potable water pump was operated until it tripped off-line on loss of suction indicating the tank was empty. (Encls 6, 14, 15, 16)
8. The tank level indicator (TLI) for potable water tank (b) (3) (A) was inoperative. (Encl 4, 14, 17, 18)
9. On 16 September 2022, between 1140 and 1200, the liquid pumped from potable water tank (b) (b) (3) (A) appeared to be water and exhibited no noticeable odor. (Encl 17)
10. On 16 September 2022, between 1200 and 1550, the liquid pumped from potable water tank (b) (3) (A) began to exhibit JP-5 odor. (Encls 17, 18)
11. In accordance with the ship's sequencing document, the (b) (3) (A) potable water piping and potable water pumps were isolated from the rest of the ship, while liquid was pumped from potable water tank (b) (3) (A). (Encls 6, 15, 17)
12. On 16 September 2022, between 1550 and 1643, (b) Potable Water Pump was operated to pump 1,100 gallons of clean potable water from tank (b) (3) (A) to flush the potable water piping used earlier in the day to empty potable water tank (b) (3) (A). (Encls 7, 14, 17-19)
13. On 16 September 2022, between 1550 and 1643, the liquid flushed from the (b) (3) (A) (b) (3) (A) potable water system exhibited strong JP-5 odor. (Encls 7, 14, 19)
14. The suction valve for tank (b) (3) (A) is on the potable water manifold located near the aft bulkhead of (b) Main Machinery Room. (Encl 20)
15. The suction valve for tank (b) (3) (A) is on the potable water manifold located near the forward bulkhead of (b) Main Machinery Room. (Encl 20)
16. To reach (b) Potable Water Pump, water pumped from tank (b) (3) (A) travels through some, but not all of the same piping as water pumped from tank (b) (3) (A), leaving a length of piping running the length of the main machinery room unflushed. (Encl 20)

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17. Between 1630 and 2000 on 16 September 2022, the (b) (3) (A) PPWO received reports of JP-5 odor coming from water dispensed from a water fountain and a deep sink in (b) (3) (A) Auxiliaries Room. The PPWO reported the odors to the Engineering Officer of the Watch (EOOW). The EOOW directed flushing the areas where odor was experienced. The EOOW made no further reports to his chain of command regarding the water. (Encls 8-10)

18. The water fountains and deep sink in (b) (3) (A) Auxiliaries Room are supplied by the portion of the potable water system used to pump liquid from potable water tank (b) (3) (A) to dirty drains. (Encl 20)

19. At approximately 1700 on 16 September 2022, (b) (3) (A) CMO reported to the Water Control Watch that the potable water in (b) (3) (A) Main Machinery Room exhibited JP-5 odor. The Water Control Watch directed the (b) (3) (A) CMO to continue flushing the potable water system. The Water Control Watch did not make further reports to his chain of command regarding the water. (Encls 7, 21)

20. In the afternoon of 16 September 2022, the Main Propulsion Assistant (MPA) received a cup of water from (b) (3) (A). The water was cloudy and exhibited JP-5 odor. At the time, MPA was not concerned by the water because he knew his division was emptying a tank that had not been used in years, the (b) (3) (A) potable water system was isolated from the rest of the ship, and the potable water piping would be flushed before being used to supply the ship. MPA took no further action and made no additional reports regarding the odor. (Encl 5)

21. After 1,100 gallons of water was flushed through the potable water system from tank (b) (3) (A) (b) (3) (A), the (b) (3) (A) potable water system was aligned for normal operation with (b) (3) (A) 6 open. With (b) (3) (A) open, (b) (3) (A) was aligned for normal operation and could receive water from or transfer water to the rest of the ship's potable water system. (Encls 7, 19)

22. On 16 September 2022, between 1643 and 2000, water was flushed through the sampling connection downstream (b) (3) (A) and the water fountains in (b) (3) (A) Main Machinery Room. (Encl 7)

23. On 16 September 2022, at approximately 2000, the time of watch turnover, the water at (b) (3) (A) appeared clean. However, water dispensed from water fountains in (b) (3) (A) Main Machinery Room had still not cleared. (Encl 7)

24. On 16 September 2022, between approximately 2015 and 2030, the Water Control Watch directed (b) (3) (A) Potable Water Pumps started to supply the ship with water. (Encls 16, 21, 22)

25. On 16 September 2022, at 2035, (b) (3) (A) Potable Water Pumps were started and aligned to supply the ship with potable water from (b) (3) (A). At 2037, (b) (3) (A) Potable Water Pumps were stopped. (Encls 14-16, 23)

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26. On 16 September 2022, between 2000 and 2100, the volume of water in potable water tank (b) (3) (A) decreased 1,600 gallons, and the volume of water in potable water tank (b) (3) (A) decreased 800 gallons indicating water from these two tanks was supplied to the ship using (b) (3) Potable Water Pumps. Tanks (b) (3) (A) and (b) (3) (A) had been sampled earlier in the day with normal results. (Encls 14, 15)

27. On 16 September 2022, at approximately 2050, the EOOW and Water Control Watch received reports from the wardroom, staterooms, and berthing of JP-5 in the water. (Encls 11, 22, 24)

28. After receiving reports of JP-5 in the water, the EOOW called the Reactor Office and spoke to the MPA and Reactor Officer about the reports. (Encl 11)

29. After receiving reports of JP-5 in the water, the Water Control Watch directed potable water pump suction shifted to a different potable water tank. (Encls 15, 16, 22)

30. On 16 September 2022, at approximately 2100, the Safety Officer brought a cup of water from the wardroom to the Reactor Office. The water exhibited strong JP-5 odor. The Safety Officer presented it to the MPA and Reactor Officer who were in the Reactor Office at the time. (Encls 2, 5)

31. After receiving reports of JP-5 in the water, the Reactor Officer directed potable water pumps shifted from (b) (3) (A) Potable Water Pumps to (b) (3) (A) Potable Water Pumps. The Reactor Officer reported the problem with the water to the ship's Commanding Officer (CO). (Encl 2)

32. On 16 September 2022, at approximately 2130, the Senior Medical Officer (SMO) received a report from a preventive medical technician of JP-5 in the ship's potable water. The SMO reported the problem to the ship's Executive Officer (XO). The XO reported the problem to the CO. (Encls 25, 26)

33. On 16 September 2022, between approximately 2130 and 2200, potable water was secured to the ship's distribution system and the water in the ship's distribution system was drained overboard via hose connections located on the ship's forward and aft starboard side sponsons. (Encls 2, 4, 5, 11, 24)

34. On 16 September 2022, between approximately 2130 and 2134, watch standers in (b) Main Machinery Room began flushing potable water from tank (b) (3) (A) to dirty drains using (b) (3) Potable Water Pumps as well as recirculating and sampling potable water tanks. The water samples exhibited odor and taste of JP-5. (Encl 4, 14)

35. On 16 September 2022, at 2209, (b) (3) (A) Potable Water Pumps were secured. (Encl 14)

36. On 16 September 2022, at 2205, (b) Potable Water Pump was started. (Encl 23)

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37. On 16 September 2022, at 2219, potable water was restored to the ship and supplied from (b) (3) (A) (Encls 2, 5, 11, 24)
38. After potable water pressure was restored to the ship, potable water continued to be supplied from (b) (3) (A) Potable Water Pumps and flushed through hose connections on the starboard sponsons as well as galley equipment, faucets, showers, and taps in the ship. (Encls 2, 4, 5)
39. On 16 September 2022, at approximately 2230, the CO made a 1MC announcement to inform the crew of the problem with the water and bottled water was available on the mess decks. The CO directed the crew not to use the ship's water. (Encls 5, 25, 26)
40. The Supply Officer directed bottled water be provided with midnight rations and the morning meal on Sunday morning. The Supply Officer opened the ship's store to make cases of bottled water and Gatorade available for sale to the crew for any who desired to purchase it. The Supply Officer shifted the menu to foods that do not require water to prepare, i.e. a "waterless" menu. (Encls 25, 27)
41. On 17 September 2022, at 0124, (b) (3) (A) Potable Water Pumps were started and aligned to supply the ship with potable water. The source of the ship's potable water was shifted from (b) (3) (A) to (b) (3) (A). (Encls 14, 23)
42. Through the rest of night and early morning until the ship arrived at the pier at Naval Air Station North Island (NASNI) on 17 September 2022, the crew continued to flush water through the potable water system to restore water quality. (Encls 2, 5)
43. On 17 September 2022, at approximately 0615, the XO contacted CSG-11 and Commander Naval Air Force Chief of Staff (CNAF COS) and reported the problem with the ship's potable water. (Encl 25)
44. On 17 September 2022, in the morning, the SMO trained medical department on symptoms and effects of hydrocarbon ingestion so all medical personnel were ready to address concerns crew members might express and treat those with symptoms. People who visited medical complained of minor symptoms common to many ailments upset stomach, nausea, headache, or rash (Encl 26)
45. On 17 September 2022, at 0752, the ship moored at NASNI. (Encl 28)
46. On 17 September 2022, at 0958, the city potable water supply was connected to the ship and aligned to supply the ship with potable water. (Encl 29)
47. On 17 September 2022, at 1048, (b) (3) (A) Potable Water Pumps were secured. (Encl 14).
48. After the ship's potable water was supplied from the pier, the XO made 1MC announcements and informed the crew the ship's potable water was connected to the city water supply. The XO provided guidance that if the ship's water exhibited JP-5 odor, to allow it to run to flush the line.

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The XO also informed the crew that water was available on the pier from temporary tanks fed from the city water supply. (Encl 25)

49. On 17 September 2022, the MPA under the supervision of the Reactor Officer, developed plans for emptying and refilling potable water tanks to flush and restore the quality of water contained in the ship's potable water tanks. The plan was executed from 17 September 2022 until completed on 1 October 2022. (Encls 2, 5, 30)

50. The CHT system tanks collect water from the ship's toilets, shower drains, sink drains, galley equipment drains, and other sewage and potable water system drains. While in port, the ship normally offloads liquid from CHT tanks via hoses to a collection facility or the base sewer. (Encl 31)

51. After arriving at NASNI, the ship was furnished with a single CHT hose to offload liquid waste from the ship's CHT tanks. While flushing the potable water system, the CHT tanks filled faster than they could be offloaded to the pier. To increase the offload rate, the ship requested a second CHT hose connected to the ship. (Encls 25, 31)

52. On 18 September 2022, while connecting the second hose, a base public works employee asked a Sailor why a second hose was required. The Sailor inaccurately stated the ship was offloading JP-5. The employee understood this to mean the ship was pumping JP-5 into the base sewer and directed the ship to stop all CHT pumping to the pier. The ship stopped pumping CHT and held the CHT in its tanks. (Encls 25, 31)

53. The level in the ship's CHT tanks increased as personnel utilized showers, sinks, laundry, toilets, and other services in the ship. To reduce the water introduced to the CHT tanks, the ship secured laundry and service steam. Later in the day, the ship secured potable water to the ship to avoid overflowing the CHT tanks. The XO and Command Master Chief coordinated with USS CARL VINSON (CVN 70), hereafter "VINSON", leadership to allow NIMITZ Sailors to utilize the VINSON berthing barge for showers. Multiple temporary potable water tanks were also available on the pier for the crew's use. The XO made 1MC announcements to keep the crew apprised of the situation and available resources. (Encl 25)

54. In the evening on 18 September 2022, the Ship CO, XO, NASNI Base CO, and CNAF COS coordinated to resolve the problem with offloading the ship's CHT. Based on better understanding of the situation, the NASNI Base CO authorized the ship to recommence pumping CHT to the pier. (Encl 25)

55. Approximately two hours after CHT pumping commenced, the ship restored normal potable water, shore steam, and laundry services. (Encl 25)

56. On the morning of 19 September 2022 the ship CO, XO, Chief Engineer (CHENG), and Naval Facilities Engineering Systems Command (NAVFAC) representatives met to discuss the ship's CHT system and JP-5 in the ship's potable water. NAVFAC informed the ship the limit for hydrocarbons in the base sewer was 500 ppm and NAVFAC utilizes an independent

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laboratory to analyze sewage samples for hydrocarbon. The laboratory was identified as Orange Coast Analytical, Inc. (Encls 25, 31)

57. On 19 September 2022, the ship isolated samples from the CHT system and transported them to Orange Coast Analytical for analysis. Analysis results revealed hydrocarbon concentration in the ship's CHT was <0.1 ppm (i.e. less than detectable by lab analysis). (Encls 25, 31)

58. Orange Coast Analytical, Inc is a commercial laboratory located in Tustin, CA. Orange Coast Analytical is accredited by the California Water Board under the state's environmental laboratory accreditation program to conduct the analysis, EPA Method 8015. (Encl 32)

59. Ship's Force does not have capability or procedures to analyze water or CHT to determine the presence or concentration of JP-5 or hydrocarbons. (Encl 31)

60. On 20 September 2022, the ship CO directed water samples from the ship's potable water system isolated and transported to Orange Coast Analytical for analysis. The ship sent initial samples from twelve potable water tanks for analysis. Analysis revealed hydrocarbon concentration ranging from non-detectable in potable water tank (b) (3) (A) to as high as 4.9 ppm in potable water tank (b) (3) (A). (Encl 25, 33)

61. The ship's crew continued to sequence through flushing potable water distribution system piping, draining and refilling potable water tanks, and sending water samples to Orange Coast Analytical for analysis. (Encls 2, 5, 25, 30)

62. On 21 September 2022, the ship engaged CNAF, Naval Sea Systems Command Naval Systems Engineering & Logistics (NAVSEA 05), and Naval Surface Warfare Center Philadelphia (NSWC PD) to verify assumptions regarding the cause of JP-5 contamination of the ship's potable water. NAVSEA identified possible system interfaces as potable water connections to JP-5 purifiers, tank walls, distilling unit ingestion of JP-5 at sea, tank coating system failures, and tank manway cover leaks. All with the exception of tank manway cover leaks were ruled out as causes by visual inspection of system components and record reviews. (Encl 34)

63. On 28 September 2022, the ship released Steam Plant Action Request (SPAR) CVN 68-0022-22 detailing the potable water system problem and actions taken. The ship requested engineering evaluation of the potable water system, additional sampling locations, increasing chlorination levels above 2 ppm, and placing ship's potable water tanks on line to aid in flushing the potable water system. NAVSEA responded on 29 September 2022 concurring with the ship's flushing plan, provided additional sampling locations, guidance to utilize a limit of 0.266 ppm hydrocarbon as determined using EPA 8015 analysis, and non-concurrence on increasing chlorination above 2 ppm due to possible adverse effect on laboratory analysis of water samples for hydrocarbon concentration. (Encl 35)

64. On 28 September 2022, a meeting was held shipboard codifying plans to isolate potable water tanks (b) (3) (A), and (b) (3) (A) by physically gagging the fill and suction

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valves and installing plugs internal to the tank suction piping after opening and cleaning each tank. Additionally, potable water tank (b) (3) (A) was reported to have damaged coating and would remain off line and caution tagged until further evaluation by qualified inspectors following return to home port. (Encls 4)

65. On 29 September 2022, the Safety Officer established a four member sniffer team responsible for systematically determining areas of the ship that continued to exhibit odor from the potable water system. The sniffer team commenced daily analysis of 65 sample points throughout the ship for odor. The results were used to target additional flushing of the potable water system. (Encls 36, 37)

66. On 29 September 2022, the ship updated SPAR CVN 68-0022-22 to Revision A with the latest actions and sample results. The trends generally showed decreasing hydrocarbon levels at all tanks and sample points. (Encls 33, 38)

67. On 30 September 2022, the ship updated SPAR CVN 68-0022-22 to Revision B with the latest actions and sample results. Decreasing hydrocarbon trends continued at all tanks and sample points. (Encls 33, 39)

68. On 1 October 2022, the ship updated SPAR CVN 68-0022-22 to Revision C documenting 22 of 26 potable water tanks and 15 of 15 potable water distribution points were sampled and analyzed with satisfactory results for hydrocarbon concentration. The four potable water tanks that were not sampled, (b) (3) (A), and (b) (3) (A), were isolated from the potable water system, were not in service, and not available for use. All results showed hydrocarbon concentration <0.266 ppm. The ship requested NAVSEA concurrence for use of the potable water system. NAVSEA answered SPAR Revision C concurring with use of the potable water system. (Encls 33, 40)

69. On 19 September 2022, the ship authorized work to open, clean, and inspect potable water tank (b) (3) (A). After the manway access cover for tank (b) (3) (A) was removed, Ship's Force discovered the tank contained liquid with strong JP-5 odor. (Encls 41, 42)

70. The manway access cover for potable water tank (b) (3) (A) is located in the bilge of space (b) (3) (A) Air Conditioning and Refrigeration Space. (Encl 43)

71. The gasket for the manway access cover for potable water tank (b) (3) (A) was in poor condition. (Encl 44)

72. The bilge in space (b) (3) (A) does not normally contain JP-5, but the bilge was filled with JP-5 during the ship's deployment in 2020. The ship identified the likely source of JP-5 as back leakage through the main drainage system caused by check valve malfunction. (Encl 31)

73. The bilge in space (b) (3) (A), JP-5 Pump Room (b) (3) (A), contains JP-5 from operation and maintenance of JP-5 distribution and purification equipment that is located in the space. (Encl 43)

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74. When the ship is at sea, the bilge in space (b) (3) (A), JP-5 Pump Room (b), is normally emptied using the main drainage system. (Encls 43, 45)

75. The main drainage system includes branch piping that terminates in spaces (b) (3) (A) and (b) (3) (A) and a common piping header connects the branches. Check valves are included in the main drainage system to prevent liquid from being transferred between spaces; however, fluid from the bilge of (b) (3) (A) can be introduced to space (b) (3) (A) through main drainage system piping if the system is aligned incorrectly or malfunctions. (Encl 45)

Opinions

1. In March 2022, during an in port period, the ship requested assistance from PSNS to empty and clean several potable water tanks that were full of liquid but out of service for suspected seawater contamination. PSNS assisted the ship with emptying tank (b) (3) (A). However, PSNS was unable to accomplish additional tanks due to resource availability and duration of the in port period. For the tank that was emptied, PSNS emptied the tank using a temporary system to pump the liquid out of the tank through an open manway access cover and the ship cleaned, inspected, sanitized, and restored the tank to service. Based on upcoming operational demands that warranted recovering full potable water storage volume, the ship developed a sequencing document with procedures to empty tanks utilizing the ship's installed potable water pumps rather than waiting for shipyard assistance at future in port period or opening the tank manway covers and emptying the tanks utilizing a temporary pump and hoses. Ship's Force does have capability to isolate and empty potable water tanks using a temporary pump and hoses through an open tank top manway; however, the process is time consuming and can be difficult to execute at sea. (FFs 1-3)

2. When developing the sequencing document used to empty potable water tanks, the ship was unaware that any of the tanks contained JP-5. Informal records indicated tank (b) (3) (A) contained a mixture of potable water and seawater. This was a major factor in the ship's understanding and consideration of the risk associated with pumping liquid from tank (b) (3) (A) through the (b) (3) (A) potable water piping. The ship assessed the consequence of contaminating the potable water system with seawater as low, and they planned to restore cleanliness of the potable water system by flushing the piping and pump with clean potable water. The ship did not know or consider the possibility that the tank might contain contaminants other than seawater. (FF 1)

3. The sequencing document the ship developed to empty potable water tanks containing water of unknown purity did not comply with the intent of the governing manuals, reference (b), (c), and (d), for maintaining the potable water system clean and free of contaminants. Additionally, the sequencing document did not contain enough detail to ensure operators flushed all affected potable water piping, nor did it contained provisions for verifying the effectiveness of the flush or system cleanliness prior to using the system to supply potable water to the ship. (FFs 11-25)

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4. Ship's Force samples and analyzes potable water for Free Available Chlorine (FAC), bacteriological contamination, odor, and visual observation for color, clarity, and sediment in accordance with references (b), (c), and (d). References (b), (c), and (d) are largely focused on maintaining the potable water system free of bacteriological contamination. Reference (b) provides troubleshooting guidance for water with taste and odor problems. However, none of the manuals provide specific guidance on corrective actions following JP-5, petroleum product, or other chemical contamination of the potable water system. (FF 59)

5. In 2020 or earlier, when the ship's crew first discovered the water in a potable water tank was contaminated with seawater, the crew should have formally documented the deficiency in the equipment deficiency log (EDL) and current ship's maintenance project (CSMP) and promptly executed steps to troubleshoot and correct the source of contamination. Failure to formally document the deficiency and promptly correct the issue allowed the condition to worsen, and it left the problem to future crew members who had no insight into circumstances of the original problem. (FF 1)

6. On 16 September 2022, the ship should have held a pre-evolution brief prior to executing the sequencing procedure to empty potable water tank (b) (3) (A). Pre-evolution briefs are a final check for supervisors to evaluate readiness to execute a planned procedure. In this case a pre-evolution brief should have been attended by the EOOW, PPWO, PPWS, Water Control Watch, CMO, and Lower Level Watch, and it should have included a review of the procedure, expected indications and system response, operator readiness and understanding, stopping points, and communication paths. However, no pre-evolution brief was held. As a result, the EOOW, PPWO, and PPWS were not familiar with the procedure or system lineup, and they were largely unaware that the procedure was being executed. When unexpected conditions (i.e. water with JP-5 odor at water fountains, sinks and sample points) were encountered and reported, the EOOW, PPWO, and PPWS did not recognize the significance, could not provide backup to operators, and they were unable to determine or take appropriate corrective actions to prevent more significant consequences from occurring which ultimately led to spreading JP-5 to the ship's distribution system. (FFs 6, 17, 19, 20)

7. Potable water tank (b) (3) (A) was contaminated with JP-5 during the ship's last deployment between the months of June 2020 and March 2021 when JP-5 leaked into the potable water tank through a deteriorated manway cover gasket. The manway cover is located in the bilge in space (b) (3) (A). JP-5 was likely introduced into the bilge in space (b) (3) (A) during the ship's last deployment due to misalignment or malfunction of the ship's main drainage system. The main drainage system contains connections to tanks that contain JP-5 as well as a bilge suction for space (b) (3) (A), which contains JP-5 system valves, pumps, and purification equipment. The ship's crew was unaware of the presence of JP-5 in potable water tank (b) (3) (A) prior to 16 September 2022. (FFs 1, 69-72, 73-75)

8. JP-5 was spread to the potable water piping, pumps and components located in (b) (3) (A) (b) (3) on 16 September 2022 between 1200 and 1550 when the crew emptied potable water tank

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(b) (3) (A). The crew pumped the liquid from potable water tank (b) (3) (A) through the potable water piping in (b) (3) (A) using (b) Potable Water Pump. The liquid was pumped to a hose connected downstream of (b) (3) (A). At this time, JP-5 from tank (b) (3) (A) did not spread beyond (b) (3) (A) because the potable water piping in (b) (3) (A) (b) (3) (A) was isolated from the rest of the ship while the tank was being emptied. (FFs 4, 5, 7, 9-30)

9. JP-5 was spread to the ship's potable water distribution system outside (b) (3) (A) shortly after 2035 on 16 September 2022 after the crew started (b) (3) (A) Potable Water Pumps and aligned the pumps to supply the ship with potable water from (b) (3) (A). (FFs 4, 5, 7, 9-33)

10. JP-5 was spread to the ship's potable water tanks in (b) (3) (A) between 2130 and 2200 on 16 September 2022, when operators attempted to locate the source of JP-5 by recirculating and sampling the potable water tanks in (b) (3) (A). (FF 34)

11. In the evening on 16 September 2022, after JP-5 was spread to the ship's potable water distribution system, the ship's chain of command took appropriate action to keep the crew safe and initiated actions recover the ship's potable water system. Immediately upon notification, the ship's leadership took action to understand and address the problem. Within approximately 30 minutes of notification, potable water was secured to the ship and draining and flushing the system commenced. Within approximately 90 minutes, the Commanding Officer and Executive Officer began making 1MC announcements to keep the crew informed of the situation, and the supply department made bottled water available to the crew and arranged for water tanks on the pier the following morning. The following morning after the ship moored at NASNI, water tanks fed from the city water supply were on the pier and shower facilities off the ship were made available to the crew and remained until the ship departed on 2 October 2022. (FFs 31, 32, 39, 40, 43, 44, 48, 49, 54, 56, 60, 62, 65)

12. Several events occurred after the ship arrived at NASNI that slowed recovery. When the crew was directed to cease pumping CHT on 18 September 2022, they also had to secure flushing the potable water system which slowed recovery for approximately 12 hours. Neither the ship nor shore support facilities had preplanned procedures or response actions to recover a shipboard potable water system contaminated with JP-5. (FFs 52-59, 63)

Recommendations

1. Recommend NIMITZ evaluate ship's policies and practices for pre-evolution briefing, authorization and control of evolutions, and authorization and control of maintenance.
2. Recommend NIMITZ evaluate ship's policy for review and approval of temporary procedures and sequencing documents.
3. Recommend NIMITZ evaluate ship's policy, procedures, and practice for documenting material deficiencies.

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4. Recommend NIMITZ visually inspect all potable water tank manway covers, tank penetrations, and piping located in the bilge for condition and integrity.
5. Recommend NAVSEA and CNAF issue Fleet guidance with lessons learned from this event and direction to inspect potable water tank manway covers, tank penetrations, piping, and components located in the bilge for condition and integrity.
6. Recommend NAVSEA review technical specifications for potable water tank manway access cover gaskets and verify accuracy, consistency, and clarity in applicable drawings, technical manuals, and shipyard work procedures.
7. Recommend NAVSEA and CNAF review and evaluate adequacy of preventive maintenance requirements and documentation for potable water system tanks, covers, piping, vents, sounding tubes, valves, pumps, and other components that, when degraded, could lead to potable water system contamination.
8. Recommend NAVSEA, BUMED, and CNAF review, evaluate, and update policies, guidance, and procedures included in applicable technical manuals (references (b), (c), and (d)) for shipboard potable water quality, potable water system operation, and potable water system maintenance. This evaluation should consider the likelihood and consequence of JP-5, petroleum product, or other sources of contamination of shipboard potable water.
9. Recommend NAVSEA and BUMED review and evaluate adequacy of shipboard potable water specifications and limits.
10. Recommend NAVSEA, BUMED, NAVFAC and CNAF review and evaluate shipboard and shore facility capability for laboratory analysis of potable water, approved laboratory access in Fleet concentration areas, and corrective actions required for potable water that does not meet specifications.
11. Recommend NAVSEA, BUMED, and CNAF develop preplanned corrective actions and response for shipboard potable water system contamination.
12. Recommend NAVSEA review and evaluate adequacy of CVN 68 Class potable water system design for isolating contaminated potable water tanks, sampling tanks, mixing tanks, and preventing cross contamination of tanks and system components.
13. Recommend NAVSEA review and evaluate adequacy of CVN 68 Class potable water tank suction/fill manifold design for obtaining representative water samples from potable water tanks and adequately mixing tanks.

(b) (6)