



DEPARTMENT OF THE NAVY
COMMANDER BATTLE FORCE SEVENTH FLEET
COMMANDER CARRIER STRIKE FORCE SEVENTH FLEET
COMMANDER CARRIER GROUP FIVE
FPO SAN FRANCISCO 96601-4305

5800
Ser 004/ 0216
JUL 20 1990

SECOND ENDORSEMENT on RADM *B-6* ltr 5800 dtd 4 June 90

From: Commander Task Force Seven Zero
To: Judge Advocate General
Via: (1) Commanding Officer, USS MIDWAY (CV 41)
(2) Commander Task Force Seven Zero
(3) Commander SEVENTH Fleet
(4) Commander, Naval Air Force, U.S. Pacific Fleet
(5) Commander-in-Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20
JUNE 1990 FIRE ABOARD USS MIDWAY (CV 41)

1. Forwarded.

B-6

Copy to:
COMSEVENTHFLT



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND
WASHINGTON DC 20362 5101

9930 IN REPLY REFER TO
OPR: 56Y5
Ser: 56Y5/142
1 May 1991

From: Commander, Naval Sea Systems Command

Subj: DESIGN/MATERIAL LESSONS LEARNED FROM FLASH FIRE AND
EXPLOSIONS THAT OCCURRED IN USS MIDWAY (CV 41) ON
20 JUN 90

Encl: (1) NAVSEA Team Report, Summary of Findings, Informal
Fire Investigation, USS MIDWAY (CV 41)

1. A NAVSEA Team conducted a lessons learned analysis of the fire that occurred aboard USS MIDWAY (CV 41) on 20 June, 1990. Enclosure (1) is forwarded for information.
2. NAVSEA is taking action on all recommendations contained in this report. Progress on implementation will be monitored by the Surface Ship Survivability Flag Level Steering Committee.

1
B-6

Distribution:
CNO (OP-03, 03C2, 05)
CINCLANTFLT (N43)
CINCLANTFLT PEB
CINCPACFLT (N43)
CINCPACFLT PEB
COMNAVAIRLANT (80, 335)
COMNAVAIRPAC (73, 343)
SUPSHIP NEWPORT NEWS (500)
COMSEVNTHTFLT (ATTN: JAG 013)
USS MIDWAY (CV 41)
COMNAVSURFLANT
COMNAVSURFPAC
COMSUBLANT
COMSUBPAC
PRESINSURV
SWOSCOLCOM
COMTRALANT
COMTRAPAC

Chief Engineer and
Deputy Commander for
Ship Design and Engineering



Copy to:

SEA 05

56Y

56Y5

56Y5S

56Y3

56Y32

56Y2

55X2

04TD

PMS 312T

SUMMARY OF FINDINGS
INFORMAL FIRE INVESTIGATION
USS MIDWAY (CV-41)

1. SCOPE OF THIS REPORT:

At the request of COMNAVAIRPAC a NAVSEA team visited USS MIDWAY to determine ship design and material lessons learned. This report represents the collective opinion of all team members. Findings are based on an inspection of the damaged area and informal discussions with USS MIDWAY personnel. This report is not intended to modify or supersede any findings of the on-going JAG investigation. The NAVSEA team consisted of the following personnel:

Mr.		GM-14, SEA 56Y5 (Team Leader)
Mr.	B-6	GM-13, SEA 56Y5
Mr.		GM-14, SEA 55XT
Lt.	, USN,	SEA 56Y3

2. SIGNIFICANT EVENTS:

A number of fuel oil transfer operations were in progress on the morning of June 20th 1990. That morning, fuel service tank B-33F had been filled to approximately 95% of capacity. Flight operations were in progress. At 1133 local time, fuel oil was reported on the deck in the Pipefitter Parts Storeroom (formerly the DC Repair Parts Storeroom), B-421 1/2-A. Fuel pump number 1 was secured at 1141. A few minutes later smoke was reported in B-421 1/2-A and the Flying Squad was called away. At 1158, the valve controlling steam to the starboard catapult steam accumulator was secured. Flight operations continued. By 1200 it had been determined that leaking fuel was coming from the catapult (CAT) steam trunk, B-425-T. Fuel service tank B-33F was sounded and found to contain 33 feet 8 inches of fuel. The maximum for the tank is 33 feet 5 inches. A 5 inch overflow pipe for this tank passes through CAT steam trunk B-425-T. This trunk is directly above B-33F. Service tank B-33F is equipped with a tank level indicator and high level alarm located in Fireroom 2A. However, there was no report of an alarm sounding.

Following the discovery that service tank B-33F was overfilled, action was taken by oil lab personnel to draw down the fuel to the 25 feet 3 inch level. Meanwhile, the Flying Squad responded and, seeing white smoke escaping from trunk B-425-T, began desmoking using a Rhine Air Mover. This device is an air operated portable blower manufactured by Rhine Air of Santee, California. There was some confusion over the

nature of the white smoke with some personnel believing it was from a Class A fire and others believing it was fuel vapor. Desmoking hoses were then placed in B-421 1/2-A and CAT steam trunk B-425-T. Lacking success in desmoking, the door to the trunk was closed and was being dogged at 1230 when an explosion occurred. The explosion pushed the door out several inches, leaving a gap at the frame. It also tore the bulkhead from the deck and adjoining bulkhead and bent the corner out about 30 inches. A fireball passed through the 4th deck spaces and 3rd deck living space B-307-L, up the access ladder onto the second deck. Fire fighters reported that their OBAs and clothing items were blown off. Efforts were then directed at evacuating personnel.

Several injured Flying Squad personnel were found in escape trunk B-417 3/4-T and the Pipefitter Parts Storeroom B-417 1/2-A. They were pulled out to safety. At this time, it was not known that there were two fatalities in B-421 1/2-A. They were exposed to the full force of the blast. Positive ventilation was set in nearby machinery spaces and nearby magazines were manned with fire hoses. Just as the last of the injured was pulled free, a second explosion occurred at 1315. Personnel on the second deck were again knocked off their feet and smoke curtains were torn from their clamps. Personnel were evacuated to the Damage Control Deck, Zebra was set around the area at 1317, and the second deck access hatch was closed.

During the next two hours, there were no reports of direct firefighting in the affected spaces. Flight operations were secured and the starboard catapult steam accumulator blown down at about 1350. There were several reports of smoke pouring through the ventilation system into magazines B-403 1/2-M and A-607-B, and a report that the bulkhead of A/C machinery space #7, which is adjacent to the CAT steam trunk, was hot and paint was blistering.

At 1521, smoke curtains were set up on the second deck in preparation for reentering the spaces. Berthing space B-307-L was opened at 1543. A total of 15 CO2 bottles were discharged and AFFF was applied. By 1620, seven 5 gallon cans of AFFF had been used. An atmospheric test of B-307-L at 1653 indicated that the atmosphere was still flammable. Desmoking of B-307-L was rigged and the crew continued to apply AFFF, using 3 more 5 gallon cans over the next hour. After observing raw fuel dripping from the exhaust vent from the 4th deck spaces, AFFF was applied through the vent at 1807. Also, a hole was cut in a supply vent to B-425-V and AFFF applied. The fire party entered B-307-L at 1838, 1942 and 2006. At 2045, the fire party reached the 4th deck. At 2220, they began filling service tank B-33F with AFFF applied through the sounding tube. By 0035 the next day, water was within 3 feet of the overhead on the 4th deck.

In all likelihood, the space had been flooded at least once to the overhead. Dewatering efforts reduced the level to 12 inches by 0832. Four inches of fuel floated on the water. Compartment B-421 1/2-A was entered at 0840. The two bodies were located an hour later. The fire was declared out at 1000 on 21 June.

3. DISCUSSION:

a. Inspection of the damaged area indicated evidence of an explosion in the catapult steam trunk with a bulkhead and watertight access door bent out approximately 30 inches at the bottom, with a vertical 36 inch tear in the adjacent bulkhead. There was evidence of heat and blast damage inside the trunk. Compartment 421 1/2-A showed evidence of blast damage with two aluminum storage bin shelves collapsed. Compartment 417 1/2-A showed minor damage. The bulkhead separating compartments 421 1/2-A and the catapult steam trunk was corroded at the base. A 5 inch overflow pipe that passes through CAT steam trunk B-425-T was perforated by corrosion about 4 inches off the deck. The most probable cause of the explosion was release of fuel through corroded openings in the overflow pipe. Fuel then vaporized and ignited when in contact with the catapult steam condensate drain. There was no evidence of sustained fire in any of the spaces. Attachment A describes the immediate area of the ship exposed to the flash fire and explosions.

b. Initial confusion surrounding the nature of this casualty is worth noting. Operating temperatures in the CAT steam trunk were at times above the flash point of F-76. With the trunk access door opened, heated fuel vapor in contact with cooler air could have condensed and appeared as white smoke. Admittedly, clouds of fuel vapor are not typically associated with a fuel spill. Had this casualty been treated as a fuel spill and action taken to apply AFFF and secure steam lines, further fuel vaporization and ignition might not have occurred.

4. Design and Material Factors:

a. In USS MIDWAY, fuel overflow piping is co-located with the catapult steam piping in the catapult piping trunk. This condition is caused by the steam piping trunk being located directly above the fuel tank top and can present a serious fire hazard if a fuel piping failure occurs. Steam piping trunks are only provided in aircraft carriers for steam piping to catapults. There is a need in aircraft carrier new design to prevent locating catapult piping trunks above fuel tank tops and routing fuel piping in these trunks.

b. This incident demonstrates the need to inspect and test fuel tank overflow piping. However, tank overflow and air escape piping is unlike other piping systems in that they are open to the tank at one end and to atmospheric pressure at the other end.

Therefore, tank overflow piping should only be subjected to low pressures, i.e. tank design heads. Such piping is normally dry and not pressurized with system operating fluid to check piping integrity. Specific NAVSEA test and inspection requirements are:

- GSO section 506 requires that overflows and air escapes be tested in conjunction with the tank tightness test. This applies to new and modified overflow and air escape piping.

- NSTM 541.3.23 requires vent terminals to be inspected and overflow check valves to be gagged when testing the tank.

- NSTM chapter 100 requires each tank be air tested during each overhaul or as required in accordance with NSTM 9880. NSTM 988.402 requires tanks to be hydrostatically tested or if conditions dictate, air tested after an alteration or repair. These chapters do not require tank tests to include overflow and air escape piping. The perforations in the overflow piping could have been found by periodic compartment tightness tests of B-425-T required by PMS. NSTM 505 requires periodic pressure testing of piping to 135 percent of design pressure or to system operating pressure. These requirements cannot be considered to apply to vent and overflow piping since there is no requirement that this piping be tested other than with the tank. The NSTM 505 requirements that can be considered applicable to the fuel tank overflow piping are:

1. Visually inspect for external pipe corrosion every six months or at first availability.

2. Ultrasonically test for internal corrosion every four years or at major overhauls (NSTM 505-1.3.6.1).

c. Although not a factor in this casualty, NSTM 505 allows the use of a temporary pipe patch to make emergency repairs to piping systems. Plastic pipe patch is used on flammable liquid piping systems. Temporary pipe patch can be present for many years. A need exists to emphasize in NSTM 505 that, for flammable liquid piping systems, pipe patches should be replaced with permanent repairs during a technical availability, restricted availability, or sooner if warranted. In addition, OPNAVINST 4790.4 should be revised to state that deteriorated flammable fluid piping is a safety deficiency. Thus, repairs would be categorized as a safety deficiency requiring accomplishment as a priority.

d. This incident demonstrates the need for NAVSEA to investigate systems which could facilitate early identification and location of gross fuel system leakage.

e. A tank level indicator (TLI) system is installed in each fuel service tank, including B-33F. The system consists of a receiver, transmitter and alarm panel. The alarm panel power light was out. The receiver was removed from Fireroom 2A and tested in Fireroom 2B. This was done by removing the receiver for service tank B-33F in Fireroom 2A and installing it in an operating TLI system located in Fireroom 2B. The receiving unit has adjustments for calibrating and initiating high and low level alarms. The receiving unit tested satisfactorily for sounding these alarms. To simulate an electrical fault in the cable between the transmitter and receiver, the cable was removed from the receiving unit. When this was accomplished, the alarm panel went into a low level alarm mode. This indicates the tank level indicator system does not provide electrical supervision for continuity from the receiver through the jumper cable to the transmitter. The alarm panel should have gone into a trouble mode. Additionally, a review of the PMS cards for the tank level indicator system indicates no requirement to test the sensing unit from inside the tank to verify proper operation and transmission of alarm signals back to the receiving unit.

f. Ships force indicated no guidance exists on how to clean the individual's firefighting ensemble when soaked with F-76. There is a need to furnish this guidance to the Fleet.

g. Ships force indicated they did not have firefighter's gloves in accordance with NSTM 077. The stock number for the proper gloves is NSN 8415-01-296-5764. Gloves available on board USS MIDWAY were heat protective gloves NSN 8415-01-092-3910 manufactured by Nationwide Glove Company. USS MIDWAY should be furnished approved firefighter's gloves.

h. Ships force indicated the need for self-contained breathing apparatus that can operate for 60 minutes.

5. Recommendations:

a. NAVSEA review its design policy to ensure prohibitions exist to prevent the installation of flammable liquid piping (including overflow piping) systems in catapult steam trunks.

b. NAVSEA develop inspection requirements for fuel system overflow piping for inclusion in NSTM 505 that are within ships force capability with particular attention to piping already located within catapult steam trunks and voids.

c. NAVSEA request OPNAV to revise OPNAVINST 4790.4 to identify deteriorated fuel piping as a ship safety item.

d. NAVSEA review piping material requirements for overflow and air escape piping with the objective of specifying materials that will not deteriorate in service.

e. NAVSEA revise NSTM 505 to indicate pipe patches in flammable liquid piping systems be replaced with permanent repairs during a technical availability, restricted availability, or sooner if warranted.

f. NAVSEA prepare a proposal and seek funding to investigate systems which could facilitate early location and identification of gross fuel system leakage.

g. NAVSEA review design requirements for the tank level indicator system and ensure electrical supervision is provided from the receiving unit to the transmitter. Additionally, PMS cards should be revised to require a test of the sensing unit to verify proper operation and transmission of alarm signals back to the receiving unit. This test could best be accomplished at some time when the tank undergoes cleaning and/or internal inspection.

h. NAVSEA revise NSTM 077 as necessary to explain how to clean firefighting ensembles soaked in ships' fuel.

i. NAVSEA initiate action to expedite delivery of firefighter's gloves to USS MIDWAY.

j. NAVSEA expedite development of new self-contained breathing apparatus with a 60 minute operating time.

FR91

FR81

WIRING TRUNK

VOID B-421 V

VOID B-417 V

RUNK B-425T

A/C MCHRY
RM NO. 7

CONDENSATE
DRAIN
BELOW

CATAPULT STEAM

BULKHEAD
EXPLSION
DAMAGE

B-33F OVERFLOW

SUPPLY VENT
PIPEFITTER STGE
B-421 1/2 A

B-25F OVERFLOW
EXHAUST VENT

VOID B-423 V

VOID B-423 1/2 V

PIPEFITTER STGE
B-417 1/2 A

VOID B-419 V

VOID B-419 1/2 V

TRUNK
B-417 1/2 A

A/C MCHRY
RM NO. 2
UP TO B-30

DAMAGED AREA 4TH DECK

~~9008626~~
(ADU)

**INVESTIGATION TO INQUIRE INTO
THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD
USS MIDWAY (CV-41)**

(VOL 1) 8 of 20



9005312
5321



**CONVENED BY
COMMANDER SEVENTH FLEET
INVESTIGATING OFFICER
RADM**

B-6

ADVANCE



DEPARTMENT OF THE NAVY
COMMANDER SEVENTH FLEET
APO SAN FRANCISCO 96301-6003

IN REPLY REFER TO

5810
Per OIG 0447
16 Jul 90

FIRST ENDORSEMENT on RADM *B6* ltr 5800 dtd 4 JUN 90

From: Commander SEVENTH Fleet
To: Judge Advocate General
Via: (1) Commander Task Force Seven Zero
(2) Commanding Officer, USS MIDWAY
(3) Commander Task Force Seven Zero
(4) Commander SEVENTH Fleet
(5) Commander, Naval Air Force, U.S. Pacific Fleet
(6) Commander in Chief U. S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ABOARD USS MIDWAY (CV 41)

i. Readdressed and forwarded *1*

B-6

2
~

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

1. Forwarded.

SUMMARY OF THE INCIDENT

2. On 20 June 1990, two explosions and a fire occurred on board USS MIDWAY (CV 41). The explosions and fire originated in the fourth deck, starboard side, in space B-425-T, which contains catapult steam lines and fuel oil overflow lines.

3. During a fuel oil transfer, a fuel oil service tank was inadvertently overfilled and fuel oil was sent through the fuel oil overflow line. After the casualty was secured, it was discovered that the fuel oil overflow line was corroded and, as a result, had several holes near the point where it passed through the deck in compartment B-425-T. Fuel oil spilled out of the overflow line through these holes onto the deck of the space. The space is accessed by a watertight door. It cannot be determined whether the holes in the overflow line existed before the fuel oil transfer, whether the force of the fuel passing through the overflow line during the transfer created the holes in the corroded portion of the pipe, or whether the force of the explosion enlarged existing holes. In any event, the heat in the space from the catapult steam lines caused the fuel which had been spilled on the deck to vaporize, producing a white vapor. The Flying Squad responded to a report of smoke in the adjoining damage control storeroom, B-421-1/2A. The fuel oil on the deck of the space, the heat generated by the catapult steam lines and oxygen introduced into the space by the ventilation system to the space and/or by personnel opening the hatch to the space resulted in the heat-fuel-oxygen triangle coming together and creating a dynamic explosive atmosphere not apparent to fire fighting personnel. An explosion occurred, and a fireball was generated within space B-425-T which enveloped spaces B-423-V, B-421-1/2A, B-417-1/2A, B-417-3/4T on the fourth deck and B-307-L on the third deck, and dissipated in a passageway on the second deck adjacent to the top of the ladder connecting the passageway to space B-307-L. Two crewmembers died at the scene as a result. A second explosion occurred approximately 45 minutes following the first. A third crewmember died in the hospital from injuries suffered during the first explosion. Eight other crewmembers were seriously injured and hospitalized for treatment for injuries suffered during the first explosion.

4. The investigation reveals that the chain of events leading to the first explosion was triggered by a material failure. The fuel overflow line had been designed to protect against spilling of oil as a result of overfilling tank B-33-F, but it failed. Human error in overfilling fuel oil tank B-33-F caused fuel to be sent to the overflow line which resulted in a spill due to the

All redactions
are TB6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

medical condition. HT1 stated that he declined to make a statement due to the amount of medication he was on. DC3 was able to recall events and stated that while he was on the third deck the order to rig desmoking apparatus came from the fourth deck where CWO2 and DCC were located. He also recalled hearing messages passed from the fourth deck to the on-scene phone talker located on the second deck at the top of the ladder to VAW-115 berthing. The messages he recalls were that the fire boundary had been checked, all bulkheads were cool except that the aft bulkhead was hot to the touch, and fuel was on the deck.

8. The NIS Special Agent Afloat on board MIDWAY informed this command that DCC could not be interviewed because of his medical condition. DCFN is on convalescent leave in Georgia. NIS is making arrangements to interview him. Upon receipt, the written results of interview of DCFN will be forwarded together with this command's comments, if appropriate.

9. Should the medical condition of DCC and the other individuals currently hospitalized improve, it is strongly recommended that they be reinterviewed concerning their knowledge of events. As their medical condition improves, they may be able to recollect events which they are currently unable to remember. Because these individuals were at or near the scene at the time of the first explosion, their knowledge of events should prove highly relevant.

10. Statements from other witnesses whose testimony is deemed relevant to this investigation have been obtained and added as enclosures.

11. It is noted that some findings of fact are not explicitly supported by cited enclosures and apparently represent the personal knowledge of the Investigating Officer. Such findings of fact have been addressed in the comments below. Some findings of fact are not supported by enclosures cited by the Investigating Officer but are supported by other enclosures not cited. Other findings of fact are supported by the enclosures cited by the Investigating Officer but have additional support in enclosures not cited. Also, some opinions are not supported by the findings of fact cited by the Investigating Officer but are supported by other findings of fact not cited. Other opinions are supported by findings of fact cited but have additional support in findings of fact not cited. To the extent time has allowed, this command has amended findings of fact and opinions to accurately reflect existing support contained in the investigation.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

12. A copy of reference C and pertinent portions of reference D have been attached to this endorsement as enclosures (133) and (134), respectively.

COMMENTS ON FINDINGS OF FACT

13. Support for that portion of finding of fact 2 which states that NR2A "remained secured and under steam blanket layup through 21 June 90" is contained in Enclosure (135).

14. Finding of fact 9 is amended to read as follows: "No pressure gauge is installed in the fuel oil transfer system on the discharge side of the fuel oil service pump check and discharge valves. Oil Lab personnel did not use a gauge to monitor system pressure during the pre- and post-transfer pressure check. [Enclosures 42, 43, 44 and 45]."

Reason: To reflect that Oil Lab personnel did not use an existing method by which a gauge can be used to monitor system pressure. See paragraph 15 below.

15. New finding of fact 9A is added to read as follows: "There is a method by which Oil Lab personnel can use a gauge to monitor system pressure during pre- and post-transfer system pressure tests. That method, however, was not used by Oil Lab personnel during the pre- and post-transfer pressure tests in question. [Enclosure 128]."

16. Enclosure (46) does not support finding of fact 10.

17. Enclosure (24) does not support finding of fact 14.

Note: It is important to note that Fuel Oil Transfer Alignment Check-Off Lists attached as enclosures (23) and (24) do not pertain to the fuel oil transfer that led to the spill. Enclosure (23) pertains to a transfer from A-4 1/2-F to B-33-F, B-58-F, B-50-F and B-26-F which occurred between 2139 and 2236 on 19 June. Enclosure (24) pertains to a transfer from B-19-F and B-20-F to B-54-F, B-42-F, B-49-F, B-25-F and B-34-F which occurred between 1523 and 1642 on 19 June. Accordingly, enclosure (23) does not provide support for some of the findings of fact for which it is cited, i.e. findings of fact 23, 27 and 28. Enclosure (24) does not provide support for any finding of fact for which it is cited. The Fuel Oil Transfer Alignment Check-Off List pertaining to the oil transfer that resulted in the fuel oil spill is not contained in the investigative report, and cannot be located in Engineering Department files. Witness statements reflect, however, that the Check-off List in question

All redactions
are B6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

was signed by BT1 as the Oil Lab Watch Supervisor and signed and approved by CW03 as Engineering Officer of the Watch. (Enclosures (136) and (137)).

18. Finding of fact 15 is amended to read as follows: "BT3 was final PQS qualified for Fuel Oil Pumper. BT2 was under instruction, and BTFN, BTFN and BT2 were not final PQS qualified for any fuel oil transfer duties. [Enclosures 37 and 138]."

Reason: (1) To make clear that BT2 was under instruction; and (2) to make clear that BTFN BTFN and BTFN were not final PQS qualified.

19. Finding of fact 16 is amended to read as follows: "The Oil Lab PQS for Fuel Oil Pumper covers all fuel transfer duties/positions but does not contain qualification procedures for specific fuel oil transfer positions except Fuel Oil Pumper. Qualification for other specific fuel oil transfer duties are subsumed within the PQS for Fuel Oil Pumper. [Enclosure 128 and 139]."

Reasons: (1) To make clear that existing PQS contains overall qualification procedures for assignment as Fuel Oil Pumper and that qualification for other specific fuel oil transfer duties are subsumed within the PQS for Fuel Oil Pumper; and (2) enclosure (37) does not support former finding of fact 16.

20. Finding of fact 17 is disapproved and new finding of fact 17 is added to read as follows: "Two of the four members of the fuel oil transfer team, the Fuel Oil Supervisor, BT3, and the sounder, BT3, were fully qualified for their positions. Personnel having the necessary training, experience and ability were assigned to the team by the Chief Engineer. Team members were assigned to specific positions on the team based on their training, experience and ability in the judgment of the Fuel Oil Supervisor. [Enclosures 37, 128 and 136]."

Reasons: (1) Former finding of fact 17 is now addressed in finding of fact 16 as amended; and (2) to make clear how it was determined to assign members to the fuel oil transfer team and to specific positions on the team.

21. Additional support for finding of fact 18 is contained in enclosure (140).

22. Finding of fact 21 is disapproved and new finding of fact 21 is added as follows: "The alignment of the fuel oil transfer system was made during the midwatch on 20 June 1990 by BT2

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

B/b, fuel oil supervisor (under instruction); checked "hands-on" by BT3 B/b fuel oil supervisor; and verified during the 0400-0800 watch by BT2 B/b, Oil Lab Supervisor, and CWO3 B/b Engineering Officer of the Watch. [Enclosures 47, 128, 136, 137 and 138]."

Reasons: (1) Former finding of fact 21 is not supported by enclosure (22); and (2) to accurately reflect the persons who aligned, checked and verified the fuel oil transfer in question.

23. Finding of fact 22 is amended to read as follows: "Subparagraph 10A(1) of ENGDEPTINST 9540.1C (enclosure 133) provides, in pertinent part, as follows:

'(1) Prior to any fuel pumping evolution, the Fuel Oil Supervisor shall conduct a "hands on" systems check, utilizing the following procedure:

a. The Fuel Oil Supervisor shall dispatch a fuel oil pumper to align the transfer system as determined by the specific evolution. The required systems alignment check-off list and EOSS shall be utilized each time.

b. The fuel oil pumper shall align the transfer system in accordance with EOSS. Upon completion, the Fuel Oil Supervisor or a qualified fuel oil pumper and an assigned officer shall then proceed to check and verify the system alignment for the fuel transfer evolution. The Fuel Oil Supervisor shall deliver the fuel system check-off sheet to the Oil Lab Supervisor of the Watch who shall review and verify with his signature, that the correct alignment has been made. The Fuel Oil Supervisor shall deliver the check-off sheet to the Engineering Officer of the Watch (EOOW) for final approval and permission to transfer fuel in accordance with the system check-off sheet.'

In 1989 the Chief Engineer interpreted the quoted provisions to mean that a 'hands-on' check of the alignment was to be completed by the Fuel Oil Supervisor, and then verified by the Oil Lab Supervisor and the Engineering Officer of the Watch by reviewing the Fuel Oil System Transfer Alignment Check-off List (hereinafter "Check-off List") to ensure that valves were positioned to properly effect the transfer. The Chief Engineer orally informed the MPA and all Engineering Officers of the Watch

All redactions
are D-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

of his interpretation of the quoted provisions. The Chief Engineer's interpretation of the quoted provisions is consistent with Engineering Operational Sequencing System (EOSS) Standard Notes for the Oil King (enclosure 134) which provides that alignment must be verified by two persons, including an officer of the Engineering Department. The Chief Engineer's interpretation also is consistent with subparagraph 4.5ak) of the EOSS User's Manual (enclosure (141)) which defines the term 'verify' as follows: 'used to alert personnel to a condition or action which must exist prior to commencing an action or series of actions.' BT3 a qualified Fuel Oil Supervisor, conducted a 'hands on' check of the system prior to the fuel oil transfer in question. BT1, the Oil Lab Supervisor, and CWO3 the assigned officer, verified the system alignment by inspecting a highlighted copy of the Check-off List to ensure that the position of the valves, as indicated on the list, were positioned to properly effect the transfer. This method of verification complied with the Chief Engineer's directions concerning checking and verifying fuel oil transfer system alignment. [Enclosures 128, 134, 136, 137, 138 and 141]."

Reason: To make clear that the "hands-on" check and verification of system alignment were accomplished in accordance with Engineering Department Instruction 9540.1C, as interpreted by the Chief Engineer.

24. Finding of fact 24 is amended by adding the following after the first sentence: "Such reverification is not required under existing instructions and procedures."

Reason: To make clear that reverification was not required.

25. Finding of fact 25 is amended by inserting "B-42-F," after "B-54-F,".

Reason: To reflect that a satisfactory pre-transfer pressure test was recorded to have been conducted between NR 1 fuel oil transfer pump discharge valve and the fill valves to tanks B-54-F, B-42-F, B-49-F, B-34-F and B-25-F.

26. Finding of fact 27 is amended by: (1) inserting "BT2 was Fuel Oil Supervisor under instruction" after the word "Supervisor," in the second line; and (2) by inserting "45," after "43,".

Reasons: (1) To make clear that BT2 was part of the fuel oil transfer team as an under instruction Fuel Oil Supervisor under BT3 Roman; and (2) to cite enclosure (45) as

All redactions
are B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

additional support for finding of fact 27.

27. Finding of fact 28 is not supported by enclosures (21), (23) or (24).

28. Finding of fact 29 is amended to read as follows: "All Oil Lab personnel involved in the fuel oil transfer evolution were final PQS qualified for their assigned duties, except BT3, BTFN and BTFN who were not final PQS qualified for any oil transfer duties. BTFN was sounder (under instruction). [Enclosures 37, 48 and 49]."

Reasons: (1) To reflect that BT3 and BTFN were not final PQS qualified; (2) to make clear that BTFN was under instruction; and (3) to cite additional support for finding of fact 28.

29. Finding of fact 34 is amended to read as follows: "BTFN had been assigned to the Oil Lab for about 5.5 months as of 20 June 1990 and had conducted soundings on approximately 10 other tanks before taking soundings on tank B-25-F on 20 June 1990. [Enclosure 49]."

Reason: To make clear that BTFN had been assigned to the Oil Lab for about 5.5 months.

30. With respect to finding of fact 37, it is noted that there is confusion in witness statements as to the length of time that elapsed between the time the fuel oil transfer pump was set in high speed operation and the time that BT3 gave the order to secure the pump. Witness statements reflect that after the pump was set in high speed operation, 30 to 60 seconds elapsed before the first sounding was taken. Witness statements also reflect that three more soundings were taken before the pump was secured. One to four minutes may have elapsed between the time the pump was set in high speed operation and the time it was secured based on the statements of various witnesses.

31. Additional support for finding of fact 38 is contained in enclosure (45).

32. Additional support for finding of fact 39 is contained in enclosures (42), (43), (45) and (49).

33. Additional finding of fact 39A is added to read as follows: "Members of the oil transfer team, specifically BTFN, BT3, BT2, BT3 and BTFN were aware that the fuel transfer pump had been operating at high speed for a few minutes with suction and yet there was no rise in

All redactions
are B.B.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

the fuel level in tank B-25-F. That fact was of no concern at that time. An overflow feature was designed into the system to protect against tank overflow. [Enclosures 42, 43, 45, 46, 48 and 49]."

34. Finding of fact 43 is amended to read as follows: "BT3 stated that the valves were not correctly labeled, that he was told to open '25,' that he turned the valve closest to the bulkhead, which was the valve to B-33-F, and that he did not notice the mistake at that particular moment. BT3 also stated that when he was asked if he cycled the valve to make sure he had the correct valve open, he realized that he had opened the wrong valve. BT3 then closed the valve for B-33-F and opened the valve for B-25-F. [Enclosure 46]."

Reason: To accurately reflect BT3 statement.

35. Additional support for finding of fact 46 is contained in enclosure (46).

36. Finding of fact 47 is disapproved.

Reason: Enclosures (46) and (48) do not provide support for finding of fact 47. In enclosure (42), BTFN stated that he was not sure when the shift to storage tank A-8 1/2-F occurred. Review of enclosures (21) and (142) shows that the loss of suction would have occurred during the pump-up of B-49-F, a tank that was pumped up prior to B-25-T. It appears, therefore, that BTFN was simply mistaken in his statement (enclosure (49)) as to when the loss of suction occurred.

37. Enclosure (20) does not support finding of fact 49. Additional support for finding of fact 49 is contained in enclosure (143).

38. Enclosure 48 does not support finding of fact 51.

39. Finding of fact 54 is supported by enclosures (11A) and (11B). It is noted that enclosure (11B) does not reflect the 8-foot height of compartment B-425-T. The 8-foot height should be noted in enclosure (11B).

40. Finding of fact 55 is supported by enclosure (11A).

41. A new finding of fact 57A is added to read as follows: "A supply vent for compartment B-425-T is not listed on damage control plates or in the Damage Control Book (0988-LP-130-6011). The exhaust vent for compartment B-425-T is listed on damage control plates but not in the Damage Control Book. [Enclosures

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

144 and 145]."

42. Finding of fact 58 is amended by deleting "B-3071" and substituting therefor "B-307-L" and by deleting "B-417 1/2-T" the three places it appears and substituting therefor "B-417 3/4-T."

Reason: To accurately reflect the designation of compartments B-307-L and B-417 3/4-T. In addition, enclosure (11A) should be amended by changing the designation of compartment B-417.5-T to B-417 3/4-T.

43. None of the enclosures cited in support of finding of fact 59 supports the statement that the high pressure drain lines exit compartment B-425-T approximately 10 inches above the deck.

44. New finding of fact 64A is made as follows: "It cannot be determined whether the holes in B-33-F fuel oil overflow piping referred to in finding of fact 64 existed prior to the overfilling of tank B-33-F or whether the holes were caused by the force of fuel passing through the overflow piping after tank B-33-F was overfilled, or whether existing holes were enlarged by the force of the explosion. [Enclosures 60, 61, 62, 63, 112 and 128]."

45. Finding of fact 68 is amended to read as follows: "BT3 Roman, Fuel Oil Supervisor, was called to the scene and observed a small pool of fuel oil on the deck adjacent to the bulkhead separating compartment B-4-121 1/2-A from compartment B-4-425-T, the catapult steam trunk. He estimated the fuel on the deck to be one gallon total volume. Other witnesses estimated the volume of oil on the deck to be from one to four gallons. [Enclosures 43, 48, 64, 67, 68 and 69]."

Reason: To accurately reflect the location of the spilled fuel oil and its volume as estimated by various witnesses.

46. Finding of fact 69 is amended to read as follows: "CWO2 ~~W~~ the Fire Marshal, was notified of fuel on the deck of B-421 1/2-A sometime between 1115 and 1130 on 20 June 1990, and proceeded to the scene to investigate. [Enclosure 64]."

Reason: Enclosure (64) does not support the statement in former finding of fact 69 that the Fire Marshal arrived on the scene at approximately 1120.

47. Additional support finding of fact 70 is contained in enclosures (48), (64) and (67).

48. Additional support for finding of fact 71 is contained in

All redactions
are B.G.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

enclosure (45).

49. Finding of fact 73 is not supported by enclosure (64). Additional support for finding of fact 73 is contained in enclosure (48).

50. Finding of fact 75 is amended to read as follows: "CWO2 ordered BTCS to make expeditious preparations for pumping down fuel tank B-33-F. BTCS went to the Oil Lab and informed the MPA of the leak. With the consent of the Chief Engineer, the MPA ordered BTCS to align the system and expeditiously pump down tank B-33-F. [Enclosure 44]."

Reasons: (1) To accurately reflect BTCS statement contained in enclosure (44); and (2) that portion of finding of fact 75 which infers that CWO2 believed that the source of the oil was B-33-F is not supported by enclosure (44) and is more properly categorized as an opinion.

51. Additional support for finding of fact 76 is contained in enclosures (44), (47) and (64).

52. Enclosure (48) does not support finding of fact 78.

53. Finding of fact 93 is amended to read as follows: "DS2 statement indicates that HT1 heard a faint hissing sound on the fourth deck, implying that the hissing sound came from compartment B-425-T. [Enclosure 74]."

Reason: To accurately reflect that HT1 is the only person who mentioned hearing a hissing sound. Enclosure (74) does not support that portion of former finding of fact 93 which stated: "and that they believed a steam leak existed in B-425T". Enclosure (69) reflects that CWO2 believed, at least initially, that there was a steam leak and lagging on fire in compartment B-425T.

54. Additional support for finding of fact 94A is contained in enclosure (140).

55. Enclosure (12) does not support finding of fact 95.

56. Finding of fact 96 is amended to read as follows: "A Rhine air blower was rigged abreast of elevator number 1 in the hangar bay. Flexible ducting extended from the blower through the second deck, then through VAW-115 berthing on the third deck, and then to the fourth deck in the vicinity of watertight door 4-90-3. [Enclosures 64, 67 and 77]"

All redactions
are B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Reason: To accurately reflect the name and location of the air blower.

57. Enclosure 69 does not support finding of fact 102.

58. Additional support for finding of fact 104 is contained in enclosure (20), page 172, entries at 0458 and 0520.

59. Finding of fact 115 is amended to read as follows: "The Chief Engineer and the DCA were both in DC Central and the Chief Engineer instructed the DCA not to enter the space. The DCA then instructed the DC Central X50J phone talker to pass orders to the scene not to enter space B-425-T. [Enclosures 69, 75 and 76]."

Reason: To accurately reflect the statements contained in the cited enclosures.

60. Findings of fact 116 through 119 are specifically approved.

61. New finding of fact 120A is added as follows: "The DCA relayed, via the X50J sound powered phone system, an order not to open the door (4-90-3) to compartment B-425T. [Enclosure 76]."

62. Finding of fact 121 is specifically approved.

63. Finding of fact 122 is amended to read as follows: "CWO2 called the DCA in DC Central via the dial telephone in VAW-115 berthing and advised him that the watertight door 4-90-3 had been opened and that they were rigging for desmoking. The DCA believes his only response was to curse and that he also may have told CWO2 to go ahead and investigate because the door was already open. CWO2 stated that he saw smoke and conveyed the impression that smoke was the result of a lagging fire. [Enclosure 76]."

Reason: To accurately reflect the statement of the DCA.

64. New finding of fact 122A is added as follows: "CWO2 did not tell the DCA what he planned to do and he did not say anything about fuel, steam leaks or heat in compartment B-425-T. [Enclosure 76]."

65. Findings of fact 123, 124 and 125 are specifically approved.

66. Finding of fact 126 is amended as follows:

a. delete the second sentence and substitute therefor the following: "DCC was not wearing an OBA. DC1 was

All indications
are B-6

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

wearing an OBA in the relaxed position, so he was not wearing a face mask."

b. delete "64," in the fifth line.

Reasons: To accurately reflect that DC1 was wearing an OBA in the relaxed position, and to delete enclosure (64) which does not support finding of fact 126.

67. Finding of fact 127 is amended to read as follows: "It appears that watertight door 4-90-3 was opened and closed a number of times either before or after CWO2 spoke with the DCA. [Enclosures 67, 78 and 80]."

Reason: Enclosure (79) is the only support cited for former finding of fact 127. Enclosure (79) is a photograph depicting the watertight door (4-90-3) and the position of the dogs after the casualty. The photograph does not establish that the hatch was opened and closed a number of times prior to the casualty, nor does it establish which dogs were engaged prior to the casualty. Enclosures (67), (76), (78) and (80) do, however, reflect that watertight door 4-90-3 was opened and closed a number of times. Enclosure (76) reflects that it was opened at least once before CWO2 spoke with the DCA.

68. Enclosure (74) does not support finding of fact 142.

69. Enclosure (74) does not support finding of fact 143. Additional support for finding of fact 143 is contained in enclosure (64).

70. Finding of fact 146 is amended by adding the following new sentence at the end thereof: "There also is evidence the fireball entered compartment B-423-V." Support for the amended portion of finding of fact 146 is contained in enclosure (146).

Reason: To reflect that there is evidence that the fireball entered compartment B-423-V.

71. Finding of fact 147 is amended to read as follows: "DC Central initially had difficulty in locating ventilation systems for compartment B-425-T. The DC plates showed only the exhaust ventilation system serving compartment B-425-T. The Damage Control Book did not list the exhaust ventilation system for compartment B-425-T. The supply ventilation system for that compartment was shown neither on the DC plates nor in the Damage Control Book. Before the first explosion occurred, an order was given to secure the exhaust ventilation, but the order was not received by the Flying Squad electricians. After the first

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

explosion, DC Central identified the supply ventilation system for compartment B-403 1/2-M after smoke was reported to have been entering that compartment through the ventilation system and ordered it to be secured. Later, an order was given to secure ventilation from frames 47 to 90, an area encompassing the location of B-425-T. Personnel securing the ventilation apparently never received the detailed information passed by DC Central for securing exhaust ventilation to B-425-T. DC Central never specifically identified the supply ventilation system for compartment B-425-T. [Enclosures 144 and 145]."

Reasons: To reflect problems encountered in identifying ventilation systems for compartment B-425-T and to address an issue raised by enclosure (126).

72. Additional finding of fact 147A is added to read as follows: "While the immediate securing of ventilation in an area of fire or smoke historically has been a basic tenet of fire fighting, such is no longer the case. Enclosure (147) provides:

'[T]he decision to secure ventilation must be made on scene. Ventilation is typically left running during the initial attack on the fire with portable extinguishers. The maximum rate or air exchange promotes the maximum tenability. This is important for evacuating personnel and for the initial fire fighters who may not be fully dressed out with breathing apparatus. Typically, ventilation should be secured when fire fighters with breathing apparatus arrive on-scene or the space is abandoned by on-scene, unprotected personnel.'

[Enclosure 147]."

73. Finding of fact 150 is amended to read as follows: "No one who was on the fourth deck at the time of the first explosion ascended to the third deck on their own power. They were assisted from the fourth deck by rescue personnel and immediately provided with medical care. [Enclosures 65, 68, 72, 74 and 96]."

Reason: Neither of the enclosures cited in support of former finding of fact 150 indicate that CW02 B.6 and HT1 B.6 exited the fourth and third decks under their own power.

74. Enclosure (76) does not support finding of fact 152.

75. Finding of fact 155 is amended by deleting " B.6

All redactions
are B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Reason: None of the enclosures cited in support of finding of fact 155 reflect that descended to the fourth deck, and own statement, enclosure (77), does not reflect that he did so. In addition, there is no reference anywhere in the investigation to a person named except on page 4 of enclosure (68) where the name is lined out and the name is substituted therefor.

76. Additional support for finding of fact 157 is contained in enclosure (98).

77. Finding of fact 158 is amended as follows:

a. delete the words "his shipmate" and substitute therefor the words "DCFN".

b. delete the words "The unidentified survivor" and substitute therefor the words "DCFN".

Reason: To reflect that DC3 identified the survivor as DCFN

78. Finding of fact 159 is amended by deleting the last sentence.

Reason: Enclosure (68) does not reflect DCFN went to the fourth deck and pulled three survivors in from the space, and DCFN own statement (enclosure 97) does not reflect that he did so. In addition, there is no reference anywhere in the investigation to a person named except on page 4 of enclosure (68) where the name is lined out and the name is substituted therefor.

79. Finding of fact 161 is specifically approved although it is not supported by the cited enclosures.

Reason: The photographs cited in support of former finding of fact 161 do not establish the source of the second explosion.

80. Additional support for finding of fact 162 is contained in enclosure (11A).

81. Enclosure (108) does not support finding of fact 166.

82. Enclosure (19) does not support finding of fact 167.

83. Enclosure (19) does not support finding of fact 169.

All reductions
are B6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

84. Finding of fact 171 is amended to read as follows: "Witness statements reflect that there were some initial problems establishing communications between DC Central and the scene. Witness statements also reflect that orders were passed from DC Central to the scene and no response was received from the scene, and that requests were passed from the scene to DC Central and there was no response from DC Central. None of the statements contained in the investigation account for this failure in communication. In enclosure (144), the DCA states that communications between DC Central and the scene were established early on the X50J phone circuit. The DCA can only assume that DCFN the DC Central phone talker, and/or DCFN the on-scene phone talker, either were not receiving messages over the phone circuit or not properly relaying messages once received. The statement by DCFN reflects that CWO2 sent DCFN p to the second deck and then CWO2 descended to the fourth deck. Thus, the Fire Marshal was separated from the on-scene phone talker by two decks. In addition, at the moment of the first explosion DCFN was thrown against a bulkhead and his sound powered phones came off. He was initially dazed. When he recovered from the effects of the explosion, he assisted in evacuating personnel. He returned to Repair Locker 4 and eventually went to Hangar Bay 1. It was not until sometime later that FN noticed that there was no on-scene phone talker. FN put on the sound powered phones and did phone checks to DC Central, Repair Locker 4 and Repair Locker 2. FN then began relaying messages, incoming and outgoing, and remained on scene until he passed the phone set to IM3 [Enclosures 68, 73, 76, 88, 91 and 144]."

Reason: To accurately reflect the communications problems encountered and to address an issue raised by enclosure (126). DCFN appears to be a crucial witness concerning the communication problems encountered. He is currently on emergency leave. Upon his return he will be interviewed concerning this issue, and his statement will be forwarded with this command's comments, if appropriate.

85. Finding of fact 172 is amended to read as follows: At 1550, CO2 was discharged into VAW-115 berthing (B-307-L) from the second deck passageway via the scuttle in the hatch leading to VAW-115 berthing. [Enclosures 19 and 95]."

Reason: Citing enclosure (14), former finding of fact 172 stated that at 1551 CO2 was discharged into B-417 1/2-T from VAW-115 berthing (B-307-L). Enclosure (14) appears to be incorrect. Enclosures (19) and (95) reflect that at 1550, CO2 was discharged into VAW-115 berthing (B-307-L) from the second deck passageway via the scuttle in the hatch leading to VAW-115 berthing.

All redactions
are B6

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

86. Finding of fact 173 is amended to read as follows: "At 1653, the results of an atmospheric test conducted in VAW-115 berthing (B-307-L) from the second deck showed the atmosphere to be highly combustible. [Enclosures 19 and 95]."

Reason: To accurately reflect that the test was conducted not in the berthing space but from the second deck.

87. None of the enclosures cited in support of finding of fact 174 support the first sentence of finding of fact 174. Enclosure (53) does not support finding of fact 174 at all.

88. Finding of fact 178 is amended to read as follows: "The ventilation system was secured to the third and fourth decks in the area near VAW-115 berthing, but witness statements do not clearly reflect a time at which ventilation was secured. [Enclosures 93, 107, 124]."

Reason: There is no support for that portion of former finding of fact 178 which indicates that ventilation was secured "when the fire party entered the space."

89. Enclosure (76) does not support finding of fact 184.

90. Finding of fact 191 is amended to read as follows: "Enclosure (19) reflects that at 1014 on 21 June the space (B-425-T) was evacuated and the fire was out. After the casualty, the door (4-90-3) to space B-425-T was discovered partly blown. [Enclosures 19, 79, 81, 82, 83, 84 and 85]."

Reason: Former finding of fact 191 as written is not supported by the enclosures cited by the Investigating Officer.

91. Finding of fact 195 is amended to read as follows: "At 1107, 21 June 1990, Captain H M3, H M3 LCDR MMCS and LT entered B-421 1/2-A and recovered the bodies of FN Vierra and MSSN Johnson. [Enclosures 19, 27, 28 and 101]."

Reason: To reflect that Captain was accompanied by LCDR, LT and MMCS

92. Finding of fact 196 is amended by deleting "many times" and substituting therefor "at least three times".

Reason: To accurately reflect witness statements.

93. Finding of fact 197 is amended to read as follows: "Enclosure (7) to MIDWAYINST 4790.1D provides a brief description

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

of MIDWAY's Zone Inspection Program. The instruction itself does not list spaces to be inspected during zone inspections. The zone inspection list is a separate, computer-generated list, a copy of which is included at enclosure (31). On that list compartment B-425-T is listed as B-425-V, with code 999, indicating that the compartment is not required to be inspected. [Enclosures 31 and 70]."

Reason: To reflect that the zone inspection list is not part of MIDWAYINST 4790.1D but is a separate computer-generated list that shows compartment B-425-T as a space not requiring inspection.

94. Finding of fact 201 is amended to read as follows: "The revised estimate of the costs associated with the explosions and fire is \$716,547.00. [Enclosures 103, 127 and 128]."

95. Additional finding of fact 212A is added to read as follows: "Naval Sea Systems Command (NAVSEASYS COM) apparently has no requirement to inspect or test fuel tank overflow piping. [Enclosure 8]."

96. Enclosures (40), (69) and (75) do not support finding of fact 216. Enclosures (64) and (128) provide additional support for finding of fact 216.

97. New finding of fact 224 is made as follows: "Prior to reading enclosure (48), the Chief Engineer had no knowledge of the high temperature in the sounding tube of B-33-F. The Chief Engineer spoke with BT3 Lambert concerning this matter, and BT3 Lambert stated that the temperature in the sounding tube of B-33-F was taken over one year ago by lowering a thermometer into the sounding tube. The high temperature in the sounding tube may have been discussed among junior personnel, but it was never brought to the attention of personnel above the E-6 level. [Enclosure 128]."

Reason: To address an issue raised by enclosure (126).

98. New finding of fact 225 is made as follows: "Over the past year, actions have been taken to alleviate the excessive heat in VAW-115 berthing (B-307-L). Emphasis was placed on cleaning and maintaining the ventilation systems and air conditioning coils servicing that compartment. In addition, steam piping in compartment B-425-T was re-lagged in an effort to control the heat emanating from that compartment which contributed to the excessive heat in VAW-115 berthing. [Enclosure 128]."

Reason: To address an issue raised by enclosure (126).

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

99. New finding of fact 226 is made as follows: "Enclosure (144) states that CWO2 D-V met and exceeded all of the qualifications for Fire Marshal contained in NAVEDTRA 43119-4C dated August 1988. [Enclosure 144]."

Reason: To address an issue raised by enclosure (126).

COMMENTS CONCERNING OPINIONS

100. Opinion 1 is specifically approved and additional support for opinion 1 is found in finding of fact 64A. The investigation reveals that the chain of events leading to the explosion was triggered by a material failure in the fuel overflow pipe for tank B-33-F. The fuel overflow line had been designed to protect against the spilling of oil as a result of overfilling tank B-33-F, but it failed.

101. Opinion 2 is approved in part and modified in part. While the facts and conclusion stated in opinion 2 are accurate, it cannot be determined from the available evidence whether any of the holes discovered in the overflow line after the casualty existed before the fuel oil transfer, or whether the force of the fuel passing through the overflow line during the fuel transfer created the holes in the corroded portion of the pipe, or whether existing holes were enlarged due to the force of the explosions. It is most probable that if any holes did exist prior to the fuel oil transfer they were pin-holes that may not have been readily detectable by visual inspection. See paragraph 102 below.

102. Opinion 3 is disapproved. Neither of the findings of fact cited in support of opinion 3 provide support for the determination that significant sized holes existed in the pipe for up to 4 years and that some smaller sized holes could have been present for up to 8 years. As reflected in finding of fact 198 it could not be determined from scientific analysis of the pipe how long the holes may have existed. More importantly, evidence of conditions existing in compartment B-425-T prior to 20 June 1990 leads to the conclusion that if any holes existed at that time, it is doubtful that they were any larger than pin-holes. Finding of fact 216 reflects that prior to 20 June 1990 water had accumulated in compartment B-425-T. More specifically, enclosures (64) and (128) reflect that prior to 20 June 1990 6 to 8 inches of water had accumulated on the deck of compartment B-425-T. If holes larger than a pin-hole had existed at that time, the 6 to 8 inches of water in the compartment would simply have drained into tank B-33-F or, being being heavier than fuel, would have displaced the fuel in tank B-33-F causing the water in the compartment to be replaced by or at least mixed with fuel. There

All indications
OK B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

is no evidence that fuel was ever detected in compartment B-425-T. (See statements at enclosure (106)). Thus, based on the available evidence, it is possible that prior to the explosion, the fuel overflow pipe for B-33-F was completely intact, although corroded, and that no hole existed in the pipe until fuel was forced through the pipe causing the portion weakened by corrosion to give way.

103. Opinion 4 is specifically approved. See, however, paragraphs 101 and 102 above for a discussion of how and when the holes may have been created.

104. Opinion 5 is specifically approved.

105. Opinion 6 is approved except for the second sentence thereof. Finding of fact 9A reflects that there is a gauging system which could be used to determine the pressure in the system during the pressure test. Findings of fact 9 and 9A also reflect that the gauge was not used during the fuel oil transfer on 20 June 1990.

106. Opinion 7 is approved in part and modified in part. USS MIDWAY ENGDEPTINST 9540.1C has been revised by ENGDEPTINST 9540.1D to include 150 PSI pre-transfer pressure test and eliminating the requirement to hold a lesser pressure for a specified time. Procedures set forth in revised ENGDEPTINST 9540.1D for transferring fuel oil from storage to service tanks are in accordance with EOSS and are adequate to support safe transfer operations. EOSS only requires that the system withstand a 150 PSI pressure check.

107. Opinion 8 is approved in part and disapproved in part. None of the findings of fact cited support opinion 8. In conducting the fuel oil transfer to B-25-F on 20 June 1990, Fuel Oil Lab supervisory personnel did comply with procedures contained in ENGDEPTINST 9540.1C. Finding of fact 22 as amended reflects that BT3 a qualified Fuel Oil Supervisor, conducted a "hands-on" check of the system alignment; and that BT1 the Oil Lab Supervisor, and CW03 the Engineering Officer of the Watch, verified the system alignment by reviewing a highlighted copy of the Fuel Oil Transfer System Alignment Check-off List; and that such method of verification was authorized by the Chief Engineer and not contrary to EOSS procedures. Witness statements attached to the investigation do reflect that unqualified junior oil lab personnel sometimes made system alignment with no independent verification and that pump discharge closing valves and pump recirculating valves were sometimes not closed during pre- or post-transfer pressure tests. Such was not the case, however, during the pressure test

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

in question. See paragraph 136 for corrective actions taken.

108. Opinion 9 is more properly categorized as a finding of fact and is specifically approved.

109. Opinion 10 is specifically approved. See paragraphs 136 and 140 below below for corrective action taken.

110. Opinion 11 is more properly categorized as a finding of fact and is specifically approved.

111. Opinions 12 through 22 are specifically approved.

112. Opinion 23 is specifically approved. See paragraph 140 below for corrective action taken.

113. Opinions 24 and 25 are specifically approved.

114. Opinions 26, 27 and 28 are more properly categorized as findings of fact and are specifically approved.

115. Opinions 29 and 30 are specifically approved.

116. Opinion 31 is more properly categorized as a finding of fact and is specifically approved.

117. Opinion 32 is specifically approved, but see finding of fact 171 as amended.

118. Opinion 33 is more properly categorized as a finding of fact and is specifically approved.

119. Opinions 34 through 38 are specifically approved.

120. Opinion 39 is specifically approved, but it is noted that there is evidence that the fireball also entered B-423-V. See finding of fact 146, as amended.

121. Opinions 40 through 44 are specifically approved.

122. Opinion 45 is approved in part and modified in part. It is probable that ventilation was not secured to the area of concern on the fourth deck prior to the first explosion. It also is probable that ventilation was not secured until after the second explosion. The delay and method of securing ventilation can be attributed to the inability of DC Central to identify the supply ventilation for compartment B-425-T and a failure of personnel securing ventilation to receive information passed by DC Central

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

for securing exhaust ventilation to that compartment. Thus, personnel securing ventilation were acting on their own, without detailed guidance. See finding of fact 147 as amended.

123. Opinions 47 through 51 are specifically approved.

124. Opinion 52 is specifically approved. MIDWAY is currently reviewing all lessons learned from this casualty.

125. Opinion 53 is specifically approved.

126. Opinion 54 is specifically approved. It is noted, however, that enclosure (8) specifically states that NAVSEASYSKOM has no requirement to inspect or test fuel tank overflow piping.

127. Opinions 55 through 61 are specifically approved.

COMMENTS ON RECOMMENDATIONS:

128. Recommendation 1 is specifically approved. As previously noted in paragraph 126 above, NAVSEASYSKOM apparently has no requirement to inspect or test fuel tank overflow piping.

129. Recommendations 2 and 3 are specifically approved.

130. Recommendation 4 is specifically approved. In addition, the unique situation confronted by the fire party was not covered by fire fighting procedures contained in Chapter 555 of the Naval Ship's Technical Manual (S9086-S3-STM-010). Accordingly, it is recommended that NAVSEASYSKOM revise that chapter to include guidance for fighting this type of fire.

131. Recommendation 5 is specifically approved. This command has established PQS qualifications on an interim basis short of final PQS qualification as fuel oil pumper, transfer pump operator, manifold operator and tank sounder.

132. Recommendation 6 is specifically approved. USS MIDWAY ENGDEPTINST 9540.1C has been revised by ENGDEPTINST 9540.1D to include a 150 PSI pre-transfer test and eliminating the requirement to hold a lesser pressure for a specified time.

133. Recommendations 7 and 8 are specifically approved.

134. Recommendation 9 is approved in part and disapproved in part. This command is in the process of reviewing Flying Squad fast reaction procedures with a view towards reevaluation of initial response reactions. This command also is reviewing composition of the Flying Squad to ensure expertise from all

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

appropriate rates are included. Paragraph 9.2.2 of NWP 62-1 (Rev. C) provides that each ship shall have a designated rapid response team who will proceed directly to the scene when a fire is called away. The cited paragraph also provides that, because immediate response is essential, the rapid response team will not don protective clothing or OBA.

135. Recommendation 10 is specifically approved. MIDWAY recently had a valuable Training Assist Visit, a major focus of which was Damage Control communications. In addition, the DCA and Fire Marshal instituted specific communication procedures to be used to respond to casualties occurring outside of the main propulsion spaces. (Casualties in propulsion spaces are covered in the Main Space Fire Doctrine.) These procedures are designed to ensure that optimal communications are established early and maintained throughout the casualty so that information can be relayed to and from DC Central, acknowledged, and acted upon in a timely manner. In addition, to enhance communications capability, MIDWAY has requested the installation of Damage Control Wire Free Communication.

136. Recommendation 11 is specifically approved. This command has taken the following actions to improve the supervision of fuel oil transfer evolutions, to ensure established procedures are followed, and to require the use of standard and formal communications and procedures between fuel oil transfer stations:

a. Training has been conducted for all Oil Lab personnel on all fuel oil transfer procedures, fuel oil transfer terminology and correct phone-talking procedures;

b. Prior to each transfer, the Fuel Oil Supervisor conducts a briefing to review assigned duties and responsibilities;

c. After each transfer, a debrief is conducted to review and critique the evolution; and

d. Fuel oil transfer evolutions are frequently monitored by supervisory personnel to ensure formal communications are utilized and instructive pre- and post-transfer briefings are conducted.

137. Recommendation 12 is disapproved. As reflected in paragraph 132 above, procedures for transferring fuel have been modified to require a 150 PSI pressure test prior to commencing any fuel oil transfer. Installation of pressure gauges on the discharge side of fuel oil transfer pumps is not required, as attainment of 150 PSI is the only pressure criterion to be met for a successful pressure test.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

138. Recommendation 13 is approved in part and modified in part. It is recommended that NAVSEASYSCOM take action to develop an additional section of the Damage Control Book (0988-LP-130-6011) which lists each compartment and identifies for each compartment the ventilation source, fan location and controller location. Such an index would expedite the identification of the ventilation system serving a given compartment, thereby aiding in fire fighting and damage control efforts. Volume 2(i) of the Damage Control Book presently lists information concerning ventilation systems. To utilize this information, however, personnel must first locate the compartment on damage control plates and then trace through the schematic to locate the ventilation fan. Once the ventilation system number and type are located, reference must be made to Volume 2(i) of the Damage Control Book to determine other compartments ventilated and the location of the controller. Such a lengthy procedure is unacceptable in damage control situations where time is of the essence. It is recommended that NAVSEASYSCOM take this action because the data base used to compile Volume 2(i) also can be used to compile the recommended additional section of the damage control book, and because every ship in the fleet should have similar information. In the interim, MIDWAY is developing ventilation guide lists for all spaces to be provided to repair lockers for use during damage control situations.

139. Recommendation 14 is specifically approved. Following the casualty, this command inspected all spaces where fuel lines and steam lines are co-located and took corrective action where appropriate to ensure that a similar casualty does not occur. In addition, MIDWAY had reviewed and updated the ship zone inspection listing to ensure that it covers all shipboard compartments except sealed spaces and tanks.

140. A hearing will be conducted under Article 15, Uniform Code of Military Justice, concerning the possible false log entries reflected in opinion 23 and enclosure (43).

CONCLUSION

141. Subject to the foregoing, the findings of fact, opinions and recommendations of the Investigating Officer are approved.

B-6

Copy to:
COMSEVENTHFLT
RADM D-6



DEPARTMENT OF THE NAVY

NAVAL SEA SYSTEMS COMMAND
WASHINGTON, D.C. 20362-5101

IN REPLY REFER TO

9555

OPR: 56Y52

Ser: 56Y52/235

5 September 1991

EIGHTH ENDORSEMENT ON RADM *DL*, USN ltr 5830
of 4 July, 1990

From: Commander, Naval Sea Systems Command
To: Judge Advocate General (Code 33)

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE, 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (I) Naval Ships Technical Manual S9086-S3-STM-010, Chapter
555, Firefighting - Ship

Encl: (159) NAVSEA ltr OPR: 56Y5, Ser: 56Y5/142 of 1 May 1991
Subj: Design/Material Lessons Learned From Flash
Fire and Explosions That Occurred In USS Midway
(CV41)

1. Forwarded.
2. In response to recommendation #1 of the basic correspondence, NAVSEA will revise NSTM 505 to address new inspection requirements for flammable liquid tank overflow piping.
3. Do not concur with recommendation #2 of the basic correspondence to modify PMS compartment inspection requirements. All shipboard compartments except sealed spaces and tanks are required to be regularly inspected under MRC 6641/4 2M-3. Space B-425-T in USS MIDWAY should have been included in regularly scheduled PMS compartment inspections in accordance with MRC 6641/4 2M-3.
4. With respect to recommendation #3 of the basic correspondence and paragraph 3 of the seventh endorsement, NAVSEA will revise the General Specifications for Building US Navy Ships, the General Specifications for Overhauling US Navy Ships and NSTM 505 to prohibit flammable liquid piping in catapult steam piping trunks and voids. Recommendation #3 is too broad as written and unsuitable for ship specification requirements. The only high pressure steam piping outside manned main and auxiliary machinery spaces is catapult steam piping which is run in trunks and voids.

2091-91



9008626
ADU 33.3

EIGHTH ENDORSEMENT ON RADM ^{Be}
of 4 July, 1990

, USN ltr 5830

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE, 1990 FIRE ON BOARD USS MIDWAY (CV 41)

5. With respect to recommendation #4 of the basic correspondence, NAVSEA does not concur with using portable equipment to inert a flammable atmosphere in the presence of ignition sources. Inerting can not be successfully accomplished when ignition sources are continuously present. Means for safely injecting inert gas into a space must be present and boundaries tight to prevent introduction of fresh air and loss of inert gas. More importantly, ignition sources must be cooled and a means to remotely monitor the space for hot spots must be available. With respect to comments of the seventh endorsement, NAVSEA is currently evaluating the merits of a penetrator applicator for fire fighting. If results are favorable, this concept will be adopted in new ship design and proposed for fleet backfit.

The most practical and effective method for dealing with a potentially explosive atmosphere is to maintain tight boundaries, seal the space and secure systems that provide the ignition source and the fuel. Use of AFFF can further reduce the risk of fire and explosion by securing fuel vapor and cooling ignition sources. In hindsight, had AFFF been applied to the catapult steam trunk rather than desmoking efforts attempted, an explosion and fire may never have occurred.

6. Do not concur with recommendation #8 of the basic correspondence. Opinion 52 indicated ship's force experienced extreme fatigue when wearing the fire fighters' ensemble and fighting fire. Reference (I), paragraph 555-5.3.9.2 addresses fire fighter fatigue and indicates that personnel should not be fully outfitted in the fire fighters ensemble and OBA for longer than 30 minutes without being relieved. The ensemble is not designed for long stay times in an extremely hot environment. Rapid combustion associated with an explosion can generate extremely high temperatures that can significantly reduce the 30 minute stay time cited in reference (I). Added insulation increases weight and bulkiness. The fire fighters' ensemble represents state-of-the-art personnel protection and a compromise between weight, cost and performance.

EIGHTH ENDORSEMENT ON RADM ^{B-6}
of 4 July, 1990

, USN ltr 5830

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE, 1990 FIRE ON BOARD USS MIDWAY (CV 41)

7. With respect to recommendation #10 as modified by the sixth endorser, NAVSEA is pursuing installation of damage control wirefree communication (WIFCOM) in CV, CVN, LHA and LHD type ships. Hardware is being procured for a TECHEVAL/OPEVAL currently scheduled to start second quarter FY 92. An LHA class ship will be used as the test platform for this program. After a successful OPEVAL now scheduled for the third quarter FY 92, the first CV/CVN DC WIFCOM installation is scheduled to begin fourth quarter FY93.
8. Concur with recommendation #13 of the basic correspondence but not with the comments of the third endorser. Development of a ventilation guide list is better served if accomplished by ship's force. Such lists are required to be developed by fleet units in accordance with paragraph 555-6.3.7.1 of reference (I).
9. With respect to paragraph 5b and 5c.4 of the sixth endorsement, and in conjunction with recommendation #1 NAVSEA will revise NSTM 505 to clarify overflow piping test and inspection requirements. Currently, NSTM 505-1.4.4.B requires each piping system to be subjected to a periodic hydrostatic test of 135 percent of system design pressure. There are no exceptions for tank overflow piping. However, as a result of this fire, these requirements have been reviewed and it was determined that overflow piping which is normally dry and not pressurized with system operating fluid, is not required to be hydrostatically tested to 135 percent of system design pressure. Overflow piping is required to be visually inspected for external pipe corrosion every six months or at first availability.
10. Shortly after this casualty, a NAVSEA team visited USS Midway to conduct a technical review of this fire. Enclosure (8) represents a preliminary report. Enclosure (159) represents the final NAVSEA Design/Material Lessons Learned report. Action is being taken on all recommendations contained in the report.
11. By copy of this endorsement, paragraph #6 of the seventh endorsement is satisfied.

^{B-6}
Deputy Commander for
Ship Design and Engineering

EIGHTH ENDORSEMENT ON RADM 5.6
of 4 July, 1990

USN ltr 5830

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE, 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Copy to:
COMNAVAIRPAC
COMSEVENTHFLT
COMCARGRU 5
COMNAVSAFECEN
COMTRAPAC
USS MIDWAY (CV41)



DEPARTMENT OF THE NAVY

COMMANDER IN CHIEF
UNITED STATES PACIFIC FLEET
PEARL HARBOR, HAWAII 96860-7000

IN REPLY REFER TO:

5830

Ser 00J/5333

03 JUN 1991

SEVENTH ENDORSEMENT on RADM ^{12/6}
of 4 Jul 90

, USN ltr 5830

From: Commander in Chief U.S. Pacific Fleet
To: Judge Advocate General
Via: Commander Naval Sea Systems Command

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Encl: (157) Copy of CONTRAPAC ltr 5830 Ser N36/000398
of 06 Feb 91
(158) CO, USS MIDWAY (CV 41) ltr 5800 Ser 014/1186 of
17 Dec 90 w/ends

1. Readdressed and forwarded. The USS MIDWAY (CV 41) is currently scheduled for decommissioning during FY-92. All recommendations should be viewed in that context.
2. Subject to the following matters, the findings of fact, opinions and recommendations of the Investigating Officer, as endorsed, are approved.
3. As to recommendation 3, requiring correction of all existing occurrences of high pressure steam piping co-located with fuel oil piping is impractical. Co-location of flammable fluid piping and "hot surfaces" (defined as surface temperatures greater than 400 degrees fahrenheit) is authorized under the conditions prescribed by paragraph 505-7.7.2 of enclosure (148). Request COMNAVSEASYSKOM re-evaluate the criteria of paragraph 505-7.7.2 to determine need and feasibility of eliminating co-location of flammable fluid piping and hot surfaces in existing and new construction ships.
4. As to recommendation 4, a portion of the recommendation appears to infer creation of a document prescribing detailed firefighting procedures for every conceivable fire which may occur on a given ship. The creation of such a document is not possible. It is possible to provide principles that govern the best method to attack any fire or damage control situation. Paragraphs 555-6.3.11.1 and 555-6.3.11.1.1 of enclosure (147) pertain. While specifically addressing actions during a Class B Machinery Space fire, the same guidance is equally applicable to the conditions found in USS MIDWAY's compartment B-425-T on 20 June 90. It may be beneficial for COMNAVSEASYSKOM to elaborate on methods for coping with confined flammable vapors, either in a revision to NSTM 555 or in a Damage Control Advisory. Totally new procedures are not necessarily required.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

5. Additionally, that portion of Recommendation 4 concerning development of new equipment is specifically endorsed. A combination penetrator-applicator would have been especially helpful in combating the conditions encountered in compartment B-425-T prior to the first explosion. Use of a hollow penetrator with a 1 1/2" female hose connection allows a fire party to introduce cooling water/fog or AFFF to a compartment without the danger of breaching a fire boundary. Breaching the fire boundary increases the potential for explosion or fire spread. Such a penetrator-applicator is available commercially and has been operationally tested by the CINCLANTFLT Non-Development Item Facility (N432F) in Norfolk, Virginia. Recommend COMNAVSEASYS COM evaluate penetrator-applicator for inclusion in Damage Control Allowance List of all USN ships.

6. COMNAVSEASYS COM is also requested to take Recommendations 1-2, 8, 10 (as modified by COMNAVAIRPAC), and 13 (as modified by CO MIDWAY) for action, reporting status to all concerned.

7. This investigation was readdressed by the Sixth Endorser to include CNET for consideration of a revision of shipboard firefighting training to expand training in explosive vapor handling and to increase SOSMRC training in the area of damage control. Since a copy is provided herein, there is no necessity for formal endorsement by CNET. CNET is requested, however, to provide comment to all concerned as appropriate. Further, by enclosure (157), COMTRAPAC has directed evaluation of the basic document by its subordinates for lessons learned.

8. Enclosure (158), requested by the THIRD ENDORSEMENT, is forwarded. It contains no information which is inconsistent with previous enclosures.

Copy to:
COMNAVAIRPAC
COMSEVENTHFLT
COMCARGRU 5
COMNAVSAFECEN
COMTRAPAC
USS MIDWAY (CV 41)
RADM

USN

B-6

B-6
J



DEPARTMENT OF THE NAVY
COMMANDER TRAINING COMMAND
UNITED STATES PACIFIC FLEET
SAN DIEGO, CALIFORNIA 02147-5030

5830

Ser N36/

00 0398

06 FEB 1991

From: Commander, Training Command, U.S. Pacific Fleet
To: Commander in Chief, U.S. Pacific Fleet
Chief of Naval Education and Training

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (a) COMNAVAIRPAC sixth end 5830 Ser 011/11129 of
21 Dec 90 on RADM , USN ltr 5800 of
4 Jul 90

1. Reference (a) requests CNET consider revision of shipboard firefighting training to expand training in explosive vapor handling and provides copies of the subject investigation to NAVSAFECEN and COMTRAPAC for dissemination of lessons learned.

2. As noted in the investigation executive summary, (Vol I, page 2) "This was a unique situation and one for which there is little or no precedence. There was little guidance available to the Fire Marshall or the ship in dealing with a situation of this nature outside an engineering space where inerting equipment is present." Recommendation No. 4 (page 2) requested, "NAVSEASYSOM develop procedures and portable equipment for use in inerting shipboard spaces containing flammable vapor and heat sources until such time that damage control parties can cool the space below the spontaneous ignition temperature and/or remove the flammable vapor." All endorsers concurred with recommendation No. 4. COMNAVAIRPAC, (page 79, paragraph 5d) also requested COMNAVSEASYSOM address issues of improved damage control procedures and equipment in handling extremely dangerous and unstable situations such as the one which developed in USS MIDWAY.

3. COMTRAPAC has directed the following action:

a. NAVTECHTRACEN Treasure Island, review reference (a) to ascertain if any guidance has been overlooked, and provide recommendations regarding explosive vapor handling training applicability for the following COIs: Gas Free Engineering (K-495-0051), Senior Enlisted Damage Control (A-495-2055) and Advanced Firefighting (J-495-0419).

b. FLETRACEN SDIEGO review reference (a) and provide recommendations regarding explosive vapor handling training applicability to the following COIs: Shipboard Firefighting, (J-495-0412), Shipboard Team Training, (J-495-0418) and Damage Control Team Training, (K-495-0045).

ENCLOSURE 15

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

c. FLETRAGRU SDIEGO review reference (a) to ascertain potential lessons learned for further dissemination.

4. COMTRAPAC will address training related issues and appropriate corrective measures, as warranted based upon reference (a) and recommendations received.

5. COMTRAPAC point of contact is LCDR *Bb* (N36), (619) 524-6744, AV 524.

1 Bb
J
Chief of Staff

Copy to:
COMSEVENTHFLT
COMNAVAIRPAC
COMCARGRU FIVE
COMNAVSAFECEN
USS MIDWAY
FLETRACEN San Diego
COMFLETRAGRU San Diego
NAVTECHTRACEN Treasure Island



DEPARTMENT OF THE NAVY

COMMANDER SEVENTH FLEET

FPO SAN FRANCISCO 96503 6003

IN REPLY REFER TO

5800

Ser 01370613

10 Jun 90

FIFTH ENDORSEMENT OF RADM B-6 USN Ltr 5800 of 4 Jul 90

From: Commander SEVENTH Fleet
To: Judge Advocate General
Via: (1) Commander, Naval Air Force, U.S. Pacific Fleet
(2) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

1. Forwarded.
2. The findings of fact, opinions and recommendations of the investigating officer, as modified by prior endorsers, are approved.
3. Commanding Officer, USS MIDWAY, is directed to provide results of Article 15 hearings and update status of corrective actions taken as a result of this investigation.

B-6

Copy to:
CINCPACFLT
CTF 70
USS MIDWAY
RADM B-6



DEPARTMENT OF THE NAVY
COMMANDER BATTLE FORCE SEVENTH FLEET
COMMANDER CARRIER STRIKE FORCE SEVENTH FLEET
COMMANDER CARRIER GROUP FIVE
FPO SAN FRANCISCO 96601-4305

*All redactions
are B-6*
5800
Ser 004/ 0224
AUG. 03 1990

FOURTH ENDORSEMENT on RADM , USN ltr 5800 of 4 Jul 90

From: Commander Task Force SEVEN ZERO
To: Judge Advocate General
Via: (1) Commander SEVENTH Fleet
(2) Commander, Naval Air Force, U.S. Pacific Fleet
(3) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (g) SECNAVINST 5520.3
(h) COMNAVAIRPACINST C3500.61 (Carrier Readiness and Training)

Encl: (148) NAVSHIPS S9086-RK-STM-010, Chapter 505, (extracts)
(149) USS MIDWAY NOTICE 1301 dtd 19 Jun 90
(150) Statement of FN Dennis S. Whittle, USN dtd 31 Jul 90
(151) NAVPERS 1070/604 of FN D. Whittle (PQS Qualifications)
(152) NWP 62-1(C) Surface Ship Survivability
(153) Memorandum for the Record of LCDR ! dtd 2 Aug 90
(154) Memorandum for the Record (Phonecon LCDR /NAVSEA)

1. Forwarded.
2. The findings of fact, opinions, and recommendations of the investigating officer, as modified by Commanding Officer, USS MIDWAY (CV 41), are approved except as noted below.
3. Reference (g) requires the Naval Investigative Service to initiate a preliminary inquiry in circumstances of "unattended death...when criminal causality cannot be firmly excluded" (paragraph 4a (3)(a)), or "any fire or explosive of questionable origin" (paragraph 4a(3)(b)). Accordingly, the NIS Special Agent Afloat has opened an investigation (CCN 20JUN90-81XU-0088-7HNA).
4. Fuel Transfer Evolution: A substantial portion of the investigation is devoted to the fuel transfer system. This was done in an attempt to determine the source of the fuel in B-425-T. Subsequently, BT3 Austin amended his statement to clarify the circumstances; i.e., a valve had been misaligned during fuel transfer operations earlier in the day (opinions 16-17). The fact the source of the fuel can now be positively identified, renders this general discussion of fuel transfer piping irrelevant.

That portion of the investigation which concerns qualifications of fuel transfer personnel has been reviewed in the prior endorsement and satisfactory remedial actions taken. Reference (h) contains no formal training requirements for oil lab personnel. The formal PQS for watchstations subordinate to Fuel Oil

All reduction
are B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE
1990 FIRE ON BOARD USS MIDWAY (CV 41)

Pumper has now been established by a local ship's instruction. Recommendations 5 and 7 are specifically concurred in. The existing PQS for Fuel Oil Pumper would require approximately six months of training and watchstanding to accomplish. It does not adequately take manning constraints into account or provide for watchstanding at subordinate levels.

BT3 who was technically unqualified to stand watch at the manifold, mistakenly opened the wrong valve (enclosure 46). However, had there been interim PQS for that watchstation, he would probably have been qualified based on his training and experience. Although his error may be attributable to lax watchstanding, he did know which valve should have been turned. This was not the result of any prior valve misalignment. In fact, amended finding of fact 22 states the engineering practice (consistent with EOSS) was for a qualified person to inspect the valves, and then to review the alignment on a piping diagram with an officer. As noted in finding of fact 21, this was done prior to the fuel transfer. Additionally, the wrong valve was turned by BT3 during the evolution, and was not improperly set prior to stationing the fueling team. As stated in finding of fact 26, several transfers had been conducted earlier in the day without incident. It is clear BTFN who was standing watch as sounder under instruction, was aware fuel was not going to the prescribed tank. He reported this to the qualified watchstander, BT3 who was standing next to him, who verified this and ordered the pump secured. Notwithstanding the unauthorized sound-powered phone procedures used by the fueling team, the improper transfer was not in any way caused by these communications.

5. Material Condition of B-425-T: A significant issue is whether ship's force should have known of the conditions in the space and the fuel overflow piping through a reasonable inspection program. The investigation, together with the observations contained in the third endorsement, demonstrates the space was consistently hot and humid. The combination of high-pressure steam drains (which were found to be leaking at the time of the explosion), minimal ventilation and standing water, created a corrosive atmosphere. This is reflected in the corrosion which was evident in the bulkhead to deck seams and fuel overflow piping for B-35-F. The general state of deterioration in the space renders finding of fact 64A invalid, and it is, therefore, disapproved. It is probable there were holes in the overflow piping for a substantial period of time prior to the explosion.

Although enclosure (8) states NAVSEA has no requirement to inspect fuel overflow piping, enclosure (148) requires surface inspection of all piping systems, especially the underside of piping and piping in isolated areas. In contradiction of the memorandum from the NAVSEA Ship Design and Material Lessons Learned Team which is enclosure (8) to the investigation, this is an inspection/testing requirement found in NSTM chapter 505. In section 1.2.2 of the aforementioned manual there is a general visual inspection requirement. A more specific requirement to conduct periodic hydrostatic tests (every 8 years) is found in section 1.4.4. This would normally be done during a major overhaul. The work would require testing of all piping systems from source to hull penetration.

All redactions
are TB6

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Normally, individual lines from tanks would be tested at the first joint in the line. On MIDWAY, this would occur at the check valve found on the third deck. The deteriorated piping would have been discovered during this test had it been conducted. In reference to section 7.7.2, this is the type of space which should be included in the list of spaces through which fuel piping should not be run.

Although these tests should be included as a standard item in all overhaul packages, they are consistently deleted at the type commander level due to high cost involved. This has been the case at COMNAVAIRPAC. Similarly, to the best of LT knowledge, this was not done during the USS INDEPENDENCE SLEP two years ago. On his return from the June 1990 visit to MIDWAY, following the fire, he verified this information at COMNAVAIRPAC.

The improper classification of the space as a "void", removed it from the shipboard space inspection system. In addition, it was not included on the EGL for the damage control PMS compartment/space inspection. The fire prevention inspection program which had been initiated by CDR O'Brien was not directed at piping or installed equipment.

The situation which existed in the space; i.e. the co-location of steam and fuel piping, most likely began with the installation of the steam catapults, approximately twenty years ago. However, as stated in enclosure (154), this would not have been of concern since the fuel in use at the time was NSFO ("black oil"), which had a much higher flashpoint. The later shift to the present fuel did not bring a concomitant review of piping systems for safe design. The designation of the space as a void could have occurred at any time and was not reviewed. The high heat conditions in the space and surrounding areas was known, but perceived to be consistent with the number of steam lines and drains. It is also logical the air in an unlagged sounding tube running through the space would be at the high temperature discussed in enclosure (48) and finding of fact 224. In an attempt to remedy the high temperatures in the surrounding spaces, all piping in the space was lagged. The fuel overflow piping in this space was not included in the work accomplished in enclosure (4). There were no prior instances of fuel in the space, which should have given notice of piping deterioration. See Findings of Fact 56-65A, 74, 196-8, 212-17, 224-5; Opinions 2-4, 25, 33, 53-4.

The synergistic effect of improper design, command inattention and space deterioration caused the explosive atmosphere which led to the fire. Responsibility for these conditions extends in all directions for many years.

6. Initial Actions: A number of issues have arisen, with respect to the qualifications of the designated Fire Marshal, communications between Damage Control Central and the scene, failure to immediately secure ventilation to the space, and alternative actions which may have avoided the explosion. The designation of CWO2 s Fire Marshal is contained in enclosure (149). As discussed in enclosure (153), CWO2 Huffman was initially assigned to duties as Fire Marshal in August of 1989, based on his prior qualification on another ship

All redactions
are B-6

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

ship, his enlisted service as a Chief Hull Technician, and his training on MIDWAY ship systems. Although a response to enclosure (144) has not been received, there is no reason to question his qualifications. Nevertheless, this information should be obtained from Brooke Army Medical Center. The responsibilities of a Fire Marshal listed in enclosure (152) are extensive. Specifically, he is tasked with directing the initial actions of the rapid response team. Further, he is to be in overall charge at the scene, while keeping DC Central informed. This doctrine charges the Fire Marshal with an active role at the scene.

As the fire party was manning up, communications were established between DC Central and the scene via the X50J circuit. CWO2 placed his phonetalker (DCFN on the second deck, at the top of the ladder leading down into the berthing space. Despite having sufficient salt-and-pepper line, the talker was kept nearly two decks away from the scene and the Fire Marshal. Communications were maintained by relaying messages to the scene.

There is a direct disagreement in the statements of the phonetalker on the scene (DCFN and the talker in DC Central (DCFN. They are both qualified sound-powered phone talkers (enclosures 115 and 151), and there is no evidence their communications were interrupted at any time prior to the first explosion. DCFN recollection was the scene requested, and was given, permission to enter. However, in DCFN statement, which was unavailable to the investigating officer due to DCFN ing on emergency leave, this is controverted. In enclosure (150), DCFN stated he passed the DCA's admonition not to enter the space over the circuit, and that DCFN responded with "aye." Also, when the DCA and the Fire Marshal (were discussing the situation on the dial telephone, DCFN overheard the DCA tell CWO2 not to enter the space and to set Zebra. At that time, the DCA was reviewing the fuel piping and ventilation systems to determine the proper course of action.

Based on the information provided in enclosures 75, 76, 144, and 145 an estimated timeline can be established:

- 1150 Flying Squad called away for smoke
- 1210 DCA orders scene to secure exhaust fan 01-83-1
- 1220 DCA and Fire Marshal confer on dial telephone
- 1230 first explosion

The initial actions in DC Central were to determine the exact conditions in the space, including the source of the fuel and means of securing ventilation. The Chief Engineer and DCA both considered the space to be a void with minimal, if any, ventilation. An exhaust (not supply) vent was determined to be the sole source of ventilation to the space and was ordered secured. This order was either not heard or not acted upon. DC Central received no response to this order. When the Fire Marshal called the DCA, he reported desmoking was in progress. In fact, the space had been accessed several times and equipment had been rigged. The Fire Marshal's actions after this conversation are unknown, although HIFN stated that, while they were desmoking, the hatch was suddenly (but partially) dogged. Shortly thereafter, FN Vierra and SN Johnson entered the space. At no time did the

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Flying Squad electricians received instructions to secure ventilation. This was not accomplished until after the second explosion (finding of fact 149). From this, it is apparent that an order was given to secure ventilation, but that it was not effectively understood or carried out.

It is concluded there was some disagreement between CWO2 [redacted] and CWO2 [redacted] on the initial actions in the space. It is clear CWO2 [redacted] recognized the dangerous situation and informed the Fire Marshal of this (findings of fact 94, 108). Nevertheless, CWO2 [redacted] commenced action to desmoke the space (opinions 29, 30). This disagreement was further complicated by the DCA's direction not to enter the space, which prompted CWO2 [redacted] to call DC Central on the dial telephone. It is probable some desmoking of the space was in progress at the time. Nonetheless, it is reasonable for the DCA to rely on the experience of a warrant officer fire marshal, who was present at the scene and had better information. The actions which were then taken were purely "judgment calls" in a unique situation for which little guidance had been provided in training or instructions. There was very little to prepare CWO2 [redacted] in his response to the situation, as stated in opinion 34. The only way to "vent" such an explosive space is to force inerting gas into the space at the same volumetric rate as the fuel vapor was removed. By recommendation 4, it is obvious this is a Navy-wide deficiency. During their dial telephone conversation, the Fire Marshal informed the DCA some desmoking had begun. Regardless of where the initial decision to secure ventilation rests (see finding of fact 147A), DC Central was making attempts to initiate that process (finding of fact 147).

7. The comments contained in paragraphs seven through nine of the third endorsement are concurred in. As it is apparent no adverse information is included in enclosures (129) through (132), JAGMAN section 0306 warnings are not required. In the event these, or other, witnesses, especially CWO2 [redacted], become able to provide further information, statements should be obtained from them. In general, since all information which was obtained from witnesses relates to their performance of military duties, Privacy Act acknowledgments are not required. That they have been executed and included in the investigation does not, however, adversely affect their interests or the validity of the investigative report.

8. Commanding Officer, USS MIDWAY is requested to forward the results of any UCMJ Article 15 hearings for inclusion in the report of investigation. Also, as final damage costs are available, USS MIDWAY is requested to forward same.

All indications
all B-6.

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE
1990 FIRE ON BOARD USS MIDWAY (CV 41)

9. Since Naval Sea Systems Command is involved in recommendations 1 through 4,
and 8, and to adequately respond, a copy of this investigation and endorsements
should be provided.

36 2

Copy to:
RADM *sk*
USS MIDWAY

From: RADM , USN
To: Commander SEVENTH Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCE CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV-41)

Ref: (a) JAG Manual
(b) MILPERSMAN 4210100 Item Papa
(c) USS MIDWAY Engineering Department Instruction
9540.1C; Fueling Operations
(d) USS MIDWAY EOSS for Fuel Transfer Operations
(e) NAVSHIPS 0947-176-4010: TECHMANUAL for Fuel Oil
Transfer Pump
(f) USS MIDWAY EOSS for Boiler Operations

Encl: (1) Commander SEVENTH Fleet ltr 5800 Ser 013/0406
dtd 25 Jun 90
(2) Executive Summary of Investigation Results, with
photos, showing firefighting attire
(3) SRF Yoko Memorandum C-212 of 03 Jul 90; Structural
Boundary Air Testing Procedures for Tanks and Voids-
FY88 EIRSA Carrier Life Extension Repair Program
(CLER Program)
(4) SRF Yoko Job order 5316 12317 Tanks and Voids FY88
EIRSA (CLER Program)
(5) SRF Yoko Hardness Test/Metallurgical Inspection
of Catapult Steam Pipe in B-425-T of 25 Jun 90
(6) SRF Yoko Strength/Tightness Test on 10 inch
Catapult Steam Piping and Drains in B-425-T of
26 Jun 90
(7) SRF Yoko Hardness Test and Melting Point
Measurement of Silver Ring Pipe Seals of 26 Jun 90
(8) NAVSEA TECHNICAL INVESTIGATION TEAM ltr of 26 Jun 90
(9) Diagram of Second Deck USS MIDWAY at Hatch 2-85-1
(10) Diagram of Third Deck USS MIDWAY at Armored Access
3-83-1
(11A) Diagram of Fourth Deck USS MIDWAY between B-425-T
and B-417 1/2-T
(11B) Drawing of B-425-T showing internal arrangements and
measurements
(12) USS MIDWAY Deck Log Sheets From 1100 Through 2400,
20 Jun 90
(13) USS MIDWAY Damage Control Message Form-Time 1543,
20 Jun 90
(14) USS MIDWAY Damage Control Message Form-Time 1551,
20 Jun 90
(15) USS MIDWAY Damage Control Message Form-Time 1812,
20 Jun 90
(16) USS MIDWAY Damage Control Message Form-Time 1844,
20 Jun 90

- (17) USS MIDWAY Damage Control Message Form-Time 2116,
20 Jun 90
- (18) USS MIDWAY Damage Control Message Form-Time 0813,
21 Jun 90
- (19) USS MIDWAY Damage Control Central Log 0400,
20 Jun 90 to 2400, 21 Jun 90
- (20) USS MIDWAY Engineering Log 20 Jun 90
- (21) USS MIDWAY Fuel Oil Pumper's Log, 19 and 20 Jun 90
- (22) USS MIDWAY Oil Lab Liquid Loads Log, 19 and
20 Jun 90
- (23) USS MIDWAY Fuel Oil Transfer System Alignment Check-
Off List 20-24, 19 Jun 90
- (24) USS MIDWAY Fuel Oil Transfer System Alignment Check-
Off list 04-08, 20 Jun 90
- (25) USS MIDWAY Medical Log 20 and 21 Jun 90
- (26) USS MIDWAY Medical Department Eight O'clock Report
of 20 Jun 90
- (27) Certificate of Death of Jeffrey Allen Vierra
- (28) Certificate of Death of Ulric Patrick Johnson
- (29) Personnel Casualty/Death Report for DC3 Robert Shane
Kilgore
- (30) USS MIDWAY Catapult Steam Space Walkthrough
11 Aug 89 and 14 Feb 90
- (31) USS MIDWAY Zone Inspection Instruction 4790.1D
- (32) Naval Message to Commanding Officer Brooke Army
Medical Center, Fort Sam Houston TX and Reply
- (33) Diagrams (3) USS MIDWAY Catapult Steam System
(Diagrams 33A, 33B, and 33C)
- (34) USS MIDWAY EOOW Watchbill 11-28 Jun 90
- (35) USS MIDWAY Flying Squad Assignments
- (36) NAVSEA 59086-SN-STM-000/CH-541: F-76 Flammability
Characteristics
- (37) USS MIDWAY Oil Lab PQS MATRIX
- (38) USS MIDWAY Memorial Service Program for
FN Jeffrey A. Vierra and MSSN Ulric P. Johnson on
25 Jun 90
- (39) USS MIDWAY Memorial Service Program for
DC3 Robert Shane Kilgore on 1 Jul 90
- (40) USS MIDWAY INSURV Inspection Report of 11 Apr 88
- (41) MATRIX of Firefigthing Attire Worn on 20 Jun 90
- (42) Statement of BTFN of 02 Jul 90
- (43) Statement of BT3 03 Jul 90
- (44) Statement of BTCS , 02 Jul 90
- (45) Statement of BT2 02 Jul 90
- (46) Statement of BT3 03 Jul 90
- (47) Statement of BT1 of 02 Jul 90
- (48) Statement of BT3 of 02 Jul 90
- (49) Statement of BTFN of 02 Jul 90
- (50) Photograph of Fuel Oil Manifold with Fill Valves
7-88-11 and 7-88-5
- (51) Photograph of Fuel Oil Overflow Pipe for Tank B-33-F

- (52) Photograph Showing B-35-F Sounding Tube, Fuel Oil Overflow Piping and 5 inch Catapult Feedwater and Supply Lines
- (53) Photograph of Ventilation Supply Duct in B-425-T
- (54) Photograph of High Pressure Drain Lines off 10 inch Steam Pipe in B-425-T
- (55) Photographs of High Pressure Drain Flex Line in B-425-T (Photographs 55A, 55B and 55C)
- (56) Photograph of Open Air Test Fitting in B-425-T Penetrating Bulkhead to B-423-V
- (57) Photograph of Air Test Fitting from B-425-T Exiting Bulkhead in B-423-V
- (58) Photograph of Support Beam in B-425-T
- (59) Photograph of Bulkhead and Vertical Support Beam in B-425-T, Thinned by Corrosion
- (60) Photograph of Fuel Oil Overflow Pipe from Tank B-33-F corroded in B-425-T; Looking Forward Horizontally
- (61) Photograph of Fuel Oil Overflow Pipe from Tank B-33-F Corroded in B-425-T Looking Down Vertically
- (62) Photograph of Fuel Oil Overflow Pipe from B-33-F, Removed from B-425-T, Showing Large Area of Deterioration
- (63) Photograph of Fuel Oil Overflow Pipe from B-33-F, Showing Wall Thickness and Deterioration
- (64) Statement of HT1 of 05 Jul 90
- (65) Statement of DC1 of 02 Jul 90
- (66) Memorandum for the Record of CDR of 01 Jul 90
- (67) Statement of HTFN of 02 Jul 90
- (68) Statement of DCFN 02 Jul 90
- (69) Statement of CWO2 of 02 Jul 90/
21 Jun 90
- (70) Statement of LT of 02 Jul 90
- (71) Statement of LCDR of
02 Jul 90
- (72) Statement of DC3 of 22 Jun 90
- (73) Statement of DCFN of 02 Jul 90
- (74) Statement of DS2 of 02 Jul 90
- (75) Statement of CDR 1 of 02 Jul 90
- (76) Statement of LCDR of 02 Jul 90
- (77) Statement of DC3 of 29 Jun 90
- (78) Statement of AO3 of 03 Jul 90
- (79) Photograph of Watertight Door 4-90-3 Leading to Space B-425-T
- (80) Statement of DCFN of 23 Jun 90
- (81) Photograph of Exit Point of Explosion from B-425-T
- (82) Photograph of Exit Point of Explosion from B-425-T
- (83) Photograph of Exit Point of Explosion from B-425-T
- (84) Photograph of Damage to Watertight Door 4-90-3 Leading from B-425-T
- (85) Photograph of Damage to Watertight Door 4-90-3 Leading from B-425-T

All redactions
 are B-6

- (86) Photograph of Starboard Aft Corner of B-421 1/2-A, Showing Blast Damage (Looking Aft)
- (87) Photograph of Starboard Aft Corner of B-421 1/2-A, Showing Blast Damage (Looking Forward)
- (88) Statement of FN of 03 Jul 90
- (89) Photograph of Hatch 2-85-1, Leading from Third Deck to Second Deck
- (90) Photograph of Armored Hatch 3-83-1 Leading from Third Deck to Fourth Deck
- (91) Statement of DC1 of 02 Jul 90
- (92) Photograph of Silver Ring Pipe Seals in Compartment B-421 1/2-A
- (93) Statement of LT of 02 Jul 90
- (94) Photograph Showing Separated Bulkhead, Vertical Beam and Watertight Door 4-90-3 Blown from B-425-T into B-421 1/2-A
- (95) Statement of CWO2 of 02 Jul 90
- (96) Statement of HM3 of 24 Jun 90
- (97) Statement of DCFN of 02 Jul 90
- (98) Statement of FN of 22 Jun 90
- (99) Photograph of Hole Punched in Vent to B-425-T
- (100) Photograph of Exhaust Vent in B-425-T (Entry Point of AFFF)
- (101) Statement of CAPT of 24 Jun 90
- (102) Photograph of Door 4-87-1 Between B-421 1/2-A and B-417 1/2-A
- (103) Estimated Cost of Damage of USS MIDWAY Fire of 20 Jun 90
- (104) Photograph of Storage Bin in B-417 1/2-A
- (105) Photograph Showing Limited Damage from Heat in Compartment B-429 1/2-A (7 AC Machinery Room)
- (106) Statements (4) Concerning Fuel Leaks in B-425-T since Dec 87
- (107) Statement of EM3 of 02 Jul 90
- (108) Statement of EMCS of 02 Jul 90
- (109) Statement of HT1 of 02 Jul 90
- (110) SRF Yoko Hydro of B-33-F Fill Manifold Valve of 28 Jun 90
- (111) Calibration Report on Tank Level Indicator Alarms of 10 Jan 90
- (112) SRF Yoko Fire Damage/Emergent Repair Inspection of Fuel Overflow Pipe of 05 Jul 90
- (113) Statement of LCDR Regarding the 28 Jun 90 Manifold Hydro Test of Valves 7-88-5 (B-33-F Fill Valve) and 7-88-11 (B-25-F Fill Valve)
- (114) SRF Yoko Fire Damage/Trunk Deck Plate Thickness Measurements in B-425-T of 27 Jun 90
- (115) USS MIDWAY Flying Squad POS Records (56)
- (116) Statement of CAPT Commanding Officer, USS MIDWAY
- (117) Naval Safety Center Norfolk, Virginia Aircraft Carrier Advisory on Fuel System Hazard

All redactions are B's

All redactions are B6

- (118) EOSS Diagram of USS MIDWAY Fuel Oil Transfer System Between Frames 47 and 99
- (119) Results of Test Conducted on Fuel Tank B-33-F of 03 Jul 90
- (120) Statement of LCDR [redacted] Regarding the Overall Condition of Firefighting Training and Readiness on USS MIDWAY
- (121) Statement of FA [redacted] of 28 Jun 90
- (122) Statement of CWO2 [redacted] of 02 Jul 90
- (123) Statement of BM1 [redacted] of 02 Jul 90
- (124) Statement of EM2 [redacted] of 02 Jul 90
- (125) [redacted] NLSO Claims Officer, ltr of 09 Jul 90

PRELIMINARY STATEMENTS

1. On 23 June 1990, RADM [redacted], Commander, Amphibious Forces SEVENTH Fleet, was appointed by Commander SEVENTH Fleet to conduct a JAG Manual Investigation into the circumstances surrounding a fire on board USS MIDWAY (CV-41) which occurred 20 June 1990, in the waters south of Japan at 35 degrees, 51 minutes North by 142 degrees, 12 minutes East. Captain [redacted], Commander Destroyer Squadron Fifteen, served on the investigation board as the engineering technical expert, Commander [redacted], CTF-76 Staff served as analyst and LT [redacted]. JAGC, provided legal counsel to the investigation. Enclosure (1) refers.

2. RADM [redacted] arrived at Yokosuka, Japan on 23 June, boarded USS MIDWAY (CV-41) and commenced the investigation immediately. The investigation included, among other things, a technical analysis of the mechanical operation of certain valves in the fuel transfer system, melting point analysis for silver ring pipe seals discovered in the space subjected to the fire and the structural integrity of various fuel system piping, steam fittings and hoses. Interviews of all personnel involved in coping with the fire before, during and after the fact, were conducted.

3. All personnel interviewed executed Privacy Act Acknowledgments in accordance with 0308 of reference (a). The injured sailors interviewed were additionally warned of their right not to comment on the origin of their injuries in accordance with SS 0306 of reference (a).

4. All interviews were taped using court reporting equipment and transcribed into summarized statements. Each individual interviewed was presented a summary of their remarks and asked to thoroughly review the document for accuracy and completeness prior to signing the statement. LN2 [redacted] USN, USS MIDWAY (CV-41) Legal Office; PN2 [redacted] USN, USS MIDWAY (CV-41) Receipts Office; LN1 [redacted] USN, COMSEVENTHFLT Staff; YN2 [redacted] USN, COMSEVENTHFLT Staff; YN3 [redacted] USN, COMSEVENTHFLT Staff; YNSN [redacted] USN,

All reductions are TS-6.

COMSEVENTHFLT Staff; and YNSR USN, COMSEVENTHFLT Staff, provided clerical services and prepared the summarized statements. They have been sworn in accordance with SS 0415 of reference (a).

5. Witnesses were not under oath during initial interviews. When issues surrounding the incident became more narrowly focused, specific key personnel were recalled.

6. During the period 24 - 26 June 1990, a NAVSEA Fire Investigator Team visited the USS MIDWAY (CV-41) to provide technical assistance to the Investigating Officer and to identify possible ship design or material deficiencies which may have contributed to the mishap. The team was composed of Mr. SEA56V5 team leader, LT USN, SEA56Y3, Mr. SEA 55XT and Mr. SEA56Y5. The team provided a written report which is attached as enclosure (8).

7. Testing Data:

Suspecting certain valves in the catapult steam system may have been leaking, a request was made to NAVSHIPREPFAC Yokosuka to remove and test these valves. An on board hydro was also conducted on the 10 in. steam piping in B-425-T. In addition a melting test was performed on silver ring pipe joint seals and an analysis was conducted on the metal composition of the fuel overflow piping in B-425-T. A deterioration rate was also examined for the pipe. Hydrostatic tests were also conducted on the two-valve fuel oil manifold containing valves 7-88-5 and 7-88-11. The reports of these tests are attached as enclosures (6), (7) and (112).

8. All black and white photographs included in the report were taken by the Photo Lab, USS MIDWAY (CV-41). The 35 photographs are included as various enclosures and are certified to be accurate depictions of the spaces and equipment in USS MIDWAY (CV-41).

9. Diagrams of spaces in USS MIDWAY (CV-41), included as enclosures (9), (10), (11A), (11B), (33), and (118), are accurate representations of equipment location, but are not drawn to scale.

10. Commander Surface Material Officer CARGRU-5 was appointed to conduct a preliminary inquiry on 20 June 1990. CDR requested written statements from all involved personnel and collected logs, watchbills, physical evidence and instructions deemed necessary. He was assisted by Special Agent of NIS. Collected material was turned over to the Investigating Officer by CDR.

11. Physical evidence gathered during this investigation which may be relevant to future inquiries into this matter was left in the custody of LT. All documentary evidence attached are the original documents where possible. Where specific documents

must be retained by USS MIDWAY (CV-41), certified true copies have been substituted in the record.

12. An advance copy of this report has been forwarded to the Judge Advocate General in accordance with SS 0211 of reference (a). Status of Investigation Reports (SIR's) have been transmitted in accordance with reference (b).

13. Due to the voluminous length of this report, an executive summary containing key facts, opinions and recommendations, and identifying the most critical witnesses/statements is included as enclosure (2).

14. As in most investigations where a large number of people are interviewed, individual recollections conflicted. In determining what weight to give each witness, the declarant's demeanor, creditability and prior military record were carefully assessed. Additional efforts to corroborate evidence were undertaken whenever possible. In the end, the Investigating Officer reported the most probable chain of events and circumstances surrounding the mishap based on all testimonial and physical evidence considered.

FINDINGS OF FACT

I. PLANT STATUS

1. Tanks B-25-F and B-33-F are fuel oil service tanks which serve NR 2A boiler. [Reference C].
2. NR 2A boiler was secured at 0023 on 20 June 90 and remained secured and under steam blanket layup through 21 June 90. [Enclosure 20].

II. FUEL OIL TRANSFER PROCEDURES

3. Prior to and immediately after fuel oil transfer from a storage tank to a service tank, a pressure test of the fuel oil transfer system between storage and service tanks is required to be conducted. [Reference C].
4. One purpose of the prior-to-transfer fuel oil transfer system pressure test is to verify proper transfer system alignment between the fuel oil transfer pump discharge valve and the fill valves to service tanks intended to be filled. [References C and D].
5. The prior-to and post-transfer fuel oil transfer system pressure tests are conducted with the transfer system valves opened along the intended route of transfer from the fuel oil transfer pump discharge valve to the service tank fill valves. The pump discharge valve, tank fill valves and all branch line valves are closed during the pressure test. [Reference C].

6. The ship's instructions require the fuel oil transfer system pressure test to be conducted at a system pressure of not less than 60 psi and not more than 100 psi. The required test duration is approximately three minutes. [Reference C].

7. EOSS procedure FOMT requires fuel oil transfer system pressure tests to be conducted at 150 psi. [Reference D].

8. Ship's instructions and EOSS procedures do not specify a maximum allowed pressure drop during the system pressure test. [References C and D].

9. No pressure gauge is installed in the fuel oil transfer system on the discharge side of the fuel oil service pump check and discharge valves; consequently, oil lab personnel are unable to monitor system pressure during the pre or post-transfer pressure tests. [Enclosures 42, 43, 44, and 45].

10. Actual practice in the conduct of pressure tests is to raise system pressure above 60 psi, to secure the pump, to wait three minutes, then to relieve pressure to the furthestmost service tank. A satisfactory test is considered to have been conducted, if pressure can be sensed to relieve through the tank fill valve when cracked open. [Enclosures 42, 43, 44, 45, and 46].

11. Given proper system alignment between the fuel oil transfer pump discharge valve and service tank fill valves, a satisfactory prior-to-transfer system pressure test would indicate all transfer system valves which were intended to be closed, including fill valves associated with service tanks, were, in fact, closed and that the closed valves did not leak through. [Reference C].

12. One purpose of the post-transfer fuel oil system pressure test is to verify all tank fill valves which had been opened incident to service tank filling were returned to the closed position after filling and that those valves did not leak through. [Reference C].

III. FUEL OIL TRANSFER OPERATIONS AND QUALIFICATIONS FOR OPERATIONS

13. On 19 June 90 between 2139 and 2236, fuel oil was transferred from storage tank A-4 1/2-F to service tanks B-33-F, B-58-F, B-50-F and B-26-F. Subsequent to the transfer, and between 2236 and 2239, a satisfactory post-transfer pressure test, under the supervision of BT3 Jones, was reported to have been conducted. [Enclosures 21 and 22].

14. During the fuel oil transfer operation, BT3 _____ was Fuel Oil Supervisor, BT2 _____ was Fuel Oil Supervisor (under instruction), BTFN _____ was pump operator, BTFN _____ was manifold valve operator and BT2 _____ was tank sounder. [Enclosures 21, 23 and 24 of 19 June 90, 20-24].

All redactions are 15-6.

All redactions are B6.

15. BT3 was final PQS qualified for Fuel Oil Pumper, but BT2, BTFN, BTFN, and BT2 were not PQS qualified for any fuel oil transfer duties. [Enclosure 37].
16. The Oil Lab PQS does not contain qualification procedures for any fuel oil transfer duty except fuel oil pumper. [Enclosure 37].
17. Specific qualification requirements, short of final PQS Fuel Oil Pumper qualification, for personnel performing duties as tank sounders, manifold operators and transfer pump operators are not delineated in any instructions. [Enclosure 37].
18. The capacity of tank B-33-F is 15,111 gals. or 32ft. 5 3/4in. by sounding. After completion of filling at 2236 on 19 June 90, soundings indicate B-33-F was filled to a 30ft. 9in. level which equates to 14,296 gals., or approximately 94.6 percent of capacity. [Enclosure 21].
19. Between 2236 on 19 June 90 and 1220 on 20 June 90, no fuel oil transfer involving tank B-33-F is recorded in any oil lab logs or the Engineering Smooth Log. [Enclosures 20 and 21].
20. Prior to 0659 on 20 June 90, preparations were made to transfer fuel from tanks A-4 1/2-F, and A-8 1/2-F to service tanks B-54-F, B-42-F, B-49-F, B-34-F and B-25-F. [Enclosure 21].
21. The alignment of the fuel oil transfer system was made during the midwatch on 20 June 90 by BT2 Fuel Oil Supervisor (under instruction). and approved by BT3 Fuel Oil Supervisor, BT2 Oil Lab Supervisor, and BTC Engineering Officer of the Watch. [Enclosure 22].
22. ENGDEPTINST 9540.1C requires that the alignment be checked by "the Fuel Oil Supervisor or a qualified pumper and an assigned officer"; however, no one checked the system lineup, other than reviewing the alignment diagram with BT2. [Reference C and Enclosure 24].
23. After the fuel oil transfer system was aligned during the midwatch on 20 June 90, but prior to the system pre-transfer pressure test, all fuel oil watch personnel were relieved at approximately 0330. [Enclosures 21, 23 and 24].
24. After the oil lab watches had been relieved, the fuel oil transfer system lineup was not reverified except via a pre-transfer system pressure test. [Enclosures 21 and 43].
25. Between 0659 and 0702 on 20 June 90, a satisfactory pre-transfer system pressure test was reported to have been conducted between NR 1 fuel oil transfer pump discharge valve and the fill valve to tank B-54-F in preparation for filling B-54-F, B-49-F, B-34-F, and B-25-F. [Enclosures 20 and 21].

All indications TB6.
etc

26. Between 0703 and 0821 on 20 June 90, fuel oil was transferred from tanks A-4 1/2-F and A-8 1/2-F to B-54-F, B-42-F, B-49-F, B-34-F and B-25-F. [Enclosures 20 and 21].

27. At the time of the commencement of fuel oil transfer, BT1 was Oil Lab Supervisor, BT3 was Fuel Oil Supervisor, BT3 was sounder, BTFN was sounder (under instruction), BT3 was valve manifold operator and BTFN was pump operator. [Enclosures 21, 23, 24, 42, 43, 46, 47, 48 and 49].

28. At approximately 0730 BT1 relieved BT1 as Oil Lab Supervisor. [Enclosures 21, 23, and 24].

29. All oil lab personnel involved in the fuel oil transfer evolution were final PQS qualified for their assigned duties, except BT3, BTFN and BTFN who were not PQS qualified for any oil transfer duties. [Enclosure 37].

IV. EVENTS LEADING TO OIL SPILL

30. Prior to transfer operations tank, B-25-F was sounded and the level was recorded as 18ft. 5in. in the pumpers log for 20 June 90. [Enclosure 21].

31. BTFN and BT3, during questioning in the course of the investigation, stated that the B-25-F prior-to-transfer tank sounding was 14ft. 1in. [Enclosures 48 and 49].

32. The discrepancy between the recorded level and stated level regarding the B-25-F prior-to-transfer sounding could not be resolved. [Enclosures 21, 48 and 49].

33. After commencement of pumping operations to fill tank B-25-F, initial soundings by BTFN showed no change in the oil level of the tank. [Enclosure 49].

34. BTFN had recently been assigned to the oil lab and had conducted soundings on approximately 10 other tanks before taking soundings on tank B-25-F on 20 June 90. [Enclosure 49].

35. BTFN sounded tank B-25-F at least two times before questioning BT3 as to why the tank level was not changing. After BTFN reported no change in B-25-F tank level soundings, soundings were checked by BT3 who verified BTFN's soundings and ordered the pump secured. [Enclosures 48 and 49].

36. The pump was operating on high speed, with a rated capacity of 700 gpm, while BTFN and BT3 sounded tank B-25-F to verify the level was not changing. [Enclosures 42, 48 and 49 and Reference E].

All redactions
are B6.

37. An estimated one to two minutes elapsed between BTFN first attempt to sound B-25-F and BT3 order to secure the fuel oil transfer pump. In two minutes of operation on high speed, NR1 fuel oil transfer pump could pump 1,400 gals. At the time of the commencement of transfer operations, tank B-33-F had 5.4 percent, or 815 gals., of capacity remaining. [Enclosures 21, 42, 48 and 49 and Reference E].
38. When no change in the level of B-25-F was verified by BT3 advised BT3 to check valve 7-88-11, the fill valve to B-25-F, for proper alignment. [Enclosures 46 and 48].
39. After the lineup to tank B-25-F was first questioned by BT3, BT3 reported he had verified proper alignment. The lineup had in fact been to B-33-F vice B-25-F; however, the temporary misalignment was not reported to anyone by BT3 [Enclosures 46 and 48].
40. The fill valves to tanks B-25-F and B-33-F, valves 7-88-11 and 7-88-5 respectively, are located on the same manifold in NR 2A fireroom with valve 7-88-11 being located immediately adjacent to valve 7-88-5. [Enclosures 46, 50 and 118 and Reference D].
41. Valves 7-88-11 and 7-88-5 are clearly labeled and indicate the tanks serviced. [Enclosure 50].
42. BT3 did not specifically check the label on valve 7-88-11 to verify it was the fill valve to tank B-25-F before operating. [Enclosure 46].
43. BT3 stated he used relative valve position on the manifold, rather than valve labels, and that valves servicing lower numbered tanks were always located inboard of higher numbered tanks on the same manifold. [Enclosure 46].
44. The fill valve to tank B-25-F is located inboard of the fill valve to B-33-F on the 2A fireroom two-valve manifold. [Enclosures 46 and 50 and Reference D].
45. BT3 inadvertently opened valve 7-88-5 rather than valve 7-88-11, thus sending fuel to B-33-F rather than B-25-F. [Enclosure 46].
46. Sometime after BT3 reported verifying proper lineup to tank B-25-F and the pump was restarted, soundings indicated a rising oil level in tank B-25-F. [Enclosures 48 and 49].
47. Approximately two minutes after tank B-25-F sounding began to rise, pump discharge pressure was lost due to loss of suction. The pump was stopped and suction was shifted to tank A-8 1/2-F, whereupon, the pump was restarted. [Enclosures 42, 46, 48 and 49].

48. At the time suction was lost, tank B-25-F was sounded and the level measured as approximately 19ft. [Enclosure 49].

49. Tank B-25-F was filled to a level of 29ft. 11in., which equates to 13,732 gals. or approximately 92.8 percent capacity, before pumping was secured. [Enclosures 20 and 21].

50. No soundings were taken on tank B-33-F immediately after the completion of the transfer operation at 0821. [Enclosure 21].

51. Tank B-33-F is fitted with a high level alarm which sounds in 2A fireroom, but the operating condition of the alarm on 20 June 90, or whether it was energized, could not be determined. [Enclosures 8, 48, 111 and 121].

52. A satisfactory post-transfer system pressure test was reported to have been conducted between 0821 and 0824 on 20 June 90. [Enclosures 20 and 21].

V. OVERFLOW PATH, PHYSICAL LAYOUT AT SCENE OF SPILL

53. Tank B-33-F overflows to tank B-51-F. The fuel oil overflow piping exits the tank top into compartment B-425-T, a catapult steam line trunk, and rises vertically through and across that compartment before exiting through the overhead. [Enclosures 8, 11B, 51 and 118].

54. Compartment B-425-T is approximately 4ft. wide, fore and aft, 11.25ft. long, port to starboard, and 8ft. high; the compartment is accessed through water tight door 4-90-3, located on the port side of the forward bulkhead of the compartment and opening into compartment B-421 1/2-A, or through watertight manhole 4-90-3, located on the starboard bulkhead and opening from compartment B-423-V. [Enclosure 11].

55. Compartment B-425-T shares a common forward bulkhead with compartment 4-421 1/2-A, a shipfitter parts storeroom, a common starboard bulkhead with compartment 4-423-V, a void, a common after bulkhead with compartment B-429 1/2-E, NR 7 air conditioning machinery room, and a common port bulkhead with compartment B-421-V, a void. [Enclosure 11].

56. In addition to the overflow pipe for tank B-33-F, the following piping systems also enter and exit compartment B-425-T: tanks B-33-F and B-35-F sounding tubes, tank B-35-F fuel oil overflow piping, a catapult feedwater supply line about 5in. in diameter and a catapult steam line approximately 10in. in diameter. [Enclosures 11B and 52].

57. Compartment B-425-T is serviced by a forced ventilation system. The supply vent ducting is approximately 3in. in diameter, enters through the compartment overhead and descends vertically to a point about 12.25in. off the deck where it terminates. The

exhaust vent is approximately 2.5in. in diameter and is located in the overhead of the starboard, forward corner of the space. During the course of the investigation, supply air pressure was measured and determined to be approximately 1/4in. of water. [Enclosures 11B, 53 and 113].

58. Access to compartment B-417 1/2-T is gained from the third deck via an armored hatch located in compartment B-307-1 which serves as VAW-115 berthing. The hatch opens from the overhead of compartment B-417 1/2-T, an access trunk. From compartment B-417 1/2-T, access is gained to compartment B-417 1/2-A, a shipfitter's storeroom, via watertight door 4-84-3, then to compartment B-421 1/2-A, a second shipfitter's storeroom, via watertight door 4-87-1, then to compartment B-425-T via watertight door 4-90-3. [Enclosures 10 and 11A].

59. The catapult steam line in compartment B-425-T is fitted with a nested arrangement of high pressure drain lines located on the starboard side of the compartment. The high pressure drain lines exit B-425-T into B-423-V through a watertight bulkhead. The bulkhead penetration is approximately 10in. above the deck. [Enclosures 11B, 54 and 55].

60. The bulkhead penetration of the high pressure drain line is designed to be watertight; however, the penetration was not watertight because four of four bolts were missing from the collar around the drain line which mates it to the bulkhead and provides the watertight seal. [Enclosure 55].

61. The high pressure drain nest was removed from the space on 24 June 90, after USS MIDWAY's return to Yokosuka, Japan on 21 June 90. The drain nest was hydrostatically tested by NAVSHIPREPPAC Yokosuka Shop 56 and determined to be leaking around three valve packing glands, at two orifice plate gaskets and through a pinhole in a nipple attached to a flexible high pressure hose. [Enclosures 5, 6 and 55C].

62. A compartment air test fitting located on the bulkhead between compartments B-425-T and B-423-V was not capped, allowing communication between the two compartments. [Enclosures 56 and 57].

63. The bulkhead-to-deck welded seams on all four sides of compartment B-425-T, the deck of the compartment, the bulkhead stiffeners on all four sides and various areas of the lower portions of all four bulkheads were thinned by corrosion. [Enclosures 58 and 59].

64. The lower portion of B-33-F fuel oil overflow piping, from where it enters compartment B-425-T to a point about 1ft. above the deck, was deteriorated from corrosion and holed in numerous places, including one hole approximately 3in. in diameter and dozens of smaller holes. [Enclosures 60, 61, 62, 63, and 112].

All redactions are B-6.

65. The overflow piping for tank B-35-F was lagged, and after the lagging was removed during the course of the investigation, the pipe was found to be deteriorated from corrosion but without visible holes. [Enclosure 52].

66. The sounding tubes for tanks B-33-F and B-35-F were visually examined during the course of the investigation and determined to be intact. [Enclosure 52].

VI. EVENTS LEADING TO FIRST EXPLOSION

67. At approximately 1115 on 20 June 90, fuel oil was discovered pooled in compartment 4-421 1/2-A by DCFN and reported to HT1, in turn, informed CWO2 [Enclosures 64, 65 and 66].

68. BT3, Fuel Oil Supervisor, was called to the scene and observed a small pool of fuel oil, an estimated one to two gallons total volume, on the deck adjacent to the bulkhead separating compartment 4-421 1/2-A from compartment 4-425-T, the catapult steam trunk. [Enclosure 43].

69. CWO2, the Fire Marshall, was notified of fuel on the deck of B-421 1/2-A and arrived on scene at approximately 1120, 20 June 90. [Enclosure 64].

70. Various personnel on scene observed the pooled oil on the deck and estimated the total volume to be between one and four gallons. [Enclosures 43 and 69].

71. The exact source of the fuel could not be immediately determined because a metal shelf, approximately 4in. off the deck, prevented a clear view of the deck area where the oil was pooled. [Enclosures 43, 44, 47, 64 and 69].

72. Immediate efforts were made to wipe up the oil using rags by oil lab personnel. [Enclosures 42, 43, 44, 47, 64, 67 and 69].

73. The bulkhead between compartments 4-421 1/2-A and 4-425-T was felt by several persons and reported as hot or warm to the touch. [Enclosures 64, 69, and 74].

74. There is no indication that there has been a previous fuel spill in B-425-T within the last two years. [Enclosures 64, 70 and 106].

75. CWO2 ordered BTCS to leave the space and pump down tank B-33-F, indicating CWO2 believed the source of the oil was B-33-F. [Enclosure 44].

76. As oil was wiped from the deck it was replaced by oil which appeared to be seeping through the deck or out of the bulkhead, the exact source being undetermined. [Enclosure 69].

All indications
are B-6.

77. Between 1120 and 1130, CWO2 [redacted], the ship's boiler maintenance officer, was directed by the MPA, LCDR [redacted], to investigate the fuel oil leak in compartment B-421 1/2-A. [Enclosures 69 and 71].

78. The order was given to evacuate all oil lab personnel who were cleaning up the fuel from the space. [Enclosures 48, 64 and 69].

79. CWO2 [redacted], after getting an unidentified oil lab watchstander to assist and after first checking the sounding tubes in compartment B-307-1 for signs of leakage, entered B-421 1/2-A to investigate. [Enclosure 69].

80. When he arrived on scene, CWO2 [redacted] observed the oil lab personnel had already wiped up most of the oil. He wiped oil from the seam between the bulkhead and deck, and he observed fuel to seep through a crack in the bulkhead paint above the bulkhead-to-deck seam weld at an estimated rate of one to two cc/min. [Enclosure 69].

81. The atmosphere in compartment B-421 1/2-A was observed to be clear of smoke and normal, except for a fuel oil odor. [Enclosures 69 and 72].

VII. EVALUATION OF CONDITIONS ON SCENE

82. CWO2 [redacted] advised CWO2 [redacted] that he thought the fuel was coming from the catapult steam trunk, and that he was concerned about the quantity of fuel oil in the trunk because the trunk access door was warm to the touch. [Enclosure 69].

83. No one on scene at the time knew what lines, other than catapult steam lines, were in the catapult steam trunk. [Enclosure 73].

84. CWO2 [redacted] and the Fire Marshall made the decision to crack watertight door 4-90-3 leading from B-421 1/2-A to B-425-T to check for fuel and/or smoke. [Enclosures 64 and 69].

85. CWO2 [redacted] undogged all but one dog as he pushed his shoulder hard against the door and quickly popped a crack opening. He shut it again quickly and slammed the dogs in place. [Enclosure 69].

86. When the watertight door 4-90-3 was cracked open, a small puff of white smoke came out. [Enclosure 69].

87. No fuel ran out of B-425-T when door 4-90-3 was cracked open. [Enclosure 69].

88. The distance from the deck of compartment B-425-T to the bottom of watertight door 4-90-3 was measured during the course of

All radiation
are B-6.

the investigation and determined to be approximately 18in.
[Enclosure 11B].

89. There was a discussion between CWO2 and the Fire Marshall as to whether or not the puff of vapor that had come out when door 4-90-3 was cracked was fuel or steam and smoke.
[Enclosure 69].

90. CWO2 and the Fire Marshall made the decision to quickly open and close door 4-90-3 again. [Enclosure 69].

91. CWO2 repeated his door opening procedure, only this time he cracked door 4-90-3 approximately a quarter of an inch.
[Enclosure 69].

92. When CWO2 cracked the door the second time, a larger puff of vapor than the first time came out. This second puff was about a foot long and about 3in. wide. The puff had a grayish tint in the middle. [Enclosure 69].

93. Various personnel on scene in compartment B-421 1/2-A stated they heard hissing sounds coming from B-425-T, and that they believed a steam leak existed in B-425-T. [Enclosure 74].

94. After closing the door, CWO2 advised CWO2 in strong terms that the vapor was raw fuel and not steam; he ordered all oil lab personnel to exit the space: he advised all personnel in the space, including CWO2 not to open the watertight door; he exited the space into compartment B-307-1 where he ordered all VAW-115 personnel to the 2nd deck and he then went to main control to report his observations to the MPA. [Enclosure 69].

94A. At approximately 1145, BT3 sounded tank B-33-F and measured an oil level of 33ft. 8in., or 1ft. 2.25in. above capacity. [Enclosure 46].

95. The Flying Squad was called away for smoke at 1147.
[Enclosures 12, 20 and 64].

96. A Ryan air blower was rigged in VAW-115 berthing, with flexible ducting extending from the vicinity of watertight door 4-90-3 to the blower and from the blower to the 2nd deck through the entrance hatch to VAW-115 berthing. [Enclosures 64, 67 and 77].

97. The initial purpose of the air blower could not specifically be determined with various personnel who were on scene at the time calling it ventilation equipment and others calling it desmoking equipment. [Enclosures 64, 67 and 77].

All redaction
acc B-6

98. CWO2 informed the MPA of the situation he observed on the 4th deck in space B-425-T. [Enclosures 69 and 71].

99. CWO2 specifically explained to the MPA his extreme concern that the vapor coming from B-425-T was fuel vapor and not smoke or steam. [Enclosures 69 and 71].

100. The MPA informed the Chief Engineer in Damage Control Central of CWO2 findings. He also conveyed the concern that CWO2 expressed regarding the presence of fuel vapors in B-425-T. [Enclosures 69, 71, and 75].

101. At 1158, valve CMS-27 was closed, securing steam supply to the catapult steam trunk in B-425-T. [Enclosures 20, 33, 69, 70 and 71].

VIII. DECISIONS LEADING TO FIRST EXPLOSION

102. Valve CMS-3 was closed at approximately 1159, isolating the starboard catapult steam line in B-425-T. [Enclosures 33, 69, 70, 71 and 75].

103. Valves CMS-1 and CMS-2 were subsequently opened, allowing steam from the port catapult system to be fed to the starboard catapult. [Enclosures 33, 70, 71 and 75].

104. The temperature of 600 psi catapult steam is approximately 850 degrees fahrenheit, and although the catapult steam line in B-425-T was insulated, some exposed surfaces existed, including the high pressure steam drain piping upstream of the drain orifices and the unlagged pipe hanger within the space. [Enclosure 51, 54, 55, 70 and 75 and Reference F].

105. The flash point of DFM is no less than 140 degrees fahrenheit and the spontaneous ignition temperature is as low as 450 degrees fahrenheit. [Enclosure 36].

106. Trough heating steam for the starboard catapult was taken from the catapult main steam line between CMS-27 and CMS-3. Trough heating steam was left aligned for operation after CMS-27 and CMS-3 were closed, and with trough heating steam still aligned, pressure in the catapult steam main between CMS-27 and CMS-3 continued to be bled-off via the trough steam heating system, through installed high pressure drain lines and through low pressure drain lines, associated with CMS-27, which were also cracked open. [Enclosures 33, 70 and 75].

107. CWO2 returned to VAW-115 berthing on the 3rd deck (B-307-1) to ensure no one entered B-425-T. [Enclosure 69].

108. CWO2 discussed his concern with the Fire Marshall that B-425-T contained fuel vapors and the space should not be entered. [Enclosure 69].

All redactions are B6.

109. At the time of the discussion on the 3rd deck, CWO2 the Fire Marshall, DCC and, possibly, HT1 and two other unidentified persons wearing firefighting ensemble gear were present. [Enclosure 69].
110. The Fire Marshall expressed his intent to enter B-425-T and his opinion was that the smoke previously observed was the result of burning lagging or a steam leak. [Enclosure 69].
111. CWO2 expressed the viewpoint that lagging only burns if oil soaked. [Enclosure 69].
112. CWO2 told the Fire Marshall again that space B-425-T should not be entered. [Enclosure 69].
113. CWO2 departed the 3rd deck to go to Damage Control Central to discuss his concerns with the Chief Engineer and the DCA. [Enclosures 69, 75 and 76].
114. In Damage Control Central both the Chief Engineer and the DCA agreed space B-425-T should not be entered. [Enclosures 75 and 76].
115. The Chief Engineer and the DCA instructed the DCC X50J phone talker to pass orders not to enter space B-425-T. [Enclosures 69, 75 and 76].
116. DCFN was the Flying Squad on scene phone talker. and soon after arriving on scene in VAW-115 berthing, was directed by CWO2 to request permission from DC Central "to enter the space to investigate." [Enclosure 73].
117. relayed the request for permission to enter the space to DC Central via the X50J sound powered phone system, but he received no immediate reply. [Enclosure 73].
118. relayed to DC Central a request from CWO2 for the presence of a "senior A-division person" to assist with identifying steam systems in compartment B-425-T, and DC Central denied the request. [Enclosure 73].
119. was directed a second time to request A-Division assistance, and the DCA personally relayed via the X50J phone for the Flying Squad to handle the problem, or words to that effect. [Enclosures 73 and 76].
120. The Engineer Officer notified the Commanding Officer that an explosive atmosphere existed in B-425-T and that he was working on ways to inert it. [Enclosure 75].
121. The DCA did not receive an acknowledgment from the scene of his order to not open the door (4-90-3) to B-425-T. [Enclosure 76].

All redactions
are B6.

122. CWO2 called the DCA in DC Central via the dial telephone in VAW-115 berthing and advised him watertight door 4-90-3 had been opened and desmoking was in progress. The DCA's response was to curse, but not to specifically order the door closed or the Flying Squad to exit the space, and CWO2 conveyed the impression that the smoke was the result of a lagging fire. [Enclosure 76].

123. The DCA, during his phone conversation with CWO2, did not specifically direct to alter his intended course of action. [Enclosure 76].

124. Shortly after CWO2 phone call to the DCA, the Engineer Officer became aware the Flying Squad was entering B-425-T. He forcefully responded to the DCA that they were not supposed to enter the space, and he directed the DCA to immediately relay to the repair locker via the MC system "no, don't enter the space." [Enclosure 75].

125. The Engineer Officer believed the DCA had relayed the order to the scene not to enter the space. [Enclosure 75].

126. DC1 and DCC arrived on scene in compartment B-421 1/2-A. Neither was wearing an OBA. The space had a light mist or vapor in the overhead. DCC touched door 4-90-3, leading to B-425-T. It was hot and singed his finger. The fumes were heavy. Both men returned to the 3rd deck. [Enclosures 64, 65, 67 and 68].

127. At sometime subsequent to CWO2 conversation with the DCA, watertight door 4-90-3 was opened and closed again and three dogs on the unhinged side were engaged. [Enclosure 79].

128. During rigging of the blower ducting about five people were on the 4th deck at any given time, and all personnel were wearing OBA's. [Enclosures 67, 72, 78 and 80].

129. Visibility had been reduced in B-421 1/2-A as the elephant trunks were being rigged. [Enclosure 72].

130. A03 observed door 4-90-3 opened an estimated 12in. and observed chocolate colored smoke coming out of the opening. [Enclosure 78].

131. A03 estimated door 4-90-3 was opened about 12in. [Enclosure 78].

132. HTFN observed door 4-90-3 opened and estimated the opening to be about 5in. [Enclosure 67].

133. HTFN estimated door 4-90-3 was left open for approximately 5 to 7 minutes before it was closed and dogged again. [Enclosure 67].

All redaction
all B-6-

134. During the time door 4-90-3 was observed open by HTFN , smoke was being extracted through the elephant trunks. [Enclosure 67].

135. As HTFN left B-421 1/2-A at approximately 1225, MSSN Johnson and FN Vierra appeared to be preparing to open door 4-90-3 again. [Enclosure 67].

136. From 1223 to 1228, 20 June 90, tank B-33-F was pumped down from 33ft. 8in. to 25ft. 11in. [Enclosures 21, 43, 44, 47 and 48].

137. An explosion occurred on the 4th deck at approximately 1230, 20 June 90. [Enclosure 19].

IX. RESCUE/DC ATTEMPTS AFTER FIRST EXPLOSION

138. The Engineering Smooth Log shows an explosion reported at 1236. [Enclosure 20].

139. The Deck Log shows an explosion reported in a catapult steam void at 1237. The catapult steam void referred to is space B-425-T. The explosion occurred in B-425-T. [Enclosure 12].

140. At the time of the explosion in B-425-T, there were seven people on the 4th deck. They were FN Vierra, MSSN Johnson, DC3 Kilgore, DCFA , HT1 , DCFN and CW02 the Fire Marshall. Their exact locations are unknown. [Enclosures 67 and 78].

141. At the time of the explosion in B-425-T there were 4 people on the 3rd deck. They were DCC , A03 , HTFN , and DS2 . [Enclosures 74, 78 and 88].

142. DCFN was standing on the ladder heading from VAW-115 berthing (B-307-L) to the 2nd deck. [Enclosures 74 and 78].

143. HT1 and DCFN were standing near the hatch on the 2nd deck when the explosion occurred. [Enclosures 74 and 78].

144. The force of the explosion produced a vertical split in the port side of the bulkhead separating B-425-T from B-421 1/2-A, and the split extended from a point approximately one foot below the overhead to the deck. The force of the explosion split the bulkhead along the horizontal bulkhead-to-deck seam weld from a point two feet to the right of watertight door 4-90-3 to a point where the bulkhead-to-deck seam weld intersected the vertical split at a right angle. At the intersection of the two splits, the bulkhead was peeled up and back into B-421 1/2-T. [Enclosures 81-85 and 94].

145. Watertight door 4-90-3 was deformed and sprung by the force of the explosion, with the lower hinge support bracket broken from the bulkhead attachment point and gaps of up to 3in. existing

All redactions are B6.

between the door and knife edge along the top, bottom and hinged sides of the door. [Enclosures 84 and 85].

146. Following the explosion, a fireball roared through B-421 1/2-A, B-417 1/2-A, B-417 1/2-T and exited through the hatch from the 4th deck leading to the VAW-115 berthing area on the 3rd deck. The fireball continued its upward movement, ascending the ladder leading to the 2nd deck. Once the fireball exited onto the 2nd deck, it dissipated. [Enclosures 65, 68, 74, 78, 81, 89 and 90].

147. At the time of the explosion, the ventilation system to B-425-T had not been secured. [Enclosures 19, 78, 91, 93, 107, 108 and 124].

148. Heat in the spaces on the 4th deck was less than 1,200 degrees fahrenheit and there was no sign of long term burning. The temperature upper limit was established by a melting test conducted on silver rings (for pipe joint mating) found in space B-425 1/2-A. The rings show no sign of any melting, indicating temperatures were less than 1,200 degrees fahrenheit. [Enclosures 7, 92 and 105].

149. According to LT the ventilation was not secured until after a second explosion. The DC Central Log lists ventilation secured between frames 47-90 as a late entry at 1425. At 1520 the DC Central Log lists securing ventilation at 4-88-1. [Enclosures 19 and 93].

150. Shortly after the explosion, the Fire Marshall, CW02 , and HT1 exited the 4th and 3rd decks on their own. They were immediately assisted in obtaining medical attention. [Enclosures 95 and 96].

151. DCC was assisted from the 3rd deck to the 2nd deck by DC1 .. DCC was not wearing an OBA. [Enclosure 65].

152. CW02 : assumed duties as Fire Marshall subsequent to CW02 injury. [Enclosures 76, 91 and 95].

153. Immediately after the explosion an heroic effort was commenced to rescue those still on the 4th deck. [Enclosures 65, 67, 68, 72, 77, 80, 97 and 98].

154. DC1 noted the 3rd deck filled with a medium white smoke that smelled of fuel when he lifted his OBA mask. [Enclosure 65].

155. Immediately donned ensembles and OBA's and descended to the 4th deck. There was a misconception that some of the 4th deck had been blown away and sounding sticks were acquired and used to probe the deck for holes. [Enclosures 65, 67 and 72].

All relocations
at B-6.

156. Visibility was zero on the 3rd and 4th decks as the rescue efforts began. [Enclosures 65, 68, 72, 97 and 98].

157. HTFN went to the 4th deck and located DC3 Kilgore. Kilgore was extracted via a line attached to the "D" ring on his OBA harness. [Enclosure 72].

158. DC3, while searching the 4th deck, felt his way looking for survivors. He heard someone breathing in a loud wheeze. Following the sound, located his shipmate under a batch of scrap metal. DC3 attached a tending line to the survivor's D-ring and pulled him free of entrapment. The unidentified survivor was then taken from the space by other members of the search party. [Enclosure 72].

159. DCFN searched the 4th deck and discovered survivors at the bottom of the ladder heading down from the 3rd deck. He reported what he had located when he returned to the 3rd deck and sought help. DCFN and went to the 4th deck and assisted in pulling three survivors from the space. [Enclosure 68].

160. At approximately 1315, a second explosion occurred on the 4th deck. [Enclosures 19, 20 and 76].

X. DC EFFORTS, DECISIONS AFTER SECOND EXPLOSION

161. The second explosion appears to have emanated from the after, starboard side of B-421 1/2-A. [Enclosures 86 and 87].

162. At the time of the second explosion, DCFN and DCFN were searching the 4th deck for survivors. DCFN was in B-417 1/2-T and DCFN Tarrence was stepping through door 4-84-3. [Enclosure 97].

163. DCFN was knocked to the deck by the force of the explosion (B-417 1/2A). His OBA face piece and helmet were torn off, and he began to choke. He regained his footing and rapidly exited the 4th deck via the vertical ladder into the VAW-115 berthing area on the 3rd deck. [Enclosure 97].

164. FN gear remained intact through the second explosion. He, too, exited the 4th deck immediately. [Enclosure 97].

165. Following the first explosion, CWO2, acting on his own and using good judgment and common sense, assumed the duties as Fire Marshall on scene. [Enclosure 95].

166. CWO2 dered electrical power secured to the affected area. [Enclosures 95 and 108].

167. The hatch on the 2nd deck leading to VAW-115 berthing was secured at approximately 1328. [Enclosure 19].
168. After the 2nd deck hatch leading to VAW-115 berthing on the 3rd deck was secured, CO2 and AFFF were put into the space through the scuttle on the secured hatch. [Enclosure 95].
169. The fire party continued to pump AFFF and CO2 into the 3rd deck berthing compartment of VAW-115 (B-307-L). [Enclosure 19].
170. At 1543, the on scene fire party entered B-307-L. [Enclosures 13 and 19].
171. Communications between DCC, repair lockers and the scene were poor from when the Flying Squad was called away until well after the second explosion. [Enclosures 68, 73, 76 and 91].
172. At 1551, CO2 was discharged into the vertical trunk leading from VAW-115 berthing (B-307-L) to B-417 1/2-T. [Enclosure 14].
173. At 1653, results of an atmospheric test conducted in VAW-115 berthing (B-307-L) showed the atmosphere to be highly combustible. [Enclosures 19 and 95].
174. Exhaust vent 01-83-1 leads from the forward, starboard corner of B-425-T and runs vertically through VAW-115 berthing on the 3rd deck and through an athwartship's passageway just forward of the 2nd deck entrance to VAW-115 berthing. At 1812, a hole was punctured in the vent ducting on the second deck and AFFF was introduced into B-425-T using the vent ducting. [Enclosures 15, 53, 93, 95, 99, 100 and 122].
175. Rigging to desmoke VAW-115 berthing (B-307-L) commenced at 1657. [Enclosures 19 and 76].
176. At 1844, the firefighting team reentered VAW-115 berthing area (B-307-L). [Enclosures 16, 93 and 109].
177. At the time the fire party reentered the 3rd deck, the space was filled with brownish smoke. [Enclosure 93].
178. The ventilation system was secured to the 3rd and 4th decks in the area of VAW-115 berthing when the fire party entered the space. [Enclosures 93, 107 and 124].
179. Visibility was about 6in. on the 3rd deck by the armored hatch in VAW-115 berthing (B-307-L) shortly after the firefighting team reentered the space. [Enclosure 93].
180. About 1900, LT *R-6* who lead the reentering effort, reported the air in the top of the armored hatch heading to the 4th deck was extremely hot. He continued pumping AFFF into the 4th deck to create a vapor lock. [Enclosure 93].

All reductions
are B-6.

181. At about 2116, AFFF was introduced into B-33-F via the sounding tube on the 3rd deck near VAW-115 berthing and it continued to be introduced for an estimated 10-20 minutes. [Enclosures 17 and 43].
182. A sample was taken from the fluid in B-417 1/2-T, and testing showed this sample to be fuel. [Enclosure 95].
183. The liquid from B-417 1/2-T was pumped over the side with a fire hose and in-line eductor (perijet). [Enclosures 19, 76 and 95].
184. At about the same time, the fuel oil stripping system was aligned to strip tank B-25-T. [Enclosure 76].
185. About 0524, 21 June 90, when the liquid in compartment B-417 1/2-T was approximately 3ft. deep, a fire party entered the 4th deck spaces. [Enclosures 19 and 95].
186. At 0610, 21 June 90, a liquid sample was taken in B-417 1/2-T, and the sample tested to be all fuel. [Enclosure 19].
187. Between 0806 and 0813, 21 June 90, a layer of foam was laid in B-421 1/2-A. [Enclosures 18 and 19].
188. At 0930, 21 June 90, CWO2 _____, Chief _____, Chief _____, HT3 _____ and two others entered B-417 1/2-A. [Enclosures 19 and 95].
189. At 0945, 21 June 90, two bodies were found in B-421 1/2-A. [Enclosures 19 and 95].
190. The two remains were later identified as FN Jeffrey Vierra and MSSN Ulric Patrick Johnson. [Enclosures 27 and 28].
191. At 1000, 21 June 90, the fire party discovered door 4-90-3 to space B-425-T was partly blown, and no fires existed. [Enclosures 19, 81, 82 and 83].
192. At 1041, 21 June 90, there was 4in. of fuel and AFFF on the deck of B-425-T when the space was entered. [Enclosure 19].
193. At 1042, 21 June 90, emergency lighting was installed in B-421 1/2-A. [Enclosure 19].
194. At 1050, 21 June 90, 1 1/2in. of fuel and AFFF were on the deck in B-421 1/2-A. [Enclosure 19].
195. At 1107, 21 June 90, CAPT _____, HM3 _____ and HM3 _____ entered B-421 1/2-A and recovered the bodies of FN Vierra and MSSN Johnson. [Enclosures 19, 27, 28 and 101].

XI. OTHER FACTORS

196. Flooding, apparently the result of condensed steam from the HP steam drain nest leaks of B-425-T, had occurred many times before 20 June 90. [Enclosures 64 and 70].

197. Space B-425-T is not included in the ship's zone inspection process and is not listed as a space to be inspected in MIDWAY Instruction 4790.1D. [Enclosures 31 and 70].

198. Analysis by NAVSHIPREPFAC Yokosuka indicated that the B-33-F overflow piping was carbon steel, but could provide no estimate of the length of time the holes might have existed. [Enclosure 112].

199. During the casualty, 1,482 OBA canisters were used and 3,500 gals. of AFFF were expended. [Enclosure 76].

200. DC3 Robert Kilgore died of his injuries at Brooke Army Medical Center, Fort Sam Houston, Texas, on 27 June 90. [Enclosure 29].

201. The full scope of the damage to the spaces on MIDWAY and the extent of repairs are still being assessed. Preliminary cost estimates to repair the damage caused by the fire run about \$700,000. [Enclosure 103].

202. With the exception of damage done by the two fireballs, little actual damage was caused by the fire. [Enclosures 103, 104 and 105].

203. Affected personnel were suited out at the time of the explosion as indicated in the matrix contained as enclosure (41). [Enclosure 41].

204. The 20 June 90, Fuel Oil Pumper's Log shows a pre-transfer pressure test was conducted between 1220 and 1223 in preparation for transferring fuel from B-33-F to A-4 1/2-F; that the B-33-F tank level was listed as 30ft. 9in., vice the 33ft. 8in. reported by BT3 ⁵ at 1145; and that the B-33-F tank sounding was recorded as 30ft. 7in. after the test. [Enclosures 21 and 46].

205. On 27 June 90, the two valve manifold containing 7-88-5 and 7-88-11 was removed and hydrostatically tested by NAVSHIPREPFAC Yokosuka. The test results were satisfactory, indicating valve 7-88-5 did not exceed maximum allowable leak-through rates. [Enclosure 110].

206. NR1 fuel oil transfer pump is a positive displacement pump. If the fuel pumped through NR1 fuel oil transfer pump had no exit from the transfer piping, pump discharge pressure should have

increased above the 18 to 22 psi observed during normal transfer operations. [Reference E].

All rotations
are B6

207. BTFN , the pump operator, observed no abnormal rise in NR1 fuel oil transfer pump's discharge pressure between the initial attempt to fill B-25-F and the time BT3 ordered the pump secured. [Enclosure 42].

208. On 02 July 90, experiments were conducted on the fuel oil transfer system using the same alignment as that intended for the fuel oil transfer evolution which occurred between 0703 and 0821 on 20 June 90. The purpose of those experiments was to determine the following:

a. Whether a satisfactory system pressure test could be achieved with all service tank fill valves, including 7-88-5, closed.

b. Whether a satisfactory system pressure test could be achieved with all service tank fill valves, except 7-88-5, closed, and with valve 7-88-5 valve handle rotated first 1/2 turn in the counterclockwise, or open direction, then with 7-88-5 rotated one full turn in the counterclockwise direction and, finally, with 7-88-5 rotated 1 1/2 turns in the counterclockwise direction.

The results of the experiment showed that:

a. With all fill valves closed and initial system pressure of 70 psi, system pressure was approximately 54 psi after three minutes.

b. With all fill valves except 7-88-5 closed and with 7-88-5 valve handle rotated 1/2 turn in the counterclockwise direction, transfer system pressure dropped from 75 psi to 0 psi in approximately 30 seconds.

c. With all fill valves except 7-88-5 closed and with 7-88-5 valve handle rotated 1 turn in the counterclockwise direction and with the fuel oil transfer pump on low speed, system pressure could not be raised above 56 psi during the test and immediately fell to 0 psi when the pump was secured.

d. With all fill valves except 7-88-5 closed and with 7-88-5 valve handle rotated 1 1/2 turns in the counterclockwise direction and with the fuel oil transfer pump on low speed, system pressure could not be raised above 14 psi during the test and immediately fell to 0 psi when the pump was secured. [Enclosures 113 and 119].

209. Forty-one of 46 Flying Squad personnel were final PQS qualified for assigned duties. The five who were not final PQS qualified were DCFN NR2 DCFN , DCFN NR1 , AN , sprinklerman, and DCFN , investigator. [Enclosure 115].

210. Firefighting training for Flying Squad personnel was conducted weekly prior to 20 June 90. [Enclosure 120].

211. Statements submitted by various oil lab personnel assigned to fuel oil transfer duties indicate the frequent use of

non-standard, local terminology over fuel oil transfer sound powered phone circuits. [Enclosures 42, 43, 45, 46, 48 and 49].

212. The ship's Planned Maintenance System (PMS) maintenance requirements for B-425-T were directed towards the inspection of the catapult steam trunk and steam system components. The fuel oil overflow line was not part of the scheduled PMS for that space. [Enclosures 64, 70 and 75].

213. The catapult steam system walkthrough inspections initiated by the Chief Engineer were directed at checking for the storage of flammable materials and other fire hazards in the spaces connected with that system. [Enclosures 30 and 75].

214. The INSURV inspection of 29 August 88, noted the condition of the catapult steam system components within B-425-T and the presence of water in the space. The quality of pipe stenciling was also noted; however, the condition of the fuel oil overflow piping was not reported. [Enclosure 40].

215. The ship's FY88 EIRSA Carrier Life Extension Repair (CLER) work package and related inspection program did not include B-425-T or its fuel oil overflow piping. The work done on fuel oil service tank B-33-F (and related tests) was limited to the tank itself and did not include its overflow piping. [Enclosures 3 and 4].

216. Prior to 20 June 90, material problems identified in B-425-T were limited to the catapult steam system related components, water accumulation in the space and steam leaks. No previous fuel leaks had been noted. [Enclosures 40, 69, 75 and 106].

217. USS MIDWAY was not equipped with steam catapults when commissioned in September 1945. The steam catapults were installed in 1955-57 and upgraded between 1967-70, subsequent to recommissioning. The catapult steam system components installed in B-425-T USS MIDWAY were acquired no later than 1970 (JANE'S FIGHTING SHIPS 1982-83).

218. A airflow stoppage test was conducted on the air supply vent in B-425-T on 03 July 90. When water was allowed to rise one eighth to one quarter of an inch above the bottom lip, air flow ceased. This equates to a level approximately twelve and one half inches off the deck. [Enclosure 113].

219. Medical Information:

At 1500I, the ships doctor made the following entries in his medical log concerning injuries:

- CWO2 ^{15.6} Received burns. He was treated and medevac'd to Yokosuka Naval Hospital.

All redactions
are B-6

- DCC : Received burns. He was treated and medevac'd to Yokota Air Force Base.
- DC3 : Received burns. He was treated and medevac'd to Yokota Air Force Base.
- DCFN Received burns. He was treated and medevac'd to Yokota Air Force Base.
- DCFA : Received burns. He was treated and medevac'd to Yokota Air Force Base.
- HT1 Received burns. He was treated and medevac'd to Yokosuka Naval Hospital
- HT1 Received burns and back pain. He was treated and medevac'd to Yokosuka Naval Hospital.
- DCFN Received burns. He was treated and medevac'd to Yokosuka Naval Hospital.
- A03 Received burns. He was treated and medevac'd to Yokosuka Naval Hospital.
[Enclosures 25 and 26].

220. Seven of the nine medevac'd personnel were subsequently transferred to Brooke Army Medical Center for specialized burn treatment. DC3 Kilgore later died due to his injuries. HT1 and A03 remained at Yokosuka Naval Hospital until released. [Enclosures 25, 26 and 29].

221. Memorial services were held on board USS MIDWAY for the deceased, FN Jeffrey A. Vierra and MSSN Ulric P. Johnson, on 25 June 90, and for DC3 Robert S. Kilgore on 1 July 90. Both were solemn and touching ceremonies attended by Commander, Task Force 70, his staff and MIDWAY crew members not on watch. [Enclosures 38 and 39].

222. The fuel oil in B-33-F could not have leaked through the deck into B-425-T. The deck was solid and in satisfactory condition. [Enclosure 114].

223. Personnel property claims have been submitted to the Claims Office, Naval Legal Service Office, Yokosuka, Japan. These claims relate to the loss of or damage to personal property suffered as a consequence of the fire and subsequent firefighting efforts on board USS MIDWAY on 20 June 90. [Enclosure 125].

OPINIONS

I. CAUSE

1. The root cause of the mishap aboard USS MIDWAY was the deterioration of the overflow piping for the FOS tank B-33-F at a point where it ran through B-425-T, a space containing a 10in. catapult steam line. [FOF #'s 53, 56, 64 and 104].

II. FUEL OIL TRANSFER

2. The overflow pipe was deteriorated to a point where one hole had developed to a size of 3 1/2in. wide and 3 1/4in. high. There were numerous other holes in the pipe of various smaller sizes. The overflow pipe in B-425-T, clearly, would not retain fuel that might be channelled as overflow from tank B-33-F. [FOF # 64].

3. It is estimated that major deterioration (probable result from long term steam drain leaks) had existed in the pipe for a number of years. It is my considered opinion that significant sized holes have existed for at least 4 years and that some smaller sized holes could have been present for up to 8 years. [FOF #'s 64 and 198].

4. It should be noted that the larger 3 1/2 x 3 1/4in. hole was hidden from casual view by lagged overflow pipe from tank B-35-F. In order to see this hole, it would have had to be viewed under the lagged overflow pipe from tank B-35-F (as shown in enclosure (60)). [FOF #'s 56, 64 and 65].

III. QUALIFICATIONS

5. USS MIDWAY Oil Lab PQS is adequate to support proper qualification of personnel assigned oil transfer duties; however, minimum interim qualification requirements, short of final qualifications as fuel oil pumper, should be specified for personnel assigned duties as transfer pump operator, valve manifold operator and tank sounder. Interim qualification procedures should be based on satisfactory completion of specified, relevant fuel oil pumper PQS line items and demonstrated proper performance under the supervision of a qualified operator. [FOF #'s 3-6, 10, 11, 16, 17 and 29].

IV. PROCEDURES

6. The need to conduct a pressure test of the fuel oil transfer system prior to transferring fuel is a valid requirement. The fact that there is no gauge in the system to determine the pressure in the system as the test is conducted is of concern. Without a gauge in the system, time versus pressure retained becomes a relative value. The decision that a successful test has occurred is left to the individual judgement of the person opening the fuel test

valve to see if, in fact, pressure was retained in the piping. Test results, at best, are totally subjective on a system that should be tested to exact specifications. Men of the Eighties are using technology of the Sixties. Fatigue could also play a part in the accuracy of the process since manning requires port and starboard watches in many cases. [FOF #'s 3, 4, 5, 6, 8 and 9].

7. Procedures defined by ENGDEPTINST 9540.1C for transferring fuel oil from storage to service tanks, including pre and post-transfer system pressure tests, are adequate to support safe transfer operations, except that system test pressure should be maximum possible pump discharge pressure, or 150 psi vice the specified 60-100 psi, and except that a maximum allowable pressure drop during the 3 minute duration of the test should be specified. [FOF #'s 3, 4, 5, 6, 7, 8, 11, 12 and 22].

V. SUPERVISION

8. Fuel oil lab supervisory personnel did not always follow the procedures specified in ENGDEPTINST 9540.1C in that "the Fuel Oil Supervisor or a qualified fuel oil pumper and an assigned officer" did not always "proceed to check and verify the system alignment for the fuel transfer evolution"; unqualified junior oil lab personnel sometimes made system alignments with no independent verification by the Fuel Oil Supervisor, a qualified pumper or an officer; and that the pump discharge quick closing valve and pump recirculating valve, if used, were not closed during the pre or post-transfer pressure tests. [FOF #'s 10, 21, 22, 25 and 26].

VI. PRACTICES

9. As the result of the overflowing of fuel oil service tank B-33-F on 20 June 90, fuel oil was forced under pressure into the overflow pipe leading from B-33-F to tank B-51-F. [FOF #'s 45, 46, 47, 50, 53, 80, 94A, 206, 207 and 208].

10. The use of non-standard, local terminology by oil lab personnel during the fuel oil transfer evolution on the morning of 20 June 90 did not specifically contribute to the overflowing of tank B-33-F, but the use of such terminology, coupled with the failure to follow established procedures for fuel transfer operations and the pumper's log inaccuracies, indicate a lack of watch discipline and a lack of proper supervision of watch personnel, caused in part by insufficient manning. [FOF #'s 10, 22, 30, 31, 42, 43, 204 and 211].

VII. PHYSICS

11. Because the B-33-F tank overflow piping was holed, fuel oil entered compartment B-425-T. [FOF #'s 45, 53 and 64].

All redactions are B6.

12. The total volume of fuel oil which entered compartment B-425-T could not be specifically determined, but it was probably less than 600 gals., but more than 400 gals. [FOF #'s 18, 33-37 and 94A].

VIII. HOW THE OIL SPILL COULD HAVE OCCURRED

13. The overflowing of service of tank B-33-F could only occur as the result of fill valve 7-88-5 leaking through or as the result of the misalignment of fill valve 7-88-5 in that valve 7-88-5 was not completely closed after B-33-F was filled on the evening of 19 June 90, or in that valve 7-88-5 was inadvertently opened during pumping operations on the morning of 20 June 90. [FOF #'s 13, 19, 25, 26, 39, 45, 205, 206, 207 and 208].

14. The successful hydrostatic test of the 7-88-5/7-88-11 valve manifold ruled out the possibility that the valve leaked through. [FOF # 205].

15. The overflowing of service tank B-33-F could only have occurred as the result of the inadvertent opening of valve 7-88-5 incident to the intended filling of tank B-25-F because of the following reasons:

a. Three pre or post-transfer system pressure tests were reported to have been conducted between 2236 on 19 June 90, and 0824 on 20 June 90, and two of those three tests were conducted with BT3 as valve manifold operator. All three of those tests were evaluated as satisfactory, i.e. pressure was sensed to be relieved through the test tank manifold valve when cracked open at the conclusion of the test, and in the case of two of those tests, BT3 reported he, himself, sensed the pressure being relieved.

b. The experimental system pressure test conducted on 02 July 90, showed transfer system pressure dropped to 0 within 30 seconds of the transfer pump being secured and with valve 7-88-5 opened only 1/2 turn. If valve 7-88-5 had been already open during the 0703 to 0821 fuel oil transfer on 20 June 90, system pressure at the conclusion of the pre-transfer system pressure test would necessarily have been 0, and a satisfactory pressure test could not have been achieved.

c. The fill valves for B-25-F and B-33-F were situated adjacent to each other, and BT3 did not specifically verify by valve label which of the two valves served tank B-25-F prior to the initial attempt to fill B-25-F. Consequently the inadvertent operation of the fill valve to B-33-F is plausible.

d. Although the prior-to-transfer sounding of tank B-25-F was recorded as 18ft. 5in. in the Fuel Oil Pumper's Log, the level was independently sounded by two separate persons, BT3 and BTFN, and both stated the tank soundings during the initial attempt to fill B-25-F showed the tank level to be 14ft. 1in. Further, during the initial attempt to fill tank B-25-F, neither BT3 nor BTFN noted air being expelled from the open sounding tube as would be expected if fuel was entering the tank.

All redactions
are B-6.

Moreover, after the initial attempt to fill B-25-F was terminated by securing NR1 fuel oil transfer pump, after BT3 questioned BT3 regarding the tank manifold lineup and after the transfer pump was restarted, BTFN reported the tank level soundings began to rise normally to the approximate 19ft. level where transfer pump suction was lost.

e. Because NR1 fuel oil transfer pump is a positive displacement pump, transfer system pressure would have rapidly risen above the normal 18-22 psi associated with pumping operations, if the pumped fuel had no where to go, but it did not, indicating some valve was opened after the pre-transfer pressure test. [FOF #'s 18, 19, 25, 45 and 206-208].

IX. HOW THE SPILL ACTUALLY OCCURRED

16. When fuel was in the process of being routed from storage tank A-4 1/2-F to the service tank for 2A boiler (tank B-25-F) there was a misalignment of valves. [FOF #'s 18, 19, 25, 45 and 206-208].

17. Valve 7-88-11 should have been opened to allow fuel to flow to fuel oil service tank B-25-F, but instead valve 7-88-5 was inadvertently opened, allowing fuel to be transferred to fuel oil service tank B-33-F. The cause of this misalignment was totally human error and in no way was the act other than accidental. [FOF #'s 26, 29, 33-35, 37-44 and 45].

X. POST-SPILL ACTIONS

18. When the mistake was discovered by BT3 the correct line up was quickly obtained. [FOF #'s 35-39, 45 and 46].

19. The fact that fuel oil might, for a while, have flowed to B-33-F vice B-25-F was not, nor should it have been, of great concern at the time. The tank in question (B-33-F) was not full at the time, but contained approximately 95 percent of capacity. If the tank were to overflow, the overflow feature designed into the system was there for just that purpose. [FOF #'s 18 and 53].

20. The other safety feature of the fuel oil transfer and stowage system was the overflow or high fuel level alarm in tank B-33-F. There is no indication that this alarm sounded when B-33-F overflowed. Exhaustive research failed to positively ascertain if the alarm sounded or was energized when B-33-F was overflowed on 20 June 1990. [FOF # 51].

21. The first manifestation of overflowing tank B-33-F was the discovery of fuel on the deck in the 4th deck space B-421 1/2-A. [FOF #'s 50, 51 and 67].

22. In any case there was concern that B-33-F may have been overflowed. Fuel oil service tank B-33-F was sounded after the spill occurred. When the tank was sounded, it was determined that

All redactions
are B-6.

the tank had been overfilled and that soundings indicated a fuel height of 33ft. 8in. At that time it was felt that tank B-33-F was now pressurized and fuel had risen in the sounding tube. [FOF #'s 75 and 94A].

23. The pre-transfer pressure test reported to have been satisfactorily completed between 1220 and 1223, on 20 June 90 was not conducted; and the pre and post-test soundings reported in the 20 June 90, pumper's log were not, in fact, taken. Had a pre-transfer sounding been taken, the B-33-F tank level would have been approximately 33ft. 8in., vice the 30ft. 9in. recorded in the log. [FOF #'s 94A and 204].

24. Immediate action was taken to clean the oil discovered on the deck in space B-421 1/2 by absorbing it with rags. [FOF #'s 72, 76 and 80].

25. It was quickly noticed that as the oil on the deck was wiped away by the rags, it was replenished by additional oil coming from either the deck (also top of fuel tank B-33-F) or by seeping through the bulkhead between B-421 1/2 and B-425-T. [FOF #'s 76 and 80].

26. When CWO2 , the Fire Marshall, and CWO2 investigated the fuel spill, there was still some uncertainty as to where the fuel was coming from (inside B-425-T or through the deck in B-421 1/2-A). [FOF #'s 71, 74, 75, 76 and 89].

27. The space was evacuated of oil lab personnel, and and decided to crack the door to space B-245-T to determine the conditions which existed. [FOF #'s 84-89].

28. The door to B-425-T was, in fact, cracked open twice by in ; presence. Both times, whitish vapor exited the top of the door. CWO2 n was adamant that the vapor was concentrated fuel vapors and told CWO2 not to let any one open the door again. [FOF #'s 84-92 and 94].

29. CWO2 had from the beginning indicated he thought the vapor in B-425-T was steam vapor and smoke from burning lagging. It would appear from his subsequent actions he was not convinced CWO2 was correct and he was wrong. His actions later in requesting to reopen the door, combined with his desire to have a member of "A" division present to assist in identifying steam systems, seems to bear this out. [FOF #'s 94, 95, 96, 97, 110, 116-119 and 122].

30. The door was, in fact, subsequently opened (multiple times) and it would seemed doubtful such would have been the case without the knowledge of and permission from CWO2 n on scene as Fire Marshall. [FOF #'s 122, 127 and 130-132].

31. During the time the Flying Squad was called away at 1147, and the first explosion, door 4-90-3 was opened at least once and likely two or three times. It is also clear that the door was closed and partly dogged at the time of the explosion. [FOF #'s 85, 92, 122, 127, 130-133, 135 and 145].

XI. FACTORS CONTRIBUTING TO EXPLOSIONS

32. Communications between the scene of the explosion and DC Central, both prior to and after the first explosion, were inadequate and resulted in confusion in DC Central regarding events and circumstances leading to the first explosion. The inadequate and confused communications prevented responsible personnel from exercising desired control and possibly contributed to the explosion. [FOF #'s 115, 116, 117 and 125].

33. All records reviewed for as far back as they exist on USS MIDWAY and NAVSHIPREPFAÇ Yokosuka, show no indication of any previous fuel spill in B-425-T. [FOF # 74].

34. The Engineer Officer and the DCA both recognized the need to inert the explosive atmosphere which was contained in B-425-T; however, no readily available method existed, and the specific equipment required to introduce an inert atmosphere was not available. Regardless of the unique nature of the situation in B-425-T, some general procedure should be developed. [FOF #'s 114 and 120].

35. From the time fuel oil was introduced into compartment B-425-T until the instant the first explosion occurred, the atmospheric conditions which existed in compartment B-425-T were inadequate to support combustion due to one or more of the following factors:

a. Steam from the leaking high pressure steam drain nest displaced the air in the space and, in effect, placed the space under an inerting steam blanket.

b. The fuel oil level in B-425-T rose above the supply vent terminus and prevented the supply of oxygen to the space.

c. Due to the high temperatures in the space, the partial pressure of the fuel oil vapor in the space was greater than supply air pressure, preventing air from entering the space.

d. The fuel oil concentration in the atmosphere of the space was too rich to support combustion. [FOF #'s 54, 57, 59, 61, 104, 105, 108, 134 and 136].

36. One or more of the following actions taken by ship's force personnel between 1158 and 1231, caused the atmospheric conditions in the space to change:

a. The closing of CMS-27, coupled with the continued alignment of trough heating steam and catapult steam high pressure drains and the opening of CMS-3, low pressure drains, starved the catapult steam drain nest in B-425-T, hence, steam ceased to leak into the space and the inerting effect of any steam blanket was lost.

b. The pumping down of tank B-33-F caused fuel oil to drain from the space into tank B-33-F through the holed overflow pipe, uncovering the air supply vent and also reducing the fuel oil vapor partial pressure, thereby allowing fresh air to be forced into the space via the supply vent.

c. The opening of watertight door 4-90-3 and removal of fuel oil vapor from B-425-T via the Ryan air blower reduced the fuel oil concentration in the atmosphere.

d. The re-closing of water door 4-90-3 immediately prior to the explosion served to contain all remaining fuel oil vapor within the space until sufficient oxygen could be introduced through the supply vent to lean the air/fuel mixture to the point where combustion could be attained. [FOF #'s 57, 61, 94, 96, 101-106, 120, 127, 134, 136, 137, 145 and 147].

37. Had watertight door 4-90-3 been open when the ignition point was reached, the concussive effect would have been significantly reduced because a substantial gas vent would have been provided. [FOF #'s 144 and 145].

WHAT CAUSED THE EXPLOSIONS - FIRST EXPLOSION

38. The first explosion occurred within the confined space of B-425-T. The conditions became such that the fuel/O₂/heat triangle was completed and combustion commenced. Because of the level of fuel vapors within the space, the explosion was most intense. The fireball developed within the space until it generated enough force to break out of the confined area. The weakest part of the bulkhead gave way and the fireball exited the port side at the forward bulkhead between B-425-T and B-421 1/2A. [FOF #'s 144 and 145].

39. The energy of the pressurized fireball propelled it forward along the path of most oxygen and carried it through the door between B-421 1/2A and B-417 1/2A (door 4-87-1). The fireball continued intact through B-417 1/2A and into B-417 1/2-T. [FOF # 146].

40. The fireball ceased to regenerate most likely as it passed through B-417 1/2-T and up and through the armored hatch between the 4th and 3rd decks. There was little to no fuel vapor in that area, but the fireball was still self-sufficient enough to continue its path up through the hatch to the 2nd deck where it dissipated. [FOF # 146].

SECOND FIREBALL

41. The second explosion was a fireball created in the aft starboard side of B-421 1/2A. [FOF #'s 154, 160, 161 and 163].

42. There was an area of unburned fuel vapor and possibly pooled fuel at this location and the heat generated from the first

explosion commenced a vaporization process. The entire 4th deck area began to refill with oxygen immediately after the first fireball exited the 2nd deck access and dissipated. The entire area in B-421 1/2A was now hot, fuel vapors were strong in the space and as soon as sufficient oxygen returned, the second explosion occurred. [FOF #'s 154, 160, 161 and 173].

43. The fireball generated this time was considerably less dense than the first one. The second fireball had its genesis in a space that was not sealed, i.e. at normal atmospheric pressure, and thus it was not compressed before it began to seek the oxygen path to the 2nd deck. The second fireball exhibited considerable strength as shown by its ability to knock  to the deck and tear his face plate and helmet from his body, but it did not contain the force or intensity of the first. [FOF #'s 97, 201 and 202].

44. With the exception of damage caused by the two fireballs, there was little damage on the 4th deck due to fire. [FOF #'s 201 and 202].

45. It is certain ventilation was not secured to the area of concern on the 4th deck prior to the first explosion. It is probable that ventilation was not secured until after the second explosion. Securing ventilation in an area of fire or smoke is a basic tenant of damage control or firefighting. The rule of sooner the better is relevant but the ability to do so within a reasonable time is mandatory. The late decision to secure ventilation and the almost haphazard method of doing so could well have contributed to the explosions. [FOF #'s 147 and 149].

46. The ventilation to B-425-T, was not secured until after the first explosion. The airflow to that space, however weak, did introduce oxygen at a time when there was a critical balance of heat/fuel/oxygen. Even if the door to B-425-T had not been opened, there may have been an explosion. The vent could have been covered by fuel in the beginning, but when tank B-33-F was pumped down, any fuel in B-425-T receded back into tank B-33-F. This would have ensured the air vent was uncovered. The slight over pressurization at the space by steam fuel vapor would also have restricted incoming air, but when the vapor dissipated, an equalization of pressure would have occurred. Once the air vent was uncovered and/or once the pressure equalized, air flow through the ventilation system would have recommenced and eventually provided enough oxygen to complete the explosive triangle. This possibility would have taken longer and the space may have cooled below explosive conditions by then, but it must be considered as a possibility. It is imperative that ventilation be shut off immediately under such circumstances. [FOF #'s 147 and 149].

XII. MITIGATION

47. The crew of MIDWAY, both Navy and Marines, medical and non-medical, showed deep and honest concern for the medical needs of their injured shipmates. The timely and highly professional medical care given the injured and the exhausted alike was magnificent. The survival chances of the injured were greatly improved by the quick knowledge and pertinent medical care they received on MIDWAY. The effort to reenter the space was methodical and deliberate, as it should have been. [FOF #'s 150, 151, 153, 155, 157, 158, 159 and 220-222].

48. Flying Squad personnel were properly qualified and trained for combatting shipboard fires. [FOF #'s 209 and 210].

49. The on scene leaders and DC planners took into consideration all actions necessary to reenter and fight a fire of unknown proportions. Had there been a raging inferno on the 4th deck, the ship was prepared to cope. The problems encountered were difficult and in some cases unexpected, but the situation was always under control. The dewatering of the spaces was successfully carried out, and although the spaces on the 4th deck were flooded in large part with fuel, no catastrophic event occurred. [FOF #'s 165-170 and 172-188].

50. The flooding of the catapult steam space B-425-T with AFFF introduced through the exhaust ventilation piping was a clever and effective idea. The pumping of AFFF into the sounding tube of tank B-33-F proved to be less effective and may have in part pushed fuel out of tank B-33-F back into B-425-T, and thus the rest of the 4th deck spaces. [FOF #'s 174, 181 and 182].

51. The result was a successful attack on a difficult and unknown situation, carried out in a deliberate and cautious manner. [FOF #'s 152-194].

XIII. POST EVENT EVALUATIONS

52. The ensembles were effective in coping with conditions where actual fire existed, but were extremely fatiguing under conditions of high temperatures only. The ship used their equipment well, but there is a need to review the lessons learned in the demanding situation. [FOF #'s 152 and 163].

53. Shipboard spaces which are designated as trunks must be included in regular zone inspections and should be subject to regularly scheduled PMS inspection under MRC 6641/4 2M-3. [FOF # 197].

54. Planned Maintenance System (PMS) and safety inspections conducted in B-425-T were directed at maintaining the steam system components (valves, piping) and preventing the buildup of visible

fire hazards (trash, storage of flammable material). The fuel oil overflow piping was not inspected and its condition not observed. This concentration of attention on the steam-related components was derived from the history of steam leaks in the space and absence of such problems with the fuel system.
[FOF #'s 212-216].

55. One of the lessons from World War II was that fuel, ammunition and steam should be kept separate. The introduction of steam piping into B-425-T at some point subsequent to the ship's commissioning violated this lesson. This was probably not considered a safety problem at the time because the Navy fuel in use prior to 1973 was Navy Standard Fuel Oil (NSFO) which had such a high flash point that a fuel leak in that space posed little danger of fire. The same cannot be said for F-76. From a design perspective, therefore, the introduction of a steam trunk into a void containing a fuel oil (F-76) overflow line produced a situation with a very limited safety margin. All that remained was for deteriorating pipe to combine with human error to produce an explosive situation. [FOF #'s 53, 56, 64, 104 and 105].

56. The heroic efforts of MIDWAY's personnel cannot be overlooked. Men willingly rushed in to aid their shipmates in the finest tradition of Navy heroism. The search and rescue efforts following the first explosion were both professional and inspiring. Many gladly went to the 4th deck to search for and rescue their friends when they knew doing so could be putting themselves at great risk. No man entered the 4th deck unprepared. They each wore proper clothing and equipment. They were tenacious in their search, and they successfully rescued five shipmates that might otherwise have perished. [FOF #'s 152-164].

57. The following men should be considered for heroic recognition:

Bb

[FOF #'s 155-165].

58. FN Vierra, MSSN Johnson and DC3 Kilgore gave their lives honorably for their country and should be recognized. [FOF #'s 189, 190 and 200].

59. CW02 Bb and CW02 Bb should also be recognized for their timely, heroic and professional performance throughout this trying event. Their personal actions undoubtedly saved lives.
[FOF #'s 79-94, 98, 107-113 and 165-188].

60. Injuries to CWO2 _____, DCC _____, DCFN _____,
_____, DCFA _____, HT1 _____, HT1 _____,
_____, DCFN _____, and AO3 _____ occurred in
the line of duty and were not due to their own misconduct.
[FOF # 220].

61. The United States is liable for payment on all legitimate
personnel property claims arising as a consequence of the 20 June
90 fire on board USS MIDWAY. [FOF # 223].

All redactions
are B-6.

RECOMMENDATIONS

1. NAVSEASYSKOM review and update requirements, procedures and standards for the inspection of all flammable liquid tank overflow piping on a scheduled, periodic basis. [Opinion #'s 1, 2, 3 and 11].
2. NAVSEASYSKOM and COMNAVAIRPAC review requirements for Planned Maintenance System compartment inspections. These requirements should be reviewed for the purpose of expanding the applicability of PMS MRC to all shipboard compartments, except sealed spaces and tanks. [Opinion #'s 20, 33, 53 and 54].
3. NAVSEASYSKOM take action to preclude the co-location of high pressure steam lines and flammable liquid piping in compartments other than manned propulsion and auxiliary spaces. [Opinion #'s 11, 29, 35, 38 and 55].
4. NAVSEASYSKOM develop procedures and portable equipment for use in inerting shipboard spaces containing flammable vapor and heat sources until such time that damage control parties can cool the space below the spontaneous ignition temperature and/or remove the flammable vapor. [Opinion #'s 28, 29 and 34].
5. COMNAVAIRPAC initiate a review of the adequacy of Aircraft Carrier Oil Lab PQS as it applies to fuel oil transfer duties. Pending the completion of that review, Commanding Officer, USS MIDWAY, establish PQS qualification (on an interim basis) short of final PQS qualifications as fuel oil pumper, for personnel assigned duties as transfer pump operator, manifold operator and tank sounder. [Opinion #'s 6, 7, 8, 10 and 23].
6. Commanding Officer, USS MIDWAY take action to resolve the contradictions which exist between ENGDEPTINST 9540.1C and EOSS procedures regarding fuel oil transfer operations. [Opinion #'s 6, 7, 8, 10, 16 and 23].
7. B-5 v r
Te : g
st : s
fc :
8. NAVSEASYSKOM re-evaluate effectiveness of firefighter ensembles with a view toward determining whether modifications to those ensembles or additional equipment is required. The evaluation should be based on an analysis of injuries sustained by fully suited-out personnel and the conditions under which those injuries were sustained. [Opinion #'s 49 and 52].

9.
Squ
ini

B-5

BS

10. The Commanding Officer, USS MIDWAY take action to improve communications procedures between DC Central and Flying Squad personnel at the scene of an emergency in order to ensure proper, timely and correct information flow and to allow responsible personnel to exercise proper control over on scene events. [Opinion #'s 30, 31 and 32].
11. The Commanding Officer, USS MIDWAY take action to improve the supervision of fuel oil transfer evolutions, to ensure established procedures are followed and to require the use of standard and formal communications procedures between fuel oil transfer stations. [Opinion #'s 5, 6, 8 and 10].
12. The Commanding Officer, USS MIDWAY take action to cause the installation of a pressure gauge on the discharge side of all fuel oil transfer pump discharge quick closing valves in order to permit the monitoring of system pressure during pre and post-transfer pressure tests. Precise criteria should be established for determining the success or failure of those tests. [Opinion #'s 6, 7 and 8].
13. The Commanding Officer, USS MIDWAY take action to develop ventilation guide lists to show vent controller location, fan room location and compartments serviced for each ship ventilation system. Guide lists should be provided to ship repair lockers to facilitate the rapid, effective securing of ventilation to spaces affected by fire or smoke. [Opinion #'s 35, 36, 37, 45 and 46].
14. The Commanding Officer, USS MIDWAY review the adequacy and completeness of the ship's zone inspection listing. [Opinion # 53].

B-6

RADM

USN



DEPARTMENT OF THE NAVY

USS MIDWAY (CV 41)
FPO SAN FRANCISCO 96631-2710

*All redactions
are B-6.*

5800
Ser 014/0694
30 JUL 90

THIRD ENDORSEMENT on RADM ltr 5800 of 4 Jul 90

From: Commanding Officer, USS MIDWAY (CV 41)
To: Judge Advocate General
Via: (1) Commander Task Force Seven Zero
(2) Commander SEVENTH Fleet
(3) Commander, Naval Air Force, U.S. Pacific Fleet
(4) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

- Encl: (126) COMSEVENTHFLT 200119Z Jul 90 (NOTAL)
- (127) Stock Control Officer memo of 9 Jul 90 (copy)
- (128) Sworn statement of CDR , USN of 28 Jul 90
- (129) Results of interview of CWO2 , USN of 11 Jul 90 (copy)
- (130) Results of interview of HT1 , USN, of 11 Jul 90 (copy)
- (131) Results of interview of DC3 , USN, of 11 Jul 90 (copy)
- (132) Results of interview of DCFN , USN, of 11 Jul 90 (copy)
- (133) USS MIDWAY ENGDEPTINST 9540.1C; Fuel (F-76) Handling and Storage
- (134) USS MIDWAY Engineering Operational Sequencing Manual (EOSS) for Fuel Transfer Operations (pertinent portions)
- (135) Boiler Water Chemistry Workshop Sheet/Log (NAVSEA 9255/8) of 20-23 Jun 90 (copy)
- (136) Sworn statement of BT1 USN, of 28 Jul 90
- (137) Sworn statement of CWO2 , USN, of 27 Jul 90
- (138) Sworn Statement of BT2 e, USN, of 27 Jul 90
- (139) MIDWAYINST 5400.15C; Engineering Department Organizational Manual (pertinent portions)
- (140) Capacity Table for Tank B-33-F (copy)
- (141) EOSS User's Manual of 15 Jan 88 (pertinent portions)
- (142) Capacity Table for Tank A-4-1/2F (copy)
- (143) Capacity Table for Tank B-25-T (copy)
- (144) Statement of LCDR , USN, of 28 Jul 90
- (145) Sworn statement of ENS USN, of 27 Jul 90
- (146) LCDR USN, memo of 27 Jul 90
- (147) NAVSHIPS S9086-S3-STM-010, Chapter 555, Firefighting - Ship (pertinent portions)





DEPARTMENT OF THE NAVY
COMMANDER NAVAL AIR FORCE
UNITED STATES PACIFIC FLEET
NAVAL AIR STATION, NORTH ISLAND
SAN DIEGO, CALIFORNIA 92135-5100

5830
Ser 011/ **1143**
5800 31 JAN 1991

SECOND ENDORSEMENT on USS MIDWAY (CV 41) ltr Ser 14/1186 of
17 Dec 90

From: Commander Naval Air Force, U.S. Pacific Fleet
To: Judge Advocate General
Via: (1) Commander in Chief, U.S. Pacific Fleet
(2) Commander Naval Sea Systems Command
(3) Commander Naval Education and Training

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

1. Readdressed and forwarded for inclusion in subject investigation.
2. The basic correspondence and enclosures contain no additional information/justification to change the COMNAVAIRPAC JAGMAN endorsement of 21 December 1990.

B6
By direction

Copy to:
COMSEVENTHFLT
COMCARGRU 5 (complete)
COMNAVSAFECEN (complete)
COMTRAPAC (complete)
USS MIDWAY (CV 41)
RADM *D b* , USN (complete)



DEPARTMENT OF THE NAVY

USS MIDWAY (CV 41)
FPO SAN FRANCISCO 96631-2710

5800
Ser 014/1185
17 DEC 90

From: Commanding Officer, USS MIDWAY (CV 41)
To: Judge Advocate General
Via: (1) Commander Task Force Seven Zero
(2) Commander SEVENTH Fleet
(3) Commander, Naval Air Force, U.S. Pacific Fleet
(4) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (a) CO, USS MIDWAY (CV 41) third end 5800 Ser 014/0694 of
30 Jul 90 on RADM , USN, ltr 5800 of 4 Jul
90

Encl: (1) Sworn statement of HT1 , USN, of 9 Oct
90
(2) NIS Report of Results of Interview of CWO2
, USN, of 14 Nov 90
(3) NIS Report of Results of Interview of DCC
, USN, of 29 Sep 90
(4) NIS Report of Results of Interview of DCFN
, USN, of 15 Oct 90
(5) NIS Report of Results of Interview of DCFN :
, USN, of 12 Jul 90

1. Per paragraphs 8 and 9 of reference (a), enclosures (1) through (5) are forwarded for inclusion in the subject investigation.

All redactions
are B-6.



RS
dl



DEPARTMENT OF THE NAVY
COMMANDER BATTLE FORCE SEVENTH FLEET
COMMANDER CARRIER STRIKE FORCE SEVENTH FLEET
COMMANDER CARRIER GROUP FIVE
FPO SAN FRANCISCO 96601-4305

5800
Ser 004/323
22 Dec 90

FIRST ENDORSEMENT on CO, USS MIDWAY ltr 5800 Ser 14/1186 of 17 Dec 90

From: Commander, Carrier Group FIVE
To: Commander, Naval Air Force, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE
1990 FIRE ON BOARD USS MIDWAY (CV 41)

Encl: (1) CO, USS MIDWAY (CV 41) ltr Ser 14/1186 of 17 Dec 90

1. In accordance with reference (a), enclosure (1) is forwarded for inclusion
in subject investigation.

B-6 -

Copy to:
COMSEVENTHFLT
USS MIDWAY



DEPARTMENT OF THE NAVY
COMMANDER NAVAL AIR FORCE
UNITED STATES PACIFIC FLEET
NAVAL AIR STATION, NORTH ISLAND
SAN DIEGO, CALIFORNIA 92135-5100

5830

Ser 011/ **11129**

21 DEC 1990

SIXTH ENDORSEMENT on RADM
4 Jul 90

B-6

, USN ltr 5800 of

From: Commander Naval Air Force, U.S. Pacific Fleet
To: Judge Advocate General
Via: (1) Commander in Chief, U.S. Pacific Fleet
(2) Commander Naval Sea Systems Command
(3) Commander Naval Education and Training

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Encl: (155) COMNAVAIRPAC San Diego CA 061900Z Jul 90
(156) USS MIDWAY (CV 41) ltr 5800 Ser 14/0909 of 6 Oct 90
w/end

Ref: (i) COMNAVAIRPACINST 5440.15H of 26 Jan 89

1. Readdressed and forwarded.

2. On 20 June 1990 while USS MIDWAY (CV 41) was steaming off the coast of Japan, two explosions and fires occurred in and around space B-425-T, catapult number one steam piping trunk. The first happened about 1230 and the second about 45 minutes later. Two sailors were killed at the scene and another died in the hospital seven days later. A total of nine people were injured severely enough to be evacuated off the ship for medical treatment, and numerous others were treated on board for minor injuries. The damage to the ship was \$716,547.00.

3. The executive summary contained in the investigating officer's report, and paragraphs 2 through 4 of the third endorsement provide overviews of this tragedy.

4. The synergistic events leading to the two explosions and fires were as follows:

a. A fuel oil transfer team attempted to transfer fuel into tank B-25-F but, because of a misaligned valve, the fuel was pumped instead into tank B-33-F which was already 95 percent full. Concur with paragraph 4 of the fourth endorsement that BT3 *B-6*, the fuel oil manifold operator, "opened the wrong valve" during the attempt to transfer fuel into tank B-25-F; and that "this valve was not improperly set prior to stationing the fueling team."

b. A section of the overflow pipe for tank B-33-F (designed to bleed off excessive fuel) ran through catapult number 1 steam

RS 011



DEPARTMENT OF THE NAVY
COMMANDER BATTLE FORCE SEVENTH FLEET
COMMANDER CARRIER STRIKE FORCE SEVENTH FLEET
COMMANDER CARRIER GROUP FIVE
FPO SAN FRANCISCO 96601-4305

5800
Ser 004/296
8 Nov 90

FIRST ENDORSEMENT on CO, USS MIDWAY ltr 5800 Ser 14/0909 of 6 Oct 90

From: Commander, Carrier Group FIVE
To: Commander, Naval Air Force, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (a) COMSEVENTHFLT fifth end 5800 Ser 013/0613 of 10 Jun 90 on RADM: *B6*
B6 : USN, ltr 5800 of 4 Jul 90

Encl: (1) CO, USS MIDWAY (CV 41) ltr Ser 14/0909 of 6 Oct 90

1. In accordance with reference (a), enclosure (1) is forwarded for inclusion in subject investigation.

B6

Copy to:
COMSEVENTHFLT
USS MIDWAY



DEPARTMENT OF THE NAVY

USS MIDWAY (CV 41)
FPO SAN FRANCISCO 96631-2710

5800
Ser 14/0909
6 Oct 90

From: Commanding Officer, USS MIDWAY (CV 41)
To: Judge Advocate General
Via: (1) Commander Carrier Group FIVE
(2) Commander SEVENTH Fleet
(3) Commander, Naval Air Force, U.S. Pacific Fleet
(4) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (a) COMCARGRU FIVE fourth end 5800 Ser 004/0224 of 3 Aug
90 on RADM , USN, ltr 5800 of 4 Jul 90

1. In accordance with paragraph B of reference (a), the following information is submitted for inclusion in the subject investigation:

a. On 17 September 1990, BTC and BT2 appeared before me at a hearing under Article 15, Uniform Code of Military Justice (UCMJ), for violation of Article 107, UCMJ, by making the false log entries reflected in opinion 23 and enclosure (43) of the subject investigation. I determined that their actions did not warrant the imposition of nonjudicial punishment but did warrant the imposition of administrative corrective measures. Accordingly, BTC and BT2 were issued nonpunitive letters of caution, and each was awarded 8 hours of extra military instruction.

b. The final cost of damages resulting from the fire was \$716,547.00.

All redactions are B-6





DEPARTMENT OF THE NAVY

COMMANDER SEVENTH FLEET

FPO SAN FRANCISCO 96601-6003

IN REPLY REFER TO

5800

Ser 013/0613

~~10 Jun 90~~

10 OCT 90

FIFTH ENDORSEMENT on RADM

, USN, Ltr 5800 of 4 Jul 90

From: Commander SEVENTH Fleet
 To: Judge Advocate General
 Via: (1) Commander, Naval Air Force, U.S. Pacific Fleet
 (2) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
 WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

1. Forwarded.
2. The findings of fact, opinions and recommendations of the investigating officer, as modified by prior endorsers, are approved.
3. Commanding Officer, USS MIDWAY, is directed to provide results of Article 15 hearings and update status of corrective actions taken as a result of this investigation.

Copy to:
 CINCPACFLT
 CTF 70
 USS MIDWAY
 RADM

All redactions are B6

NO UNCLASSIFIED W/EXEMPT CODE IS
 THIS W/EXEMPT IS ACCOMPLISHED

COPIES # 1 OF # 1
 CODE 11
 REC # 202 265 53
 DATE SCAD 10 05 90
 TIME # 11 05 53



DEPARTMENT OF THE NAVY
COMMANDER SEVENTH FLEET
FPO SAN FRANCISCO 96601-6003

IN REPLY REFER TO

5800
Ser 013/0440
10 JUL 90

From: Commander, SEVENTH Fleet
To: Rear Admiral *TSC*, U.S. Navy

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED
WITH THE 20 JUNE 1990 FIRE ABOARD USS MIDWAY (CV-41)

1. You are granted an extension of time until 15 July 1990 to
complete this investigation.

TSC
C *>*



DEPARTMENT OF THE NAVY
 COMMANDER BATTLE FORCE SEVENTH FLEET
 COMMANDER CARRIER STRIKE FORCE SEVENTH FLEET
 COMMANDER CARRIER GROUP FIVE
 FPO SAN FRANCISCO 96601-4305

*All redactions
 are B-6.*

5800
 Ser 004/2224
 AUG. 03 1990

FOURTH ENDORSEMENT on RADM USN ltr 5800 of 4 Jul 90

From: Commander Task Force SEVEN ZERO
 To: Judge Advocate General
 Via: (1) Commander SEVENTH Fleet
 (2) Commander, Naval Air Force, U.S. Pacific Fleet
 (3) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

Ref: (g) SECNAVINST 5520.3
 (h) COMNAVAIRPACINST C3500.61 (Carrier Readiness and Training)

Encl: (148) NAVSHIPS S9086-RK-STM-010, Chapter 505, (extracts)
 (149) USS MIDWAY NOTICE 1301 dtd 19 July 90
 (150) Statement of FN _____, USN dtd 31 Jul 90
 (151) NAVPERS 1070/604 of FN _____ (PQS Qualifications)
 (152) NWP 62-1(C) Surface Ship Survivability
 (153) Memorandum for the Record of LCDR _____ dtd 2 Aug 90
 (154) Memorandum for the Record (Phonecon LCDR _____ /NAVSEA)

1. Forwarded.
2. The findings of fact, opinions, and recommendations of the investigating officer, as modified by Commanding Officer, USS MIDWAY (CV 41), are approved except as noted below.
3. Reference (g) requires the Naval Investigative Service to initiate a preliminary inquiry in circumstances of "unattended death...when criminal causality cannot be firmly excluded" (paragraph 4a (3)(a)), or "any fire or explosive of questionable origin" (paragraph 4a(3)(b)). Accordingly, the NIS Special Agent Afloat has opened an investigation (CCN 20JUN90-81XU-0088-7HNA).
4. Fuel Transfer Evolution: A substantial portion of the investigation is devoted to the fuel transfer system. This was done in an attempt to determine the source of the fuel in B-425-T. Subsequently, BT3 _____ amended his statement to clarify the circumstances; i.e., a valve had been misaligned during fuel transfer operations earlier in the day (opinions 16-17). The fact the source of the fuel can now be positively identified, renders this general discussion of fuel transfer piping irrelevant.
 That portion of the investigation which concerns qualifications of fuel transfer personnel has been reviewed in the prior endorsement and satisfactory remedial actions taken. Reference (h) contains no formal training requirements for oil lab personnel. The formal PQS for watchstations subordinate to Fuel Oil



DEPARTMENT OF THE NAVY

USS MIDWAY (CV 41)
FPO SAN FRANCISCO 96631-2710

5800
Ser 014/0694
30 JUL 90

THIRD ENDORSEMENT on RADM ltr 5800 of 4 Jul 90

From: Commanding Officer, USS MIDWAY (CV 41)
To: Judge Advocate General
Via: (1) Commander Task Force Seven Zero
(2) Commander SEVENTH Fleet
(3) Commander, Naval Air Force, U.S. Pacific Fleet
(4) Commander in Chief, U.S. Pacific Fleet

Subj: INVESTIGATION TO INQUIRE INTO THE CIRCUMSTANCES CONNECTED WITH THE 20 JUNE 1990 FIRE ON BOARD USS MIDWAY (CV 41)

- Encl: (126) COMSEVENTHFLT 200119Z Jul 90 (NOTAL)
- (127) Stock Control Officer memo of 9 Jul 90 (copy)
- (128) Sworn statement of CDR , USN of 28 Jul 90
- (129) Results of interview of CWO2 , USN of 11 Jul 90 (copy)
- (130) Results of interview of HT1 , USN, of 11 Jul 90 (copy)
- (131) Results of interview of DC3 , USN, of 11 Jul 90 (copy)
- (132) Results of interview of DCFN , USN, of 11 Jul 90 (copy)
- (133) USS MIDWAY ENGDEPTINST 9540.1C; Fuel (F-76) Handling and Storage
- (134) USS MIDWAY Engineering Operational Sequencing Manual (EOSS) for Fuel Transfer Operations (pertinent portions)
- (135) Boiler Water Chemistry Workshop Sheet/Log (NAVSEA 9255/8) of 20-23 Jun 90 (copy)
- (136) Sworn statement of BT1 , USN of 28 Jul 90
- (137) Sworn statement of CWO2 , USN, of 27 Jul 90
- (138) Sworn Statement of BT2 , USN, of 27 Jul 90
- (139) MIDWAYINST 5400.15C; Engineering Department Organizational Manual (pertinent portions)
- (140) Capacity Table for Tank B-33-F (copy)
- (141) EOSS User's Manual of 15 Jan 88 (pertinent portions)
- (142) Capacity Table for Tank A-4-1/2F (copy)
- (143) Capacity Table for Tank B-25-T (copy)
- (144) Statement of LCDR , USN, of 28 Jul 90
- (145) Sworn statement of ENS , SN, of 27 Jul 90
- (146) LCDR , USN, memo of 27 Jul 90
- (147) NAVSHIPS S9086-S3-STM-010, Chapter 555, Firefighting - Ship (pertinent portions)

All redactions are B-E

