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COMNAVAIRPAC/
COMNAVAIRLANTINST 5400.27C
NAVAIRPAC N72
NAVAIRLANT N81
19 MAY 1998

COMNAVAIRPAC/COMNAVAIRLANT INSTRUCTION 5400.27C

Subj: STANDARD REPAIR PARTY MANUAL FOR NAVAL AIR FORCE

1. **Purpose.** To issue the Standard Repair Party Manual for ships of the Naval Air Force, U.S. Atlantic and Pacific Fleet. Due to extensive revision, paragraph markings have been omitted. This instruction should be read in its entirety.
2. **Cancellation.** COMNAVAIRPAC 9880.2G/COMNAVAIRLANT 5400.27B
3. **Scope.** The COMNAVAIRPAC/COMNAVAIRLANT Repair Party Manual provides standardized policy and guidance for shipboard damage control parties. This manual applies to all ships in the Force. Pertinent references are listed at the beginning of each chapter. This is a complete revision and individual paragraph changes are not marked. **When tailoring the Repair Party Manual, ships are authorized to retain as much or as little of the non-directive content of the Repair Party Manual as desired, based on individual ship circumstances.** Mandatory items are specified with explicit, directive wording such as "will" or "shall." Advisory items are identified by *suggested* wording such as "may" or "can, "should" or "could." Those sections that are advisory in nature may be deleted at the Commanding Officer's and Engineer Officer's discretion.
4. **Action.** This instruction becomes effective as a ship's instruction after completion of the following:

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- a. Ship specific information is tabulated and inserted where required.
- b. Ship commanding officer shall issue this manual as a ship's instruction by letter.
- c. At least one copy of this manual will be distributed to and maintained in Damage Control Central, each Damage Control Repair Station and at Command Control Stations.
- d. No changes shall be made to provisions and intent of this manual except as noted in paragraph 4a, above, without the approval of the Type Commander. The Repair Party Manual is designed solely as a reference for the ship. It is not intended to serve as an inspection checklist.
- e. This instruction must be in place prior to the start of the first Basic Phase of the Inter-deployment Training Cycle after this instruction's date.


R.L. LEITZEL
Chief of Staff


R.L. CASEY
Chief of Staff

Distribution: (SNDL Parts 1 and 2)

21A1 CINCLANTFLT
21A2 CINCPACFLT
26J AFLOAT TRAINING GROUP AND DETACHMENT
28A CARRIER GROUPS
28B CRUISER-DESTROYER GROUPS
29B AIRCRAFT CARRIERS

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COMNAVAIRLANT (N02A12)

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LIST OF ACRONYMS

AFFF	- Aqueous Film Forming Foam
ASFP	- At Sea Fire Party
CBR	- Chemical, Biological and Radiological
CBR-D	- Chemical, Biological and Radiological Defense
CCS	- Central Control Station
CCSW	- Central Control Station Watch
CDO	- Command Duty Officer
CMWDS	- Counter Measure Wash Down System
CRT	- Casualty Response Team
DCA	- Damage Control Assistant
DCC	- Damage Control Central
DCRS	- Damage Control Repair Station
EDO	- Engineering Duty Officer
EEBD	- Emergency Escape Breathing Device
EOOW	- Engineering Officer of the Watch
EOS	- Engineering Operating Station
ETR	- Estimated Time of Repair
FF	- Fire Fighting
FM	- Fire Marshal
GFEA	- Gas Free Engineer Assistant
GFE	- Gas Free Engineer
GFEPO	- Gas Free Engineer Petty Officer
GRP	- Glass Reinforced Plastic
IET	- Inport Emergency Team
LD	- Load Dispatcher
MOPP	- Mission Oriented Protective Posture
MSFD	- Main Space Fire Doctrine
NFTI	- Navy Firefighting Thermal Imager
OBA	- Oxygen Breathing Apparatus
OOD	- Officer Of the Deck
OSL	- On Scene Leader
PKP	- Purple - K - Powder
PPWO	- Propulsion Plant Watch Officer
RPL	- Repair Party Leader
RLO	- Repair Locker Officer
R&A	- Rescue & Assistance
RDO	- Reactor Duty Officer
SCBA	- Self Contained Breathing Apparatus
TML	- Team Leader
UL	- Unit Locker

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ORGANIZATION AND RESPONSIBILITIES

101. References

- (a) OPNAVINST 3120.32 (Series), Standard Organization and Regulations of the U.S. Navy
- (b) NWP 3-20.31, Surface Ship Survivability
- (c) NSTM Chapter 555, Shipboard Firefighting
- (d) NATOPS 00-805-14, U.S. Navy Aircraft Firefighting and Rescue Manual
- (e) CNAP/ CNAL 3500.20 (Series), Aircraft Carrier Training and Readiness Manual
- (f) NAVSEA S5090-B1-MMO-5090-B1-MMO-010, Stowage Aid Booklet for Damage Control Equipment

102. Required Chapter Annexes

- a. 1-1, Damage Control Order of Succession.
- b. 1-2, At Sea Fire Party Organization.
- c. 1-3, Damage Control Communications Plan (primary and secondary two-way).
- d. 1-4, Repair Party Organization Chart.
- e. 1-5, Repair Party Mustering Locations.
- f. 1-6, Specific Damage Control Repair Station (DCRS) Missing/OOC Items
- g. 1-7, List/Diagram of Spread Stowage
- h. 1-8, Damage Control Command and Control Organization Chart.
- h. 1-9, Inport Emergency Team Manning Chart.
- I. 1-10, Rescue and Assistance Detail Manning Chart.
- j. 1-11, Damage Control Repair Station and Unit Locker Areas of Responsibility. A sample is provided.

NOTE: REPAIR LOCKER LEADER'S NOTEBOOK IS NOT REQUIRED. ALL INFORMATION CONTAINED IN A REPAIR LOCKER LEADER TYPE NOTEBOOK MUST RESIDE WITHIN THE REPAIR PARTY MANUAL (RPM).

- a. **Authority to Sprinkle/Flood Magazines.** The Commanding Officer shall publish policy regarding authority to order the sprinkling of magazines. The policy should distinguish between fires in a magazine and fires in adjacent compartments to a magazine. The decision to flood a magazine can have serious consequences on the damage control effort and the ship's ability to continue uninterrupted combat operations. The decision to flood a magazine shall only be made by the Commanding Officer or person delegated by the Commanding Officer.
- b. **Damage Control Measures Requiring Command Approval.** The following damage control actions shall not be taken without considering the tactical situation or the consequences/impact on other ship mission capabilities. They are, therefore, command directed:
 - (1) Ballasting/de-ballasting
 - (2) Counter-flooding
 - (3) Changes to material condition of readiness (e.g. X, Y, Z).
 - (4) Establishing/changing Maximum Permissible Exposure (MPE).
 - (5) Jettisoning.
 - (6) Activation/deactivation of the countermeasure wash down system (CMWDS).
 - (7) Sending Chemical, Biological, and Radiological (CBR) monitors or decontamination teams outside the skin of the ship when in a CBR environment.
 - (8) Activation of magazine sprinkler/flooding systems.
 - (9) Transferring contaminated (CBR) aircraft from the flight deck to the hangar deck.

104. Required Damage Control Central Equipment, Materials, Publications

- a. Liquid loading diagram updated to reflect the latest tank and void soundings shall be maintained in DC Central and a copy posted at Secondary DC Central.
- b. Complete set of DC plates.
- c. Flooding Effects Diagram (if provided) or locally prepared stability data cards.

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- d. Clinometers for determining actual list and trim.
- e. AN/PDR-65 High Range Survey Meter (may be only available on Bridge).
- f. Deck plan (may be locally prepared to plot areas contaminated by CBR agents).
- g. Propulsion Plant and Vital Auxiliary Status Board to display equipment status and plot engineering casualties.
- h. Damage Control Book and Ship's Information Book.
- i. Tank sequencing chart and/or tables.
- j. Closure Log.
- k. Damage Control Tag-Out Log or listing of installed Damage Control equipment currently tagged out.
- l. Lists of preplanned routes to ready and deep shelter, combat systems equipment casualty control supply support centers, battle dressing stations, battle messing, and other battle logistics supply centers/storerooms.
- m. Charts, nomograms and other required materials to calculate various radiological factors.
- n. Repair Party Manual with a completed set of Master Chapter Annexes and a Master Set of Repair Locker Kill Cards (Hard copy or ADP Program).
- o. The following references and instructions are to be included:
 - CBR Defense Bill
 - Casualty Power Bill
 - Jettison Bill
 - Securing and Salvage Bill
 - Strip Ship Bill
 - Toxic Gas Bill
 - NWP 3-20.31 Surface Ship Survivability
 - NSTM Chapter 555, Shipboard Firefighting
 - NATOPS 00-80R-14, U.S. Navy Aircraft Firefighting and Rescue Manual
 - NSTM Chapter 079, Vol. 2, Practical Damage Control
 - Ship's Damage Control Book
 - NSTM Chapter 079, Vol. 1, Stability and Buoyancy
 - NSTM Chapter 070, Radiological Recovery of Ships after Nuclear Weapons Explosions
 - NSTM Chapter 470, Shipboard BW/CW Defense Countermeasures

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- NAVMED P-5041, dtd 05/94, Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries
- NSTM Chapter 074, Vol. 3, Gas Free Engineering
 - Modified "Z" Plan

105. **Damage Control Central Succession.** Provisions must be made for the functions of Damage Control Central to be carried out by other stations should Damage Control Central be evacuated. Most ships are built with the Damage Control Repair Station (DCRS) furthest from Damage Control Central having most of the interior communications circuits necessary to provide a secondary Damage Control Central. The succession of Damage Control Central on each ship shall be annotated in the Repair Party Manual Chapter 1, Annex 1-1 and posted at all DCRS's.

106. **Duplicate DC Materials for Command and Control**

- a. To ensure the Commanding Officer is aware of and can better visualize the damage control situation, a duplicate set of Damage Control plates showing the hull, all decks, and compartments will be provided to command and control stations (Damage Control subdivision plates 2 thru 5).
- b. The plates need not be permanently mounted or hard laminated like those in Damage Control Central. Due to space considerations, they may be cut down or modified as appropriate so long as they remain functional.
- c. A copy of the Repair Party Manual complete with Chapter Annexes shall also be provided to all command and control stations.
- d. A major conflagration will disrupt the repair organization and may require reorganization at a topside location. The Damage Control Assistant (DCA) shall make provisions to provide the topside location with a copy of the complete Repair Party Manual and damage control plates for plotting and evaluating damage. Every effort should be made by Evacuating personnel to take essential items to maintain an effective displaced Repair Locker.

107. **Damage Control Repair Station (DCRS) Inventories**

- a. DCRS inventories shall be according to the ship's Allowance Equipage Lists (AEL). A paper copy of the ship's current DCRS AEL(s) if available and a current inventory shall be maintained in each DCRS's. A Shortage/OOC List will be maintained in Chapter 1, Annex 1-6.
- b. To assist in inventories, ships are authorized to use the following:
 - (1) Damage Control - Operating Space Item Management System (DC-OSIMS) Program.

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- (2) Inventory Aid Booklet for Damage Control Equipment (NAVSEA S5090-B1-DCB-010)
- c. As much as possible, the equipment should be distributed throughout the DCRS's designated area of responsibility via spread stowage and listed or diagramed in Chapter 1, Annex 1-7.
- d. Additionally, each DCRS shall maintain a copy of the ship's Damage Control Book, laminated damage control plates and an annotated copy of the Repair Party Manual complete with the Repair Party Manual Chapter Annexes in each DCRS.

108. DC Organization

- a. DCRS's will be organized according to ref (b), chapter 2 (see ref b fig 2-3). This organization will be described in Chapter 1. Annex 1-8.
- b. Repair Party assignments shall be IAW Ref (b), Chapter 2 (see Ref (b) fig 2-4) and annotated in Chapter 1, Annex 1-4.
- c. At Sea Fire Party. The exact composition is left to individual unit Commanding Officers; however, it must functionally comply with ref (b) chapter 9. This will be promulgated in Chapter 1. Annex 1-2.

109. Inport Emergency Team (IET) Organization

- a. Inport Emergency Team (IET). The unit Commanding Officer will develop an IET which is an effective Casualty Control Team appropriate to current circumstances (including machinery space fires). IET manning will be described in Chapter 1. Annex 1-9.
- b. The ship must be able to demonstrate an effective organization to relieve or replace the IET in case of catastrophic events. (e.g., R&A, Back-up Fire Party, Fire Quarters, etc.) This organization will be promulgated in Chapter 1, Annex 1-9.

NOTE: *THE TERM CIRCUMSTANCES SHOULD INCLUDE CONSIDERATIONS FOR COLD IRON, COLD IRON WITH FLAMMABLE LIQUID SYSTEMS RUNNING, AUXILIARY STATUS AND OPERATION OF MAIN ENGINES.*

- 110. Rescue and Assistance Team (R&A)/Re-entry Locker.** The Rescue and Assistance Detail is required when a ship is underway or out-of-homeport. They shall maintain the functional capabilities listed in Ref. (b), Chapter 2. The R&A detail shall be event specific, that is, only those functions appropriate to a particular casualty will be dispatched with the

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appropriate equipment. R&A manning will be described in Chapter 1, Annex 1-10. Re-entry Locker should be established and stowed as per Ref. (b) Chapter 2.

CHAPTER ANNEX 1-1

DAMAGE CONTROL ORDER OF SUCCESSION

Secondary DC Central:

Third Alternate DC Central:

Fourth Alternate DC Central:

AT SEA FIRE PARTY ORGANIZATION

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CHAPTER ANNEX 1-3

DC COMMUNICATIONS PLAN

From To Primary Secondary Tertiary

DCRS ORGANIZATION CHART

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CHAPTER ANNEX 1-5

DCRS MUSTERING LOCATIONS

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CHAPTER ANNEX 1-6

DCRS CURRENT MISSING/OOC DC ITEMS OR DC-OSIMS REPORT

ITEM	NSN	REQ #	STATUS
Pump, Sub	7HH4320-00-368-3186	xxxxxxxxxxxx	OOC/Wiring

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CHAPTER ANNEX 1-7

LIST / DIAGRAM SPREAD STOWAGE

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CHAPTER ANNEX 1-9

INPORT EMERGENCY TEAM MANNING

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RESCUE AND ASSISTANCE DETAIL MANNING

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CHAPTER ANNEX 1-11

DAMAGE CONTROL REPAIR STATION (DCRS) AND UNIT LOCKER (DCUL)
AREAS OF RESPONSIBILITY

- NOTE 1:** *UNDER MAJOR EQUIPMENT INCLUDE THE FOLLOWING TYPE INFORMATION: MAGAZINES-TYPE OF MUNITIONS: MAJOR ELECTRICAL DISTRIBUTION COMPONENTS - EMERGENCY SWITCHBOARDS, LOAD CENTERS; VITAL AUXILIARY MACHINERY/SYSTEMS - EMERGENCY DIESELS, FIRE PUMPS, AIR COMPRESSORS, FRESH WATER PUMPS, AC PLANTS, REFRIGERATION PLANTS; STOWAGE OF CHEMICAL WARFARE PROTECTIVE CLOTHING AND DECONTAMINATION SUPPLIES (e.g., HTH); SOURCES OF ADDITIONAL SUPPLIES WHICH CAN BE USED/NEEDED IN A MAJOR CONFLAGRATION - FOUL WEATHER GEAR, BLANKETS, SHIPS STORE CLOTHING, COVERALLS, MEDICAL SUPPLIES.*
- NOTE 2:** *SPACES WHICH ARE NORMALLY LOCKED (e.g., STOREROOMS, OFFICES, STATEROOMS, etc.) AND UNMANNED DURING GENERAL QUARTERS SHOULD BE ANNOTATED TO AIDE THE RPL AND INVESTIGATORS. SHIPS MAY INCLUDE DIVISIONS RESPONSIBLE/PHONE NUMBERS TO AIDE IN OPENING LOCKED SPACES.*

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CHAPTER 2

INVESTIGATING DAMAGE

201. References

- (a) NSTM Chapter 079, Volume 2, Practical Damage Control
- (b) NWP 3-20.31, Surface Ship Survivability

202. Required Chapter Annexes

- a. 2-1, Tanks and Voids. A sample is provided. A listing of all tanks and voids in each DCRS's area of responsibility, along with their access, sounding tube and air escape (if fitted).

203. Principles of Investigation

- a. Investigate thoroughly
- b. Investigate cautiously
- c. Report damage quickly, clearly, and concisely
- d. Take appropriate initial action
- e. Continue investigation, report in at least every 15 minutes
- f. Repeat the process

These principles are based on the investigator knowing his area of responsibility.

204. Investigator Requirements

- a. Travel in pairs.
- b. Wear an OBA (or SCBA when available), anti-flash gear, helmet w/light, and long sleeves. CBR protective mask and inflatable life vest need not be worn, but must be assigned and readily available in the DCRS.
- c. Investigators shall carry only the equipment deemed necessary, based on initial response, to conduct investigation. The investigator kit is designed to respond to all types of damage investigation, and if carried in whole will slow down the investigation process. Required equipment is:

- Adjustable wrench (suitable for ATF, WTD/WTH with dogs)

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- Explosionproof flashlight
- Firefinder
- Message blanks

d. Investigators will be familiar with Chapter Annexes 2-1.

205. Investigation Procedures

a. To prevent further damage in the course of investigation, personnel shall:

- (1) Maintain positive control of watertight fittings during access, egress and inspection.
- (2) Secure compartments after inspection.
- (3) Look for hidden damage.

b. Each compartment should be inspected for:

- (1) Fire and/or smoke
- (2) Flooding
- (3) Structural damage
- (4) Electrical/cable way damage
- (5) Mechanical/equipment/vent duct damage
- (6) Personnel casualties

c. Personnel in manned spaces shall conduct investigation on station and report results to the cognizant supervisory watch station, which in turn shall report results to DC Central. Investigators will concentrate on unmanned spaces.

d. The inspection of the ship for damage must not be confined to the primary damage area. Inspect outward from the damaged area and along the projectile path, if applicable.

e. When investigating for underwater hull damage and flooding, caution must be used when opening a watertight closure to a potentially flooded space.

f. To determine if the space is flooded:

- (1) Check for condensation on adjacent bulkheads, if accessible.

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- (2) Tap on the bulkhead, a minimum of six inches from welds, with a dogging wrench or similar object listening for a distant change in the echo tone.
- (3) Carefully loosen air test fittings/sounding tubes if provided. Remember to tighten when done.

NOTE:

GREAT CAUTION MUST BE EXERCISED IN THE REMOVAL OF SOUNDING TUBE CAPS. BACK THE CAP OFF SLOWLY AND LISTEN FOR RUSHING AIR AND LOOK FOR TRICKLING WATER FROM THE THREADS; EITHER SYMPTOM MAY INDICATE THE TANK OR VOID IS OPEN TO THE SEA.

- (4) Check air escape/vents, remembering that they may be located several decks above the damaged space.
- g. When underwater hull damage is found or suspected, all tanks and voids shall be sounded and compared with the pre-damage soundings; the closest tanks and voids to the suspected damage should be sounded first, but underwater structural damage may not necessarily be confined to the adjacent area of the damage.
- h. Tell-tale indications of damage:
- (1) Smoke or toxic gases.
 - (2) Loss of electrical power or lighting.
 - (3) Loss of interior communications.
 - (4) Sudden pressure gauge change.
 - (5) Split seams, bulging bulkheads or warped decks.
 - (6) Unexplained change in list or trim.
 - (7) Unusual noise or vibration.
 - (8) Unexplained changes in tank sounds or content.
 - (9) Warm vent ducting.
 - (10) Hot machinery bearings.
 - (11) Hot electrical cables or circuits.
- i. Use of the Firefinder. Because the Firefinder is a heat indicating device, it can be used by the investigators to:

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- (1) Locate the source or seat of the fire.
- (2) Locate hot spots on bulkheads, decks, overhead and within ventilation ducting.
- (3) Locate overheating electrical cables, controllers, or component systems.

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DAMAGE CONTROL REPAIR STATION (DCRS) 5

<u>TANK/ VOID NUMBER</u>	<u>MANHOLE ACCESS LOCATION</u>	<u>SOUNDING TUBE NUMBER</u>	<u>SOUNDING TUBE LOCATION</u>	<u>AIR ESCAPE/ VENT LOCATION</u>
5-204-2-F PORT	2-205-2 2-180-4-L	2-209-2	2-180-4-L	MAIN DECK FR 176
5-206-1-F STBD	5-278-1 5-230-0-E	1-269-2	1-212-0-L	MAIN DECK FR 255
5-308-1-W	3-324-1	3-308-1	5-292-0-E	1-278-1-Q

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CHAPTER 3

COMPARTMENT ISOLATION

301. References

- a. NSTM Chapter 555, Shipboard Fire Fighting

302. Required Chapter Annexes

- a. 3-1, Compartment Isolation Lists/Kill Cards. Prepare for each major compartment in the DCRS's respective areas of responsibility an isolation list, with copies maintained in DC Central. Each isolation list shall identify all 110V and 440V electrical loads, ventilation, compressed air, fire main, fuel/lube/hydraulic oil systems, chill water and potable water in the compartment. Individual items should be listed in a logical manner for implementation while giving due consideration to the relative importance of the item. A sample is provided. The promulgation of Kill Cards shall adhere to the following priority:
 1. Fossil fuel spaces
 2. Auxiliary Machinery spaces
 3. Primary electrical spaces (load centers, CIC, SWBD, or over 440V, etc.)
 4. Spaces protected with installed fire fighting capabilities
 5. Galley/Laundry spaces
 6. Any space hazardous to the Repair Locker (eg. O2N2, ready use acetylene, etc.)

NOTE: *MAIN SPACES COVERED BY THE MACHINERY SPACE FIRE FIGHTING DOCTRINE (4-5) NEED ONLY BE LISTED IN CHAPTER 4 (FIRE FIGHTING), HOWEVER, THE SPACE MUST BE LISTED IN CHAPTER 3 AND REFERENCE THE LISTING IN CHAPTER 4.*

NOTE: *ELECTRICAL CABLES ONLY PASSING THROUGH THE SPACE DO NOT HAVE TO BE LISTED, EXCEPT FOR BUS TIE CABLES. IN THE EVENT OF A CABLE WAY FIRE CABLES MUST BE TRACED AND ISOLATED.*

NOTE: *COMPARTMENT ISOLATION LISTS SHALL BE FREQUENTLY VERIFIED BY DCRS/DCTT PERSONNEL DURING DAMAGE CONTROL DRILLS.*

303. Compartment Isolation Considerations

- a. Every effort should be made to secure and/or isolate systems and equipment that are the cause of a fire or have the potential to increase the intensity of a fire, or pose a safety hazard to repair personnel.

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- b. Total isolation of the affected space is ideal but not necessarily required. Each casualty must be evaluated individually. Ref. (a) Para 10.3.8.1**
- c. When a space is abandoned due to fire, flooding, or other damage, the space should be mechanically and electrically isolated to the greatest extent possible under the circumstances.**
- d. Fire fighting may start before electrical power is secured.**
- e. The decision to secure lighting should be made by the scene leader.**

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CHAPTER ANNEX 3-1

ISOLATION LIST / KILL CARDS
FOR**COMPARTMENT NAME:**
COMPARTMENT NUMBER:**ELECTRICAL ISOLATION**

<u>EQUIPMENT/SYSTEM</u>	<u>CIRCUIT ID NUM</u>	<u>BREAKER LOCATION(S)</u>
1. LOAD CENTER 11	1S-3P-11	1-2-3-E/1-3-2-E
2. 115V OUTLETS	(3-45-2)-1P-C1P	3-45-2-L

MECHANICAL ISOLATION

<u>VENTILATION</u>	<u>NUMBER</u>	<u>CONTROLLER LOCATION</u>
1. RECIRC	1-2-1	1-2-0-L

<u>PIPING</u>	<u>VALVE SYS NUM</u>	<u>DC NUM</u>	<u>VALVE LOCATION</u>
1. FUEL OIL SUPPLY	FO-1	1-1-1	1-1-0-L
2. LP AIR	LPA-1	1-1-2	1-2-0-L

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KILL CARD

Card Number:

Compt Number:

Name:

Frames:

Nearest DCRS:

Access Equipt:

<p><u>Supply Ventilation Control</u> Fan Starter At Dampers At</p>	<p><u>Hazards Inside Compt</u></p>
<p><u>Exhaust Ventilation Control</u> Fan Starter At Damper At</p>	<p><u>Hazards Outside Compt</u></p>
<p><u>Natural Ventilation</u> Damper At</p>	<p><u>Fire Fighting Equipt Inside Compt</u> Fixed Portable</p>
<p><u>Electrical Isolation</u> (Notate VITAL)</p>	<p><u>Fire Fighting Equipt Outside Compt</u> Fixed Portable</p>
<p><u>Mechanical Isolation</u> (Notate (VITAL))</p>	<p><u>Desmoking Action</u> Fixed Portable</p>
<p><u>Communications</u> Inside Outside</p>	<p><u>Dewatering Action</u> Fixed Portable</p>
<p><u>Boundaries (Watertight)</u></p>	<p><u>Boundaries (Fumetight)</u></p>

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CHAPTER 4

FIRE FIGHTING

401. References

- (a) NWP 3-20.31, Surface Ship Survivability
- (b) NSTM Chapter 555, Shipboard Fire Fighting
- (c) NSTM Chapter 079, Volume II, Practical Damage Control
- (d) Hazardous Material Information System (HMIS)
- (e) OPNAVINST 5100.19(Series), Navy Occupational Safety and Health Program Manual for Forces Afloat (NAVOSH)
- (f) Ship's Damage Control Book
- (g) NAVAIR 00-80R-14 NATOPS U.S. Navy Aircraft Fire Fighting and Rescue Manual

402. Required Chapter Annexes

- a. 4-1, Fire Fighting Methods. The fire fighting agents for each class of fire are listed in preferential order in Chapter Annex 4-1.
- b. 4-2, Repair Party Leader's (RPL) Fire Fighting Checklist. A sample format is enclosed. This checklist must be tailored by each ship to be used by the DCA, RPL, On Scene Leader and bridge/quarterdeck personnel.
- c. 4-3, Compartment Hazards. According to references (d) and (e), each Damage Control Repair Station (DCRS) shall have for all spaces a listing of all hazards to include, but not limited to, hazardous material, flammable liquids, ammunition/pyrotechnics, industrial chemicals, industrial gases and any other items the repair party may be concerned with. They may be segregated by DCRS areas of responsibilities.
- d. 4-4, Magazine Sprinkler Control Valves. Using reference (f), Damage Control Repair Stations will list by location all magazine sprinkler root/control valves in their area. Sample format provided.
- e. 4-5, Considerations for a Major Fuel/Lube Oil Leak and Class "B" Fire in the Main Space
- f. 4-6, Sample Machinery Space Fire Fighting Doctrine Checklist for CV/CVN. Paragraph 405 instructions apply.
- g. 4-7, Halon Flooding System. Using reference (f), Damage Control Repair Stations will list by location all halon actuation stations. They may be segregated by DCRS area of responsibility. Sample format provided.

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- h. 4-8, Fixed CO2 Flooding Stations. Using reference (f), Damage Control Repair Stations will list by location all fixed CO2 actuation stations. They may be segregated by DCRS area of responsibility.
- i. 4-9, Smoke Removal Channels. Using references (a), (b) and (c) develop smoke removal channels, make up air ports and exhaust points for major passageways and spaces.

403. General Shipboard Fire Fighting

- a. Every crewmember should be concerned with fire prevention and aware of fire fighting guidance in reference (a) through (c). The major steps involved in shipboard fire fighting are locating the fire, reporting, containing, extinguishing, and restoring from the casualty.
 - (1) **Locating.** Considerations for locating the fire include knowledge of the ventilation systems and employment of the Firefinder. The discovery of smoke normally precedes the discovery of a fire; therefore, personnel should be familiar with the ventilation systems and air flow through their spaces to allow for quicker response. The NFTI is a great tool for locating the fire source. However, once inside the space, crossing the thermal layer and high temperature can cause a "white out" condition requiring close adherence to procedures outlined in reference (b).
 - (2) **Reporting.** Personnel must be trained to report the fire/smoke in the following manner: access the ship's emergency number, identify yourself, report class of fire or color of smoke, location (space noun name), and space DC identification (compartment) number if known. If the space is tenable, return to the fire and initiate firefighting actions. If it is untenable, isolate the space, break out fire fighting equipment and stand by in the area to brief the Casualty Response Team. Make sure all personnel in the surrounding area are aware of the fire/smoke.
 - (3) **Containing.** Lessons learned from shipboard fires have shown how spaces are more vulnerable to vertical fire spread; the topside fire boundary cannot be overemphasized. Fire boundary personnel must be very active in removing all combustibles from adjacent spaces. If the space has false decks, make sure all materials below the false deck are removed or wet down. One inch of water on deck may prevent fire spread even when the temperature of the space below is above 1000 degrees Fahrenheit. Primary fire boundaries shall have hoses flaked out and made ready as appropriate.

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(4) **Extinguishing.** Based on the tenability of the space, the Damage Control Organization should consider direct/indirect firefighting using the preferred agents listed in Chapter 4, ANNEX 4-1.

(5) **Restoring.** How fast the casualty is restored is driven by the situation and the extent of the damage. EOSS should be used, where applicable.

404. **Aircraft Fire Fighting.** Reference (a) describes the shipboard organization and responsibilities for aircraft fire fighting. Reference (g), the Aircraft Fire Fighting and Rescue Manual, describes aircraft fire fighting and rescue operating instructions and procedures. The ship's aircraft fire fighting personnel shall be organized and trained according to references (a) and (g) and Chapter 8.
405. **Machinery Space Fire Fighting Doctrine.** The Repair Party Manual Chapter 4. Annex 4-6 establishes the minimum requirements for combating Main Machinery Space Fires.
- a. Incorporate Chapter 4, annex pages 4-6-1 through 4-6-31 as part of the MSFD. Some ship classes (depending on the number of machinery spaces in the particular class) will have to make additional copies of certain pages. These pages should be numbered accordingly. Refer to reference (b), paragraph 555-10.3.8 when completing the Isolation List chapter annex page 4-6-25. Dewatering from Outside Space, list valves in the order in which they are to be aligned.
 - b. Some line items may not be applicable to all ship classes. In these cases, delete, line out or mark "NA" any line item that does not apply to the particular ship class in question.
 - c. Insert copies of the Main Space Fire Doctrine with completed chapter annex pages into each shipboard copy of the Repair Party Manual. The ship's Damage Control Assistant shall maintain the master copy in the ship's master copy of the Repair Party Manual.
 - d. Prepare laminated copies of those chapter annex pages which require action by propulsion plant watchstanders and insert into the watchstanders guide (eg., EOCC, etc.)
 - e. Prepare laminated copies of those chapter annex pages which require action by repair/fire party personnel and keep in damage control repair stations. The chapter annex pages identifies the repair/fire party team members to whom each section applies. Each team member requires copies for only those sections applicable to their duties.

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CHAPTER ANNEX 4-1

FIRE FIGHTING METHODS

<u>Combustible Involved</u>	<u>Fire</u>	<u>Extinguishing Agents</u>
Woodwork, bedding, clothing, combustible stores	A	<ol style="list-style-type: none"> 1. Fixed water sprinkling 2. Fire main 3. AFFF 4. PKP 5. CO2 Extinguisher
Paints, spirits, flammable liquid stores	B	<ol style="list-style-type: none"> 1. Halon 1301 2. Fixed CO2 System 3. Foam/AFFF 4. Installed sprinklers 5. Fire main 6. PKP 7. CO2 Extinguisher
Fuel Oil, JP-5, Gasoline	B	<ol style="list-style-type: none"> 1. Fixed F/F System (CO2/Halon) 2. AFFF 3. PKP 4. Water sprinkling system 5. Halon 1211 6. Fire main 7. Jettison
Deep Fat Fryer	B	<ol style="list-style-type: none"> 1. Range Guard Fire Extinguishing System 2. AFFF Portable Extinguisher 3. Simultaneous PKP and Low Velocity Fog
Electrical/Electronic	C	<ol style="list-style-type: none"> 1. De-energize circuit 2. Halon 1301 3. CO2 4. Water, IAW Ch 555-4.8.1, 8.2.2 5. AFFF, PKP
Magnesium alloys	D	<ol style="list-style-type: none"> 1. Jettison into the sea 2. Fire main (Not solid stream) 3. Dry sand - talc - smother
Grenades, napalm	D	<ol style="list-style-type: none"> 1. Dry sodium chloride 2. Stow in kerosene or similar hydrocarbon

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SAMPLE REPAIR PARTY LEADER CHECKLIST FOR SHIPBOARD FIRES

- ___ FIRE/SMOKE REPORTED COMPARTMENT
- ___ SECURE TRANSFERRING FUEL
- ___ RAPID RESPONSE TEAM ___ (COMMS) ___ CKT
- ___ CHECK FIRE MAIN PRESSURE (ADDITIONAL FIRE PUMPS REQD?)
- ___ DAMAGE CONTROL REPAIR STATION MANNED/READY (COMMS)
CIRCUIT
- ___ ZEBRA SET TIME
- ___ INVESTIGATORS OUT (FIREFINDER ISSUED)
- ___ ORDER FIRE BOUNDARIES (6 SIDES, TOPSIDE CRITICAL)
- ___ ORDER SMOKE BOUNDARIES (SMOKE CURTAINS, BLANKETS)
- ___ ORDER ELECTRICAL ISOLATION
- ___ ORDER MECHANICAL ISOLATION (FLAMMABLE LIQUID PIPING,
VENTILATION, etc.)
- ___ SPACE EVACUATED/CASUALTIES
- ___ DAMAGE CONTROL CENTRAL (DCC)/COMMAND DUTY OFFICER (CDO)
NOTIFIED
- ___ COMMAND'S MISSION AFFECTED
- ___ SPACE HAZARDS (CHECK CHAPTER ANNEX 4-3 RPM) HAZMAT?
- ___ CLASS OF FIRE A ___ B ___ C ___ D ___
(FUEL SOURCE) (SECURE ELECT. PWR)
- ___ INSTALLED F/F SYSTEM ACTIVATED
- ___ FIRE FIGHTERS ENSEMBLES (FFE) PRIMARY TEAM
- ___ STATUS OF VENTILATION
- ___ STATUS OF HAZARDOUS SPACES NEAR CASUALTY (ANNEX 4-3)
(CHECK DAMAGE CONTROL PLATES COLOR CODE IAW NWP 3-20-31)
(MAGAZINES/FUEL TANKS/CO2/HALON FLOODING/BATTERY
LOCKERS/STOREROOMS)
- ___ OFF SHIP ASSETS REQD/BACKUP FIRE PARTY LOCATION ___
- ___ INVESTIGATORS REPORT IN AT LEAST EVERY 15 MINUTES. TIME: ___
- ___ FIRE ___ SMOKE ___ BOUNDARIES SET
- ___ STATUS OF MECHANICAL ___ ELECTRICAL ___ ISOLATION
- ___ ACTIVE DE-SMOKING REQUIRED?
- ___ OBA ACTIVATION TIME
- ___ ENTER SPACE - DIRECT OR INDIRECT METHOD?
- ___ FORCIBLE ENTRY REQD? - PECU/PHARS
- ___ STATUS OF DE-WATERING SPACE (FIRE FIGHTING WATER (FFW)
AFFECTING STABILITY? SPACE HIGH OR LOW IN THE SHIP?)
- ___ FIRE CONTAINED
- ___ STATUS OF OBA MEN -- COORDINATE RELIEF'S _____ (LOCATION)
- ___ FIRE OUT

- ___ MAJOR FIRE - VITAL SYSTEM RESTORATION - COORDINATE WITH
EOW USING MASTER LITE-OFF CHECK-OFF SHEET
- ___ REFLASH WATCH SET
- ___ OVERHAUL COMPLETE/DEWATERING
- ___ DE-SMOKE (ENSURE SMOKE PATH CLEARS SHIP)
- ___ AFFECTED SPACE GAS FREED BY GFE/GFEA
- ___ REMAN; PROVIDE POST FIRE DAMAGE REPORT

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CHAPTER ANNEX 4-3

COMPARTMENT HAZARDS

REPAIR 3

<u>SPACE</u>	<u>HAZARDS</u>	<u>REMARKS</u>
AFTER STEERING 6-5-6-0-E	HYDRAULIC OILS	USE AFFF STA 4 WITH INLINE EDUCTOR & 1-1/2" HOSE
ARMORY 2-483-2-Q	AMMUNITION/GRENADES	MAG SPRINKLER--ACT VLV 2-481-12
#2 FLAM LKR 2-524-0-Q	PAINTS/OILS GREASES	PRI-CO2 FLOODING--SEC-#4 AFFF STA
TOWED ARRAY RM 2-506-0-Q	ISOBAR	PRI-HALON FLOODING--SEC#4 AFFF STA
TORPEDO MAGAZINE 1-390-1-M	OTTO II FUEL HE	PRI-MAG SPRINKLER--ACT VLV 1-417-1 SEC-FIRE MAIN--PRI-SCOTT AIR PAC SEC-OBA
LAUNDRY 2-382-0-Q	BLEACH	CORROSIVE - PERSONNEL HAZARD-DO NOT EXPOSE TO AL/CU=H2
JP-5 PUMP ROOM 3-398-0-E	JP-5/AC PLANT--FREON/HCL/ HBR/HFL/PHOSGENE	PRI-AFFF SPRINKLING SEC-F/S 2-418-2 INLINE EDUCTOR
REPAIR 2		
ANCHOR WINDLASS 1-0-0-E	HYDRAULIC OIL	PRI-#1 AFFF STA SEC-FIRE STA # 1-79-1/ELECT. ISO.
CHT PUMP ROOM 5-138-0-E	H2S, METHANE RAW SEWAGE	TOXIC/FLAMMABLE
RADAR ROOM 03-138-1-C	HIGH VOLTAGE	SECURE PWR/CO2
REPAIR 5		
GALLEY 1-260-0-Q	DEEP FAT FRYER	PRI-RANGE GUARD--SEC-4' APPL & PKP/PORTABLE AFFF--ELECT. ISO.
OIL LAB 2-274-2-Q	PETROLEUM CHEMICALS (LIST)	PRI-CO2/PKP SEC-#2 AFFF STA
#1 SK STOREROOM 3-274-0-A	(LIST HAZARDS)	PRI-#2 AFFF STA SEC-FIRE STA # 4-299-1
LOG ROOM 2-260-0-Q	CAUSTIC SODA	PERSONNEL HAZARD-H2 CREATED WITH AL/CU

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CHAPTER ANNEX 4-4

MAGAZINE SPRINKLER CONTROL VALVES

<u>REPAIR</u>	<u>ROOT/CONTROL VLV STATION/LOCATION</u>	<u>COMPT SERVED</u>	
2	1-31-1 (LOCK OPEN)	GROUP 1	01-23-1-M
2	01-33-1	FR 33 - 01 DECK STBD SIDE	01-23-1-M

NOTE: ***UNLESS OTHERWISE SPECIFIED, MAGAZINE SPRINKLER SYSTEMS ARE TO BE ACTIVATED ONLY BY ORDER OF THE COMMANDING OFFICER. THE SHIP'S POLICY MAY BE ADDED TO THIS LIST.***

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CHAPTER ANNEX 4-5

**CONSIDERATIONS FOR A MAJOR FUEL / LUBE OIL LEAK AND
CLASS "B" FIRE IN THE MAIN SPACE**

1. Person Discovering the Leak

a. **Report the Leak.** An accurate report of the source, nature and location of the oil leak/spray or fire will allow assistance to be quickly dispatched to correct the casualty and combat any fire. A major leak is any leak which is a steady stream or in which fluid is squirting out of the system. Notify either a nearby watchstander or EOS to call assistance to the scene and allow other watchstanders to take action and quickly isolate the leak (e.g., major JP-5 leak lower level starboard side of #1 Main Machinery Room from the JP-5 manifold).

b. **Deflect the Leak.** Prompt and effective actions can limit the casualty, and in many cases prevent the leak from cascading into a major fire. Persons discovering the leak must deflect the leak with any available material. The goal is to deflect the leak in such a manner that it is directed towards the bilge away from hot surfaces and is in a solid stream form to minimize the chance of fire. Suggested materials are shirts, jackets, rags, gasket material or sheets. If possible secure the source of the leak.

c. **Obtain an EEBD.** Obtain and shoulder an EEBD.

d. **Activate AFFF bilge sprinkling.** Activate the nearest AFFF hose reel and proceed toward the leak. A second watchstander should be available by this time to act as a hoseman. He should keep the hose on top of his shoulder when the nozzle is activated to help direct the nozzle in a downward direction. When near the leak, place the vari-nozzle in a narrow pattern and activate the hose to flush the oil to the bilge and cover it with AFFF. Do not use solid stream or the wide spray pattern.

e. Should a Class Bravo fire start, proper initial actions must be taken in the first two minutes of the fire ignition. Initial actions include:

- (1) Report the fire and warn others in the immediate vicinity.
- (2) Notify EOS/CCS.
- (3) Attempt to contain and extinguish the fire using an AFFF hose and, if readily available, a PKP extinguisher until relieved at the scene or until the fire goes "out of control".

For most Class Bravo fires, the person closest to the fire after reporting it should attempt to combat the fire with portable fire fighting equipment. Other individuals should break out portable PKP and AFFF Hose Reels.

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2. Initial Actions by On-Watch Personnel/Emergency Teams

- a. The senior person in the space shall take charge and direct fire fighting and source isolation.
- b. The Engineering Officer of the Watch (underway) or Load Dispatcher (inport) shall immediately pass the word using the 1MC.
- c. Watchstanders in unaffected spaces shall isolate systems and take actions as directed by EOOW/PPWO/RDO/EDO.
- d. Set Negative Ventilation in the affected space.
- e. The At Sea Fire Party shall additionally provide a hose team dressed out in full fire fighting gear with a hose from outside the affected space. This team is designated as Primary Fire Party, and will relieve initial fire fighting personnel when directed.
- f. The Propulsion Plant Casualty Assistance Team/Remanning Team will provide a relief watch team to man the affected space and ensure safety of propulsion plant equipment.
- g. The EOOW or DCA shall muster all Reactor Department/Engineering Department personnel to provide an adequate manpower pool for additional fire fighting efforts.
- h. Equipment should be secured as much as possible in the affected space. Main engines should be locked, turbine generators, and other major equipment secured, and steam taken out of the space. The fire may affect equipment in the opposite plant.

3. Actions by Emergency Teams:

- a. Upon hearing the word for the fire, members of the At Sea Fire Party/Inport Emergency Team/Propulsion Plant Casualty Assistance Team shall proceed to the repair locker specified and begin breaking out fire fighting equipment in preparation for entering the affected space.
- b. Fire Marshal/Duty Fire Marshal shall report to the scene and oversee fire fighting actions until properly relieved by the On-Scene Leader, after which the Fire Marshal/Duty Fire Marshal shall proceed to Repair 4/5 and help direct the remainder of the emergency team.
- c. The following actions must be accomplished by the Emergency Teams:
 - (1) Establish communications with Damage Control Central.
 - (2) Man AFFF Stations and Bilge Sprinkling AFFF Stations. Stand by to transfer AFFF.

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- (3) Don equipment, including fire fighting ensemble, and when directed light off OBA's. Report light off times to DC Central.
- (4) Enter the space and fight the fire. They should relieve watchstanders fighting the fire. (If space not evacuated).
- (5) Set fire and smoke boundaries and investigate the surrounding area for secondary fires.

4. Out of Control Class Bravo Fire Actions. A Class Bravo Fire, especially one that has burned for a long period of time or is fed by an unsecurable oil source, can become out of control within seconds. When this happens, operating machinery in the plant should be secured and the space should be evacuated. In addition, when faced with an out of control fire the following guidelines are provided for consideration:

a. The main engines should be locked. If this can not be done then the ship should be slowed so that the shaft(s) will not rotate.

b. Evacuation is the last resort. If at all possible fire fighters want to stay in the space. As long as personnel are in the space the fire can be fought. Once personnel evacuate there is very little chance of re-entry until the fire burns itself out. Once the decision is made by the EOOW, PPWO or Space Supervisor to evacuate the space, all personnel should exit using the nearest safe access. To prevent running the system dry, operate AFFF Bilge Sprinkling for no longer than four minutes. Never operate the system when the concentrate level is not visible in the tank sight glass. Immediate manning of the AFFF Station is essential to expedite tank replenishment. Access doors, hatches, and scuttles should be secured when all personnel are out of the space. At this time, ventilation in the affected space shall be secured. The EOOW and Fire Marshal shall be notified when the following actions have been taken:

- (1) Ventilation to the space has been secured.
- (2) Halon and AFFF Bilge Sprinkling Systems have been activated where installed.
- (3) The space is evacuated and all personnel mustered.
- (4) The Space Supervisor has completed briefing the fire party and On-Scene Leader on the location of the fire and plant status.
- (5) If the fire is declared "out of control" by the man in charge, the space should be mechanically and electrically isolated. Permission should be obtained from the DCA or Engineering Duty Officer with the Engineering Officer's concurrence before re-entry is attempted.

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(6) Isolation of the affected space is necessary to prevent a fire from intensifying due to the addition of flammable liquids or oxygen, and to reduce the electrical hazards. Complete isolation of the space is not required in order to allow fire fighters to re-enter and fight the fire. Immediate isolation shall be IAW Ch. 555-10.3.8.1.

(7) Complete electrical isolation will be very difficult due to the sheer number of cables passing through any given space. To the extent possible, all electrical equipment should be secured from outside the affected space at the ship's service, IC and emergency switchboard, load center, or distribution panel. The switches, circuit breakers and fuses necessary to do this shall be clearly identified by a colored border. In addition, a placard stating the color code shall be posted on affected switchboards, load centers and distribution panels. Complete electrical isolation is not required for fire party entry/re-entry.

5. Space Evacuation. Should the fire go "out of control", requiring the space to be evacuated, take the following actions:

a. Adjust the vari-nozzle stream to the wide angle position to protect yourself and others from the fire's heat. If necessary, don SEED/EEBD to facilitate evacuation.

b. **DO NOT TURN YOUR BACK ON THE FIRE!!** Start backing out of the space toward the nearest exit. This will normally be an escape trunk.

c. Upon reaching the escape trunk, lay your gear down off to the side of the entrance and proceed through the door one at a time until the only man left in the space is the nozzleman. He should then close the bail of the nozzle and back through the door without turning his back to the fire.

d. When in the escape trunk have one person attempt to see through the viewing windows to look for other personnel coming toward the door. Other personnel in the trunk should proceed through the hatch to the second deck. The first person through the hatch remains at the hatch to close it if required. Should the person at the escape trunk door see someone else coming toward the door or feel pressure from someone trying to open it, he should shout, "**CLOSE THE HATCH**". Upon hearing the shout the person at the hatch will shut but not dog the hatch and stand on it. He will continue to do so until told to open the hatch. Once the hatch is shut, the guard at the escape trunk door will allow personnel from the main space into the trunk. **Only the escape trunk door or the hatch, should be opened at any given time.**

e. Proceed in the above fashion until all personnel have exited the escape trunk except for the door guard. He will then shout up to close the hatch and climb the escape trunk ladder. Upon reaching the top, he will bang on the hatch to have it opened. After he has exited, the hatch should be shut and dogged.

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f. All personnel who have exited the main space should report to the nearest repair locker for muster and turn over of space conditions to the Repair Locker Officer and On-Scene Leader. Personnel shall remain at the repair locker until directed by the EOOW/PPWO.

g. Activate AFFF Bilge Sprinkling for "XX" minutes when evacuation is ordered.

6. General Quarters

a. If the ship is already at General Quarters when a main space fire occurs, the casualty will be treated as battle damage and handled as such.

b. If the ship is not at General Quarters, the casualty should be handled with personnel on watch, Reactor/Engineering Department personnel and the At Sea Fire Party/Inport Emergency Team. The DCA/EOOW will recommend the ship go to General Quarters, if in their judgement, it will enhance fire fighting efforts.

(1) If inport, the following are available as reinforcements to the Inport Emergency Team:

(a) Rescue and Assistance Detail. (If assigned)

(b) Augmenting personnel from the duty section.

(c) Off-Ship teams: Other ship's R&A Details, base/shipyard fire departments.

(2) In the above cases the DCA, or in his absence the Fire Marshal/Duty Fire Marshal is in overall charge of the fire fighting efforts and the integration of reinforcing/relief personnel.

(3) ACDO is responsible for mustering relief personnel IAW Chapter 1, ANNEX 1-9.

c. If General Quarters is called away, personnel fighting the fire should remain. The transition from fighting a fire from Condition III to Condition I is extremely difficult and complex. The Commanding Officer should establish the procedures for this transition and ensure that all of the ship's training teams train these procedures thoroughly and ensure that they are understood completely by the entire crew.

7. **Desmoking, Atmospheric Testing, Dewatering, and Remanning.** After the fire is out, the space shall be made safe and ready for remanning. A reflash watch shall be posted with AFFF to quickly extinguish any fire which may reignite. The following general guidelines are provided:

a. **Desmoking.** When a Class B Fire has been extinguished, combustible gases may be present. Operating electric controllers to start fans may ignite these gases. Desmoking with the installed ventilation system can proceed with minimal risk when Halon and AFFF bilge sprinkling have been operated, the source of fuel secured, the space allowed to cool, all fuel washed into the bilge's, and no damage sustained to the electrical distribution system. Clearing the space of smoke should commence as soon as the space has cooled sufficiently so there is no danger from re-ignition. Temperatures in the space should be below 140 degrees F. Before it is reported cooled. Circuit breakers and other protective devices, which tripped automatically, shall be left in the tripped position until system damage has been assessed. Examine the electrical distribution system and, if possible, reestablish power to the installed ventilating fans. If fully operational, run all fans on high speed for a minimum of 15 minutes to remove smoke and toxic gases. If the installed system is partially or fully inoperable, desmoking will take longer, but can be accomplished by using portable blowers, operable installed fans, or positive ventilation from adjacent spaces and opening accesses to the affected spaces.

b. **Atmospheric Testing.** Desmoking shall precede atmospheric testing because some combustible gas analyzers will not operate reliably in a Halon rich or oxygen deficient atmosphere. Additionally, oxygen analyzers will not operate reliably if the sensor is exposed to excessive moisture or comes in contact with particulate found in a post-fire atmosphere. When the space is clear of smoke, test for oxygen, combustible gases and toxic gases. NSTM Chapter 074, Vol. 3, Gas Free Engineering, states that the oxygen level shall be between 19.5 and 22 percent, combustible gases shall be less than 10 percent of the lower explosive limit, and all toxic gases below their Permissible Exposure Limits (PEL), before the space may be certified safe for personnel.

c. **Dewatering.** Dewater the space with the Commanding Officer's permission and in accordance with operating procedures.

d. **Remanning.** Once the space is certified as safe, remanning can begin. Operations of equipment and de-isolation of mechanical and electrical systems shall be considered only after a careful assessment of damage.

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CHAPTER ANNEX 4-6

SAMPLE MAIN MACHINERY SPACE FIRE FIGHTING DOCTRINE FOR CV/CVN

SAMPLE TO BE TAILORED TO SHIP

1. **Actions in case of a major flammable liquid leak inport or underway**

a. **WATCHSTANDER/SPACE SUPERVISOR**

Initial actions (in sequence):

- ___ If auxiliary steaming inport or at anchor, establish plant/repair party control until relieved by the EOOW/EDO.
- ___ If auxiliary steaming inport or at anchor, inform all engineering spaces and Damage Control Central
- ___ If underway, report the leak to the EOOW.
- ___ Secure the source/deflect the leak away from ignition/heat sources and isolate the affected system according to applicable operational procedures.
- ___ Obtain and shoulder an EEBD.
- ___ Apply AFFF/flush fire hazard to bilge.

Concurrent actions:

- ___ Secure operating machinery according to applicable operational procedures.
- ___ Secure all other heat and ignition sources.
- ___ Deploy portable PKP extinguishers to the scene of the leak.
- ___ Vapor secure all bilge surfaces by activating AFFF Bilge Sprinkling System, if installed, for "XX" (___) minutes, or by applying AFFF with a foam hose. (If not determined for ship then 1 minute minimum).
- ___ Leave space ventilation in operation; set negative ventilation if possible.
- ___ When ordered, pump the fire hazard over the side.

b. EOOW/CCSW ACTIONS (MAJOR FLAMMABLE LIQUID LEAK).

- ___ Report leak to OOD.
- ___ Direct actions according to applicable operational procedures.
- ___ Order AFFF station manned, as required.
- ___ Order emergency/standby generator(s) be started before loss of electrical power.
- ___ Order additional fire pump(s) be placed in operation as required to maintain fire main pressure.
- ___ Obtain permission to pump fire hazard over the side.

NOTE: *DE-WATERING SHALL BE COMPLETED ACCORDING TO OPNAVINST 5090.1 (Series), ENVIRONMENTAL AND NATURAL RESOURCES PROGRAM MANUAL, AND LOCAL SOPA INSTRUCTIONS.*

c. OOD ACTIONS (MAJOR FLAMMABLE LIQUID LEAK)

- ___ Establish communications with DC Central.
- ___ When appropriate, be prepared for loss or reduction in ships maneuverability.
- ___ Inport, ensure all off-watch personnel and non-IET personnel are mustered.
- ___ Notify other ships or authorities as appropriate.
- ___ Be observant for smoke or other signs of fire.
- ___ Sound General Quarters when directed.
- ___ Be prepared to maneuver ship to cause smoke to be carried away from ship.

d. CDÖ ACTIONS (MAJOR FLAMMABLE LIQUID LEAK)

- ___ Position self so whereas to best exercise command and control.
- ___ Ensure appropriate authorities are notified.
- ___ Request assistance when needed (other ships, base fire department).
- ___ Ensure appropriate reports to authorities are made (OPREPS, etc).

2. ACTION IN CASE OF CLASS BRAVO FIRE UNDERWAY

a. SPACE SUPERVISOR

Initial actions (in sequence):

- ___ Report Class "B" fire to the EOOW.
- ___ Ensure all watchstanders obtain and shoulder an EEBD.
- ___ Direct local fire fighting efforts.
- ___ If the fire is not localized, threatens to block exit, is fed by oil source which cannot be secured or heavy smoke is present, order space evacuation. Fire is out of control.

NOTE: *AN OIL SPRAY FIRE FROM THE IGNITION OF ATOMIZED FLAMMABLE LIQUIDS FROM A SOURCE WHICH CANNOT BE SECURED READILY WILL MOST LIKELY GROW OUT OF CONTROL AND FORCE EVACUATION.*

- ___ Secure the plant and operating machinery in the affected space(s) according to applicable operational procedures.

Concurrent actions:

- ___ Deploy additional portable PKP extinguishers to the scene of the fire and operate as needed.
- ___ Activate AFFF bilge sprinkling, if installed, for "XX" ___ minutes. (Minimum of 1 minute if time not yet determined for ship).
- ___ Leave space ventilation in operation; set negative ventilation if possible.
- ___ If evacuation is ordered or necessary, activate Halon and AFFF Bilge Sprinkling, if installed, and not already in operation.
- ___ If space is evacuated, report the following to Affected Repair Party leader:
 - ___ Status of personnel evacuated from or remaining in the space
 - ___ Status of the leak
 - ___ Location and intensity of fire
 - ___ Time Halon was activated (if activated in space)

- ___ Time AFFF Bilge Sprinkling (if installed) was activated (if activated in space)
- ___ Status of Fire fighting equipment in space
- ___ Status of space eductors
- ___ Recommend reentry route.

b. EOOW ACTIONS (CLASS BRAVO FIRE UNDERWAY)

Initial actions:

- ___ Report Class "B" fire to the OOD.
- ___ Request OOD maneuver for wind to avoid smoke ingestion by ventilation systems.

Concurrent actions:

- ___ Start or maintain equipment in unaffected spaces to maintain propulsion, electrical power, and fire main pressure.
- ___ Order fire and smoke boundaries set in adjacent engineering spaces. If not already ordered.
- ___ Place additional fire pumps in operation to maintain fire main pressure, if not already ordered.
- ___ Establish communications with affected Damage Control Repair Station Leader.
- ___ Secure operating machinery in the affected space(s) according to applicable operating procedures.
- ___ Notify OOD of maximum speed available.
- ___ Ensure AFFF bilge sprinkling activated, if installed, for "XX" ___ minutes. (Minimum of 1 minute if time not yet determined for the ship).
- ___ Set negative ventilation in affected space, if possible; if not, leave ventilation in operation.
- ___ Set positive ventilation in unaffected spaces.
- ___ Isolate the affected space mechanically/electrically with exception of fire fighting equipment, lighting, and ventilation.
- ___ Ensure watchstanders in adjacent spaces obtain and shoulder an EEBD.
- ___ Order space evacuated if the fire is reported out of control or if other circumstances arise which make evacuation necessary.
- ___ If evacuation is ordered, ensure Halon and AFFF bilge sprinkling are activated.
- ___ If EOOW is reasonably sure the watch team is trapped/killed, ensure Halon and AFFF Bilge Sprinkling are activated.

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- ___ When DCA establishes communications, report status of plant, mechanical/electrical isolation and fire fighting efforts. The DCA will assume control of fire fighting efforts if/when the space is evacuated, and as soon as communications are established.

NOTE: *WHEN DCA ASSUMES CONTROL OF FIRE FIGHTING EFFORTS, THE DCA WILL ANNOUNCE THIS OVER THE IMC. (EOOW RETAINS PLANT CONTROL).*

Restoring actions (after fire is out):

- ___ Report to the OOD all casualties and ETR's.

NOTE: *REFER TO NSTM 079 VOL 3 SECTION 48 FOR GUIDANCE ON RECONDITIONING AND SALVAGE OF IMMERSED MACHINERY.*

- ___ Direct propulsion and auxiliary systems to be aligned for operational tests.
- ___ Inform the OOD of test results and request permission to restore the affected space.
- ___ Direct the affected space watch supervisor to restore all unaffected systems to normal operation.

c. **DAMAGE CONTROL ASSISTANT (DCA, BRAVO FIRE UNDERWAY)**

Initial actions:

- ___ Assist EOOW in damage control efforts.
- ___ When the space is evacuated take control of fire fighting efforts.
- ___ Determine status of Halon activation and discharge (if installed).
- ___ Determine status of evacuees.
- ___ Ascertain re-entry route (coordinate with OSL).

Concurrent actions:

- ___ Ensure investigators are deployed.
- ___ Ensure fire and smoke boundaries are set.
- ___ Ensure that adequate fire main pressure is maintained by starting additional pumps.
- ___ Ascertain mechanical isolation of the affected space.
- ___ Ascertain electrical isolation of the affected space.
- ___ Order DCRS's other than affected DCRS to provide OBA reliefs, relief or back-up hose teams, or equipment as required.
- ___ Determine effectiveness of primary/secondary Halon:
 - ___ If Halon effective, space re-entry should be attempted as soon as conditions permit. (This is a Command Level decision based on the ships' tactical situation) In determining if conditions are appropriate consider, at a minimum, the following:
 - Temperature of the space
 - Dissipation of Halon
 - Possible flooding of the space (from sea water system, etc.)
 - Conditions which may dynamically affect the AFFF vapor seal (sea conditions, progressive flooding, necessity to de-water (stability), etc.)

NOTE: *CONTINUE TO MONITOR HALON EFFECTIVENESS UNTIL SPACE IS RE-ENTERED.*

___ If Halon is not installed or appears to have been ineffective in extinguishing the fire, re-entry should be attempted as quickly as possible after the space has been evacuated and mechanically isolated.

NOTE: *WHERE INSTALLED, ACTIVATE AFFF BILGE SPRINKLING FOR 2 MINUTES BEFORE REENTRY IF HALON IS INEFFECTIVE.*

- ___ Check fire main pressure.
- ___ Instruct Relief's to report to the affected Repair Party Leader.
- ___ Order setup of OBA change out area and recovery station.
- ___ Designate access route to the scene.

Reentry actions:

___ Make sure mechanical isolation is complete and electrical isolation is in progress. IAW 555-10.3.8.1.

NOTE: *THE ON-SCENE LEADER SHOULD DECIDE WHETHER OR NOT TO SECURE LIGHTING.*

- ___ Order AFFF bilge sprinkling activated for 2 minutes before reentry.
- ___ Order space reentry.
- ___ Note OBA activation time:
- ___ Report time of reentry to OOD.
- ___ Report when the fire is contained to OOD.
- ___ Determine de-smoking procedures, inform OOD of smoke exit points.
- ___ Order affected Repair Party Leader to setup for de-smoking.

CAUTION: *SHOULD DE-WATERING OCCUR BEFORE OVERHAUL OF THE FIRE DO NOT REMOVE THE AFFF BLANKET UNTIL AFTER THE FIRE HAS BEEN OVERHAULED.*

___ Obtain permission to de-water, as necessary, to remove fire fighting water so that it does not adversely affect ship stability or fire fighting efforts.

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- ___ Report when the fire is out to the OOD.
- ___ Report when reflash watch is set to the OOD.
- ___ Report when the fire is overhauled to the OOD.
- ___ Status of de-smoking.
- ___ Status of de-watering, if not already in progress.
- ___ Report when the space is de-smoked to the OOD.
- ___ Report when de-watering is complete to the OOD.
- ___ Report when atmospheric tests are complete and space is safe for personnel to the OOD.
- ___ Order affected Repair Party Leader to investigate for damage/system alignment.

**d. — AFFECTED DAMAGE CONTROL REPAIR STATION
OFFICER/LEADER (BRAVO FIRE UNDERWAY)**

NOTE: *UNDERWAY, THE AFFECTED REPAIR PARTY LEADER REPORTS TO AND RECEIVES ORDERS FROM THE EOOW UNTIL THE DCA ESTABLISHES COMMUNICATIONS AND ASSUMES CONTROL OF FIRE FIGHTING EFFORTS.*

Initial actions:

- ___ Man affected Damage Control Repair Station and establish communications with Main Control/CCS/DCC and the On-Scene Leader.
- ___ Report when manned and ready.
- ___ Report ZEBRA set.

Concurrent actions:

- ___ When ordered, mechanically isolate the space with the exception of fire fighting equipment.
- ___ When ordered, electrically isolate the space, IAW space electrical isolation list, with the exception of lighting. (The On-Scene Leader may order lighting to be isolated).
- ___ Order fire and smoke boundaries set and a buffer zone established.

NOTE: *PRIMARY FIRE BOUNDARIES SHALL HAVE HOSES LAID OUT AND MADE READY AS APPROPRIATE. REENTRY SHOULD NOT BE DELAYED FOR PURPOSES OF PLACING HOSES AT FIRE BOUNDARIES.*

- ___ Receive briefing on space status to include:
 - ___ Status of personnel evacuated from or remaining in the space.
 - ___ Status of the leak.
 - ___ Location and intensity of fire.
 - ___ Time Halon was activated (if activated in space).
 - ___ Time AFFF Bilge Sprinkling (if installed) was activated (if activated in space).
 - ___ Status if Fire fighting equipment in space.
- ___ Status of space eductors.
- ___ Recommended reentry route.

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- ___ Note time of Halon discharge: _____. Report to DCA.
- ___ Order AFFF bilge sprinkling secured not less than 1 minute but not more than 4 minutes after activation. (Unless the time to vapor seal the bilge has been determined by the ship).
- ___ Ensure the NFTI is warmed up and tested.
- ___ Verify Halon effectiveness and ascertain the best access to use for re-entry. Report to the DCA (coordinate with On-Scene Leader and DCA).

NOTE: *CONTINUE TO MONITOR HALON EFFECTIVENESS UNTIL THE SPACE IS RE-ENTERED.*

- ___ If Halon did not extinguish the fire, attempt to determine why, or if the fire has reflash, order On-Scene Leader to activate secondary Halon (if installed).
- ___ Verify effectiveness of secondary Halon, if activated, and report to DCA.
- ___ Pass to On-Scene Leader status of and information received from evacuees, and reports on leak/space isolation and Halon effectiveness received from Main Control/ CCS/ DCC/investigators.

Re-entry actions:

- ___ Report when manned and ready to enter affected space.
- ___ Report start/stop times for 2 minute AFFF bilge sprinkling activation.
- ___ When ordered, direct space re-entry.
- ___ Record/monitor OBA activation times.
- ___ Report when the space is entered (re-entered).
- ___ Send OBA relief's to the scene as necessary to relieve all fire team members before 30 minutes after OBA activation.
- ___ Record OBA start times for relief's.
- ___ Report when the fire is contained.
- ___ Report when the fire is out.
- ___ Report when reflash watch is set.

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- ___ Report when the fire is overhauled.
- ___ Report commencement of de-smoking procedures.
- ___ Request permission to commence de-watering, if needed to improve stability or DC teams' restoration efforts.
- ___ Report when the space is de-smoked.

CAUTION: *DO NOT DISTURB THE AFFF FOAM BLANKET BEFORE OVERHAUL IS COMPLETE.*

- ___ Report when de-watering begins.
- ___ Report when de-watering is complete.
- ___ Report results of atmospheric test(s).
- ___ Receive space gas free certification from the GFE/GFEA/GFEPO.
- ___ Order OBA's removed.
- ___ Direct damage investigation and check for system alignment.
- ___ Report all casualties and ETR's.

e. AFFECTED ON-SCENE LEADER (BRAVO FIRE UNDERWAY)

Initial actions:

___ Report to scene. Establish communications with Damage Control Repair Station.

Concurrent actions:

___ When ordered, direct personnel to isolate the space with the exception of lighting, ventilation and firefighting equipment.

___ Assist evacuating personnel, if necessary. If possible determine:

___ Status of personnel evacuated from or remaining in the space.

___ Status of leak.

___ Location and intensity of fire.

___ Time Halon was activated (if activated in space):

___ Time AFFF Bilge Sprinkling (if installed) was activated (if activated in space):

___ Status of Fire fighting equipment in space.

___ Status of space eductors.

___ Ensure Halon activation and discharge.

___ Ensure AFFF bilge sprinkling, if installed, was activated.

___ Upon verification of evacuation, isolate AFFF to space hose reel.

___ Note time of Halon discharge (if installed):

___ Report indications of Halon effectiveness at re-entry access.

___ Receive report from affected DCRS relaying information reported by evacuees and information reported by sources (other than the scene) on leak/space isolation and personnel evacuation.

___ Determine re-entry route and inform the DCRS.

___ Decide if one or two hose teams will be used in re-entry.

- ___ Determine if lighting will remain on. If other circuits are to remain energized inform the team leader and hose teams.

Re-entry actions:

- ___ Electrically isolate ventilation motor controllers immediately prior to entry.
- ___ Direct or ensure (and report to DCRS) activation of AFFF bilge sprinkling for 2 minutes before re-entry.
- ___ Direct space re-entry when ordered.
- ___ Order OBA activation and report activation times.
- ___ Report when the space is re-entered.
- ___ Report when the fire is contained.
- ___ Report when fire is out.
- ___ Report when reflash watch is set.
- ___ Report when the fire is overhauled
- ___ Report when de-smoking begins.
- ___ Report when de-smoking is complete.
- ___ Report when de-watering begins.
- ___ Report when de-watering is complete.
- ___ Request atmospheric testing.
- ___ Report results of atmospheric test(s).
- ___ Receive space gas free certification.
- ___ Direct the removal of OBA's.
- ___ Direct damage investigation and check of system alignment.
- ___ Report to Damage Control Repair Station all casualties and ETR's.

f. AFFECTED TEAM LEADER (BRAVO FIRE UNDERWAY)

Re-entry actions:

- ___ When ordered, re-enter space and direct fire fighting efforts.
- ___ If primary Halon was effective and the fire re-flashes upon re-entry, then evacuate and activate secondary Halon.
- ___ If secondary Halon is not available, then direct the hose team(s) to extinguish the fire.
- ___ If major equipment is found on line, request isolation of equipment from topside before proceeding.
- ___ Report when fire is contained.
- ___ Report when fire is out.
- ___ Set reflash watch, report.
- ___ Direct overhaul of the fire, report completion.
- ___ Report when de-smoking begins.
- ___ If needed to assist the Damage Control teams' efforts, request permission to begin de-watering. Maintain a blanket of AFFF in the bilge until fire hazard is removed.
- ___ Report when de-watering begins.
- ___ Report when space is de-watered.

**g. LEADERS OF UNAFFECTED DAMAGE CONTROL REPAIR
STATIONS (BRAVO FIRE UNDERWAY)**

- ___ Set assigned fire/smoke boundaries according to Fire and Smoke Boundary check sheets.
- ___ When ordered by DCA, provide OBA relief's, OBA canisters, AFFF and other equipment, as necessary.
- ___ Investigate surrounding area, especially those potentially affected by vent ducting or intakes/uptakes associated with the affected space.
- ___ Setup OBA change out area, and firefighters recovery station.

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h. OOD

- ___ Sound General Quarters as directed.
- ___ Establish communications with DC Central and EOOW.
- ___ Be prepared for loss or reduction of ships maneuverability.
- ___ Notify other ships and OTC as appropriate.
- ___ Be observant for changes in smoke color and quantity and report any changes to DC Central.
- ___ If possible, maneuver the ship to avoid smoke ingestion by ventilation systems.

**3. ACTIONS IN CASE OF CLASS BRAVO FIRE INPORT/AT ANCHOR
AUXILIARY STEAMING**

a. WATCHSTANDER/SPACE SUPERVISOR

NOTE: *REFER TO APPLICABLE PORTIONS OF SPACE SUPERVISOR UNDERWAY
ACTIONS.*

b. EOOW/DUTY ENGINEERING OFFICER

___ Order the affected plant secured and report the class, location, and source of the fire to the OOD and request that the inport emergency team (IET) be called away.

___ Establish communications with the affected space. Inform all engineering spaces EOOW/Duty Engineering Officer has control from the primary or secondary watch station.

___ Make sure electrical power is provided from the pier or from emergency/standby/generator(s).

___ Complete applicable steps of checklist for EOOW Actions (Underway)

NOTE: *REPORTS TO THE DCA REQUIRED BY THE UNDERWAY CHECKLIST
SHOULD BE MADE TO THE OFFICER ASSIGNED TO DIRECT FIRE
FIGHTING EFFORTS FROM DCC, IF ONE IS ASSIGNED.*

___ If DCC is not manned or is not responsible for controlling and directing fire fighting efforts in main machinery spaces inport per the ship's SORM, complete the applicable steps of the check-list for DCA Actions (Underway).

c. FIRE MARSHAL / CDO / ACDO

___ Establish communications with EOOW/Duty Engineering Officer/Affected Damage Control Repair Station.

___ Make recommendations to the CDO as to the use of naval base fire department or assistance from other ships or as required by Chapter 1, ANNEX 1-9.

___ Request CDO call Base Fire Department and ships on the same pier, if inport.

___ Complete applicable steps of checklist for DCA (Underway) (page and). Use personnel in the duty section as necessary.

d. AFFECTED REPAIR PARTY LEADER

NOTE: *ACTIONS ARE THE SAME AS REPAIR PARTY LEADER (UNDERWAY)*

e. AFFECTED SCENE LEADER

NOTE: *ACTIONS ARE THE SAME AS SCENE LEADER (UNDERWAY)*

f. AFFECTED TEAM LEADER

NOTE: *ACTIONS ARE THE SAME AS TEAM LEADER (UNDERWAY)*

g. OOD

- ___ Secure the Quarterdeck to nonessential traffic.
- ___ Notify Base Fire Department and adjacent ships as applicable.
- ___ Establish communications with the EDO/EOW and affected DC Repair Station.
- ___ Be observant for changes in smoke color and quantity and report any changes to DC Central.
- ___ Make sure the Duty Section Leader musters all hands on board not on the IET, render assistance as required.
- ___ Notify base Medical Facility of a major fire and request assistance for possible personnel casualties.
- ___ If at anchor, inform Beach Guard Duty Officer of the fire, suspend normal boating and coordinate the use of all boats to transport assisting fire fighting teams and fire fighting equipment to the ship.
- ___ Await further instructions from CDO.

h. WEAPONS OFFICER SHALL:

- ___ Muster with ACDO.
- ___ Ensure immediate access to all Weapons Department spaces.
- ___ Supervise activation of magazine sprinkler systems, if required.
- ___ Direct moving of weapons/ammunition, if required.

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j. SUPPLY OFFICER SHALL:

- ___ Muster with ACDO.
- ___ Ensure immediate access to all Supply Department spaces.
- ___ Direct moving of flammable stores, if required.
- ___ Provide ice water to OBA change out and repair lockers.

k. SENIOR MEDICAL OFFICER SHALL:

- ___ Establish a triage area.
- ___ Provide corpsmen at the OBA change out station.

l. AIR DEPARTMENT PERSONNEL:

- ___ Man the pump rooms and all fuel oil transfer stations and secure any pumping evolution.
- ___ Establish communications V-4 Divisional Office and pump rooms on a sound powered phone circuit.
- ___ Isolate flammable liquid systems from the affected space(s) as directed by the V-4 Division Officer/LCPO/Duty Department Head.

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FIRE BOUNDARIES

COMPARTMENT: (SPACE NAME / NUMBER)

PRIMARY BOUNDARIES OR GROUPS:

BOUNDARY OR GROUP #	COMPARTMENT(S) NAME / NUMBER	BLKHD/ DECK	FIRE STATION/ # HOSE LENGTHS	RESPONSIBLE PARTY (INPT/UNDERWAY)	OBA REQ? (Y/N)

SECONDARY BOUNDARIES OR GROUPS:

BOUNDARY OR GROUP #	COMPARTMENT(S) NAME / NUMBER	BLKHD/ DECK	FIRE STATION/ # HOSE LENGTHS	RESPONSIBLE PARTY (INPT/UNDERWAY)	OBA REQ? (Y/N)

SMOKE BOUNDARIES

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COMPARTMENT NAME:

COMPARTMENT NUMBER:

PRIMARY:
(INCLUDING BUFFER ZONE)

FITTING NUMBER	CLASSIFICATION	CURTAIN/ BLANKET	RESPONSIBLE PARTY INPT/UNDERWAY	OBA REQ? (Y/N)

SECONDARY:
(OUTSIDE BUFFER ZONE)

FITTING NUMBER	CLASSIFICATION	CURTAIN/ BLANKET	RESPONSIBLE PARTY INPT/UNDERWAY	OBA REQ? (Y/N)

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ISOLATION LIST

COMPARTMENT NAME:

COMPARTMENT NUMBER:

PRIMARY BOUNDARY FWD:

PRIMARY BOUNDARY AFT

SECONDARY BOUNDARY FWD:

SECONDARY BOUNDARY AFT:

ELECTRICAL SYSTEMS:

SYSTEM TYPE	NOUN NAME	CKT NUMBER	LOCATION	RESPONSIBLE PARTY (INPT/UW)	FUSE/CKT BKR	PRI/ALT

ELECTRICAL ISOLATION SHALL INCLUDE ALL MACHINERY, SWITCHBOARDS AND LOAD CENTERS REQUIRED TO ISOLATE THE AFFECTED SPACE.

MECHANICAL SYSTEMS:

SYSTEM/ SYSTEM TYPE	NOUN NAME	VALVE NUMBER	REMOTE OPERATOR	RESPONSIBLE PARTY (INPT/UW)	PRIORITY

VENTILATION SYSTEMS:

NATURAL/ FAN	CONTROLLER LOCATION	REMOTE CONTROL LOCATION	CLOSURE TYPE	DESIGNATION/ AREA SERVED	WEATHER DECK		RESPONSIBLE PARTY (INPT/UW)
					NTAKE	EXH	

DE-WATERING FROM OUTSIDE SPACE

SPACE TO DE-WATER	USE EDUCTOR NUMBER	OPEN THE FOLLOWING VALVES (LOCATION OF OPERATORS)	PRIMARY/ ALTERNATE

OBA CANISTER DISPOSAL

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FOR FIRE IN	LOCATION	DCRS RESPONSIBLE	ALTERNATE LOCATION	DCRS RESPONSIBLE

EEBD COLLECTION AREA

FOR FIRE IN	LOCATION	DCRS RESPONSIBLE	ALTERNATE LOCATION	DCRS RESPONSIBLE

19 MAY 1998 PRIMARY/SECONDARY SPACE REENTRY PLAN

NOTE: FOR EACH MACHINERY SPACE INCLUDE LINEUP OF #1/#2 HOSES FOR BOTH PRIMARY AND SECONDARY ACCESSES. INCLUDING: FIREPLUG LOCATION, NUMBER OF REQUIRED HOSES, AND USE OF IN-LINE EDUCTOR OR AFFF HOSE REEL, AS APPLICABLE. SPECIFY DESIGNATION OF PRIMARY AND SECONDARY ACCESS FOR EACH SPACE.

SPACE: .

PRIMARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

SECONDARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

SPACE:

PRIMARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

SECONDARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

SPACE:

PRIMARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

SECONDARY ACCESS (FILL IN LOCATION)

HOSE NUMBER	FIREPLUG NUMBER	LENGTHS OF HOSE	IN-LINE EDUCTOR (Y/N)	AFFF HOSE REEL (Y/N)
#1 HOSE				
#2 HOSE				

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DE-SMOKING PLAN

NOTE: SHIPS SHALL PREPARE DE-SMOKING PLANS FOR EACH OF THE FOLLOWING CONTINGENCIES:

- a. USE OF POSITIVE VENTILATION/OVER-PRESSURIZATION.
- b. USE OF INSTALLED VENTILATION.
- c. USE OF PORTABLE DE-SMOKING EQUIPMENT.

COMPARTMENT PROCEDURE

(SPACE) a.
 b.
 c.

(SPACE) a.
 b.
 c.

(SPACE) a.
 b.
 c.

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ATMOSPHERIC TESTING

NOTE: *SHIPS MUST LIST THE ATMOSPHERIC TESTS WHICH MAY BE REQUIRED DURING POST-FIRE GAS FREE TESTING FOR EACH MACHINERY SPACE. DIFFERENT SPACES MAY REQUIRE DIFFERENT GAS FREE TESTS BASED ON THE POTENTIAL HAZARDS CONTAINED WITHIN THAT PARTICULAR SPACE. (e.g., IF HALON 1301 HAS BEEN DISCHARGED, A TEST FOR HYDROGEN FLUORIDE SHALL BE DONE) REFER TO NWP 3-20.31 SERIES FOR GUIDANCE.*

SPACE REQUIRED TEST(S)

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OBA RELIEVING PROCEDURES

NOTE: *IN A MAIN SPACE FIRE, PERSONNEL STAY TIMES MAY BE AS SHORT 3-10 MINUTES IN LENGTH. THE DRIVING FORCE FOR OBA RELIEVING PROCEDURES IS NOT NECESSARILY GOVERNED BY OBA CANISTER DURATION BUT BY HEAT INTENSITY IN THE AFFECTED SPACE.*

OBA RELIEVING PROCEDURES WILL OCCUR AS FOLLOWS:

DCRS #5 POSITION	1ST RELIEF	2ND RELIEF
#1 NOZZLE MAN		
#2 NOZZLE MAN		
TEAM LEADER		
SCENE LEADER		XXXXXXXXXXXXXXXXXX
DCRS OFFICER		XXXXXXXXXXXXXXXXXX

RELIEF'S FOR AT LEAST THOSE POSITIONS LISTED ABOVE SHALL BE APPOINTED IN WRITING, BY POSITION. RELIEF'S FOR OTHER HOSEMEN MAY BE APPOINTED IN WRITING OR MAY RELIEVE THROUGH NORMAL BUMP-UP PROCEDURES. RELIEF'S MAY COME FROM ANY OTHER REPAIR STATION OR DCRS #5 ITSELF. IF FROM ANOTHER DAMAGE CONTROL REPAIR STATION, THESE INDIVIDUALS MUST PARTICIPATE IN REGULAR DCRS #5/ MAIN SPACE FIRE TRAINING. **THE FOCUS ON THIS PROCEDURE IS THAT CRITICAL BILLETS LISTED ABOVE WILL HAVE AT LEAST TWO QUALIFIED RELIEF'S.** THE SCENE LEADER AND DCRS OFFICER MAY HAVE ONLY ONE ASSIGNED TEMPORARY RELIEF SINCE THESE INDIVIDUALS WILL NOT NORMALLY BE DIRECTLY EXPOSED TO RADIANT HEAT BUT ARE STILL WITHIN THE BUFFER ZONE.

EXAMPLE:

DCRS #5 POSITION	1ST RELIEF	2ND RELIEF
#1 NOZZLE MAN	DCRS 2 #1 NOZZLE MAN	DCRS 3 #1 NOZZLE MAN

ROTATION OF PERSONNEL OR OTHER FACTORS MAY PERIODICALLY CAUSE THIS LIST TO CHANGE. RECOMMEND COMPLETION OF THIS SHEET AFTER LAMINATION.

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CHAPTER ANNEX 4-7

HALON FLOODING SYSTEM ACTUATION STATIONS

<u>REPAIR</u>	<u>STATION</u>	<u>LOCATION/FRAME</u>	<u>COMPARTMENT SERVED</u>
2		2-40-2-L FR 45 (S) 3-43-0-L FR 45 (S)	FLAM LIQUID STRM 3-32-1-K
3	1-255-1	1-250-3-L	PAINT MIX/ISSUE RM 1-240-1-K
3		2-238-2-L FR 360 (P)	GAS CYLINDER STRM 2-355-2-K

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CHAPTER ANNEX 4-8

FIXED CO2 FLOODING SYSTEM ACTUATION STATIONS

<u>REPAIR</u>	<u>STATION</u>	<u>LOCATION/FRAME</u>	<u>COMPARTMENT SERVED</u>
2	RLSE 2	2-64-0-L FR 64 (S) 4-64-0-Q FR 64 (S)	INNER GMLS
2	RLSE 4	2-64-0-L FR 64 (S) 4-64-0-Q FR 64 (S)	OUTER GMLS
3		2-464-01-L FR 468 (P) 3-464-0-Q FR 473 (P)	FLAM LIQUID STRM 6-464-4-K

CHAPTER ANNEX 4-9

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SMOKE REMOVAL CHANNELS

<u>FROM</u>	<u>VIA</u>	<u>TO</u>
1. Compartment #	WTD - Passageway WTD - Passageway WTD -	Portside weather deck WTD -
2. Compartment #	WTD - Passageway WTD - Passageway WTD - Passageway WTD - Passageway	Starboard weather deck WTD -

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SHIP STABILITY AND FLOODING CONTROL

501. REFERENCES

- (a) NWP 3-20.31, Surface Ship Survivability
- (b) NSTM Chapter 079, Volume 1, Stability and Buoyancy
- (c) Ship's Damage Control Book
- (d) OPNAV P-03C-01-89, U.S. Navy Cold Weather Handbook for Surface Ships

It cannot be over-emphatized that the information and instructions in the Damage Control Book Section II(a) (Stability and Loading) must be completely understood and followed by ship's personnel. Section II(a) contains comprehensive instructions tailored to each ship in "Procedures After Damage".

502. Required Chapter Annexes

- a. None

503. Required and Available Stability

- a. Every crewmember should be confident in the ship's ability to survive severe weather conditions while intact, and to survive massive amounts of damage in moderate sea conditions. For the ship to have its required stability and reserve buoyancy, both before and after damage, the following must be observed:
 - (1) The limiting drafts specified in ref (c), section II(a), are not exceeded before damage.
 - (2) There are no excessive or unusual topside weights or deck loads, such as icing.
 - (3) The liquid and dry cargo loading instructions contained in ref (c), section II(a), and Damage Control Diagram 1 (Liquid Loading Diagram) are followed , and
 - (4) A proper degree of watertight integrity is maintained. (Watertight fittings are effectively maintained and personnel are adequately trained to set the required material condition).
- b. The Damage Control Assistant shall determine the ship's stability and complete a draft report at least daily, and following any major alteration to

the ship's loading. If the liquid and dry cargo loading instructions are followed, only the drafts, trim and displacement need to be determined. If these instructions are not followed, the DCA must also calculate the position of the center of gravity (KG) and Metacentric Height (GM). All values shall be compared to the acceptable limits prescribed in the Damage Control Book, Section II(a).

504. Procedures After Damage

- a. Ref (c), section II(a), provides detailed instructions and procedures to be followed in the event of damage. The following is a generic sequence of events:

Step 1. Isolate the Flooding

- a. Set flooding boundaries
- b. Isolate electrical power
- c. Isolate mechanical systems

Step 2 Determine Impact of Flooding and Prioritize De-watering Efforts

- a. De-water spaces colored pink on the Flooding Effects Diagram which can be made sufficiently tight to allow pumps to be effective.
- b. De-water spaces which have the greatest Free Surface Effect first.
- c. Use locally prepared stability data cards, if applicable, to assess impact of flooding.

Step 3. Evaluate Critical Stability

NOTE: *STABILITY IS CRITICAL WHEN IMMEDIATE IMPROVEMENT IS NECESSARY TO AVOID LOSS OF THE SHIP. STABILITY SHOULD BE CONSIDERED CRITICAL IF ANY OR ALL OF THE FOLLOWING CONDITIONS EXIST:*

(1) Small or negative metacentric height

- a. The ship is lopy, with a slow erratic roll period and a tendency to hang at the end of the roll.
- b. The ship has a tendency to list at the same angle to either side.
- c. The ship has a list which cannot be accounted for by off-center weight.

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- (2) **Approach or Exceed floodable length**
 - a. The extent of flooding approaches or exceeds the maximum amount of flooding tabulated in ref (c), section II(a).
- (3) **Excessive list**
 - a. The ship lists to a static heel of 15 degrees or more.
- (4) **Heavy winds and seas**
 - a. Heavy winds and rough seas are prevailing or are anticipated.

Step 4. If Stability is Critical

- a. Suppress free surface effect by de-watering or filling partially flooded compartments.
- b. Strike down solid weights, such as ammunition, from upper deck handling rooms to magazines.
- c. Ballast tanks according to the ship's Liquid Loading Instruction.
- d. If freeboard is adequate, fill completely those compartments which will improve stability when flooded solid. (Yellow or green compartments on the Flooding Effects Diagram).
- e. Favor stability in the handling and maneuvering of the ship. Limit speed and rudder angle to reduce dynamic forces.
- f. Jettison topside weights if items (1) and (2) are insufficient or impossible. This is a difficult and timely procedure. Concentrate on heavy items and plan ahead considering the effect of removing various items.

Step 5. Eliminate or Reduce List

- a. **List caused by off-center flooding only:**
 - (1) Counter-balance on the high side to reduce the list. Add only that amount that would correct for one-half the list, evaluate the effect of this action and then proceed to correct the list.

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b. **List caused by negative Metacentric Height (GM) only:**

- (1) **DO NOT** add weight to the high side to correct for this list. Take action to lower the ship's center of gravity by ballasting low tanks symmetrically, jettisoning topside weight symmetrically, shifting weight low symmetrically, and at all times by suppressing free surface effect.

c. **List caused by a combination of off-center loading and negative metacentric height (GM):**

- (1) First, take all corrective actions listed above to restore positive GM. Secondly, proceed with corrective actions to correct for off-center flooding.

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CHAPTER 6

REPAIRING DAMAGE IN ACTION

601. References

- (a) NSTM Chapter 079, Volume 2, Practical Damage Control
- (b) NSTM Chapter 079, Volume 3, Engineering Casualty Control

602. Required Chapter Annexes

- a. 6-1, Sample Casualty Power Routes
- b. 6-2, Sample Casualty Power Checklist

603. Use of Shoring

- a. Shoring is the process of placing supports against the side, beneath, or above a structure to prevent metal fatigue, sagging and bulging. Ships often have had to support ruptured decks, build up temporary bulkheads and decks against the sea, to support hatches and doors, and to provide supports for equipment that has broken loose. This is accomplished largely by shoring.

604. When to Shore

- a. Shoring is not an immediate action to be initiated after flooding damage. Ships are designed with inherent structural strength to resist flooding. All principle transverse and longitudinal structural bulkheads and all watertight decks are designed to stand the maximum static pressure which any conceivable flooding can place on these structures. Provided the bulkhead or deck is in a proper state of preservation, this pressure may result in deformation but there will be no serious threat of failure. Failure of a bulkhead may occur, however, from one of the following causes:
 - (1) If the structure is old, it may have been subjected to considerable corrosion and so weakened.
 - (2) The damage itself may cause some local weakening of the structure and this is particularly liable to occur for those structures close to an explosion.
 - (3) The static pressure due to flooding may be increased by a dynamic pressure due to the ship's movement, either by her speed or her behavior in a seaway.

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Unless one or more of the above conditions exist, there should be no reason for shoring bulkheads or decks. Shoring is not required as a matter of routine.

- b. Exercise good judgement when inspecting the damaged area. Deep bulges in plating bowed frames and stanchions, loose rivets, cracked seams, and panting bulkheads are indications for the need for shoring. Panting is a dangerous condition. It results in metal fatigue which eventually causes cracking and splitting.
- c. Carefully inspect equipment whenever damage is sustained in their vicinity. Weakened supports under guns and machinery may not be readily noticed. These must be shored whenever necessary so that further operation will not cause greater damage.
- d. Due to ship construction, each shoring structure will be different. Many shoring situations will require the removal of interference's such as equipment, ventilation ducting, or even cable ways. Damage Control Central must approve and coordinate interference removal to avoid further damage or impact on other damage control evolution's in progress.
- e. When in doubt, always shore!

605. Casualty Power System. Ships are designed with an installed casualty power system which provides a means for repair party personnel to quickly respond to a damaged electrical distribution system and provide temporary emergency power to predetermined equipment vital to ship survivability. The system eliminates the need for time consuming cable tracing, cutting, and splicing. The components of the system include permanently installed vertical risers, bulkhead and switchboard terminals, and portable pre-staged cables and switches. Features of the casualty power system are:

- a. Preservation of watertight integrity of the ship.
- b. Simplicity of installation and operation.
- c. Flexibility of application.
- d. Inter-changeability of parts and equipment.

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606. **Casualty Power Bill.** In a damaged condition, the timely and effective response of repair party personnel to rig casualty power may be vital to ship survivability. Safety in rigging casualty power is never to be sacrificed for speed. Experience shows that trained repair parties who are knowledgeable of their system and have practiced for such emergencies will be able to rig casualty power safely and with dispatch while unprepared/untrained repair parties lose critical hours in getting organized. Tables of normal, alternate, and emergency electrical sources, vital loads, casualty power bulkhead and riser terminals ABT's and MBT's are included in the ship's Damage Control Book (Part IV) and Damage Control Plates (13 and 14). Preplanned casualty power cable routes shall be developed and included in the Repair Party Manual Chapter Annex on 6-1 as the ship's Casualty Power Bill.

607. **Procedure for Rigging Casualty Power**

- a. Make sure the power is NOT available at the damaged panel or switchboard.
- b. Make sure that all power supplies are tagged open. If a type "K" switch is installed on the panel, OPEN IT.
- c. Make sure that there are no grounds and no short circuits existing in the panel or equipment. If supply cables are damaged and no switch is available, disconnect the leads.
- d. The Engineer Officer will designate the switchboard and riser to be used as the source of supply.
- e. The casualty power cables should then be taken from their stowage and laid out ready for connecting.
- f. Personnel making the connections must be provided with rubber gloves, a voltage tester, rubber boots or a rubber mat. Rubber boots protect against sea water, a rubber mat DOES NOT.
- g. Connect all horizontal cables BEGINNING AT THE RISER OR BULKHEAD TERMINAL AT THE CASUALTY and work toward the riser or bulkhead terminal entering the compartment from which power will be supplied. (Load to Source)
- h. Test, then connect the equipment to the riser or bulkhead terminal leaving the compartment.

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- i. **UNDER NO CIRCUMSTANCES** is the riser terminal to be used for a connection block unless the other end of the riser is to supply the same piece of equipment.
- j. Install a portable switch in the line near the casualty to kill power in the event of an emergency, or for reversing leads to correct phase rotation.
- k. When all cables have been connected (including the horizontal connections) to the riser leading to the compartment designated as a power supply, inform Damage Control Central.
- l. Hang "DANGER HIGH VOLTAGE" signs every five (5) feet on horizontal connections.
- m. The Damage Control Assistant will request that the bridge pass the word "Stand Clear of Casualty Power Cables Rigged". (If for training only, this should be repeated every 5 minutes).
- n. When the operator of the designated switchboard receives word from Damage Control Central to "Rig and energize casualty power cables", the operator shall perform the following:
 - (1) Test the bulkhead terminal and rig that end ONLY.
 - (2) Rig the cable to the switchboard terminal after checking to make sure the switchboard casualty power circuit breaker is open and after testing the casualty power terminal in the switchboard to make sure the terminal is de-energized.
 - (3) Prior to closing and opening the power switch, pass the word, "STAND CLEAR OF CASUALTY POWER CABLES RIGGED WHILE BEING ENERGIZED."
 - (4) Close and open the casualty power switch momentarily and then close again. This could eliminate serious casualty to personnel in case someone is still working on the casualty cable run.
- o. Report to Main Control "Casualty power riser, or bulkhead terminal, rigged and energized". Main Control then notifies Damage Control Central.
- p. Make sure that motor rotation is in the correct direction. If not, the rotation can be reversed by de-energizing the circuit at the portable switch or the switchboard and reversing any two of the three leads.

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608. Procedures for Securing Casualty Power

- a. The Damage Control Assistant will notify Main Control to "De-energize and disconnect casualty power from riser or bulkhead terminal".
- b. The switchboard electrician will:
 - (1) Open casualty power circuit breaker.
 - (2) Test for de-energization.
 - (3) Disconnect the casualty power cable from the riser (or bulkhead terminal) leading from the switchboard compartment. (Source to Load)
 - (4) Disconnect the casualty power cable from the switchboard terminal.
 - (5) Report to Main Control "Casualty power de-energized and disconnected from riser (or bulkhead terminal) _____".
- c. Main Control will notify Damage Control Central of this action.
- d. Damage Control Central will direct the repair party(ies) to unrig and restow casualty power cables.
- e. In unrigging casualty power cables:
 - (1) Test each connection block to make sure it is de-energized before removing the cable.
 - (2) Disconnect cable at the casualty.
 - (3) Then disconnect horizontal cable runs.
 - (4) In disconnecting, keep the leads separated between fingers of the rubber glove. When the three leads are free, they shall be dropped to the deck, making sure that no personnel are in the immediate area of the point of drop. The operator shall turn his head away from point of contact of cable with deck.
- f. After the casualty has been repaired and the casualty power cables have been unrigged, the repair party(ies) will notify Damage Control Central.
- g. The Damage Control Assistant will inform the Engineer Officer who will then direct the energizing of appropriate power supply circuits. The

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Engineer Officer will notify the OOD when the casualty has been repaired and the normal power source has been restored.

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CASUALTY POWER ROUTES

The following pages lay out the various routes to be used when rigging casualty power from designated vital equipment to an available power source. The responsible Damage Control Repair Station (DCRS), and the terminals (Bulkhead Terminals (BT), Riser Terminals (RT)) and cables to be used are listed. These routes are not to be considered binding, but are the "best case", shortest routes available. In case of damage or other obstruction to these routes, the DCA will order an alternate route. The DCRS responsible for rigging casualty power is identified in the column on the left.

DCRS FROM #1 FIRE PUMP CONTROLLER TO 1E SWBD

II #1 Fire pump to 1E SWBC use cable 3-18-1 (35')

DCRS FROM #1 FIRE PUMP TO 1SA/1SB SWBD

II #1 Fire pump to RT 3-23-1 use cable 3-18-1 (35')

II RT 2-23-1 to BT 2-23-3 use cable 2-23-1 (20')

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CHAPTER ANNEX 6-2

CASUALTY POWER CHECKLIST

1. ___ Damaged Cables to Vital Load
2. ___ Open power panel breakers to load
3. ___ Are cables from Normal/Alternate/Emergency power supplies damaged?
4. ___ DCA recommend to CO the rigging of casualty power
5. ___ DCA check vital load DC Plate for Normal/Alternate/Emergency power supplies and load circuit breaker numbers
6. ___ DCA order Main Control to open and tag-out load circuit breakers on Normal/Alternate/Emergency power supplies
7. ___ Engineer Officer designate source and source riser
8. ___ DCA designate casualty power route according to Casualty Power Bill
9. ___ Repair electrician disconnect power feeders from load power panel
10. ___ Repair personnel rig from load riser to source riser
11. ___ Rig from load power panel terminal to load riser (install K switch between load power panel and riser)
12. ___ Switchboard watch rig from source riser to source terminal (make sure casualty power breaker is open and de-energized)
13. ___ Bridge pass word "Stand clear of casualty power cables rigged between frames ___ and ___" every 5 minutes
14. ___ DCA give permission to flash test - switchboard watch momentarily energizes casualty power breaker (SAFETY PRECAUTION)
15. ___ DCA give permission to energize cables
16. ___ Repair electrician operationally test the load

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CHAPTER 7

CHEMICAL, BIOLOGICAL, AND RADIOLOGICAL DEFENSE (CBR-D)

701. References

- (a) NWP 3-20.31, Surface Ship Survivability
- (b) NSTM Chapter 070, Radiological Recovery of Ships after Nuclear Weapons Explosions
- (c) NSTM Chapter 470, Shipboard BW/CW Defense and Countermeasures
- (d) NAVMED P-5041 dtd 05/94, Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries

702. Required Chapter Annexes

- a. 7-1, CBR-D On Station Survey Recording Sheets (Nuclear)
- b. 7-2, Radiological Survey Forms
- c. 7-3, Internal/External Sampling Sheets (Chemical)
- d. 7-4, Damage Control Repair Station CBR Assignments

703. CBR Defense Bills

Detailed responsibilities, procedures, action to take, shall be promulgated in the ship's CBR Defense Bill using NWP 3-20.31 (Series) and this manual for guidance.

704. Mission Oriented Protective Posture (MOPP)

- a. The MOPP provides the Commanding Officer and/or the Task Force Commander a wide range of protective levels from issuing protective clothing and equipment (MOPP Level 1) to wearing protective clothing and equipment (MOPP Level 4). The ideal situation is to balance the degree of protection (MOPP Level) commensurate with the threat. A detailed check list is provided in ref (a).

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MOPP LEVELS

	1 SUSPECTED	2 POSSIBLE	3 PROBABLE	4 IMMINENT
ALARMS/ DETECTOR KITS	FULL ALLOWANCE OF ALL ITEMS STOWED AT BATTLE STATIONS	CONDUCT OPERATIONAL INSPECTION/TEST POST M-8/9		SOUND ALARM VISUAL OBSERVATION M-8/9 PAPER CONTINUOUSLY
WATER WASHDOWN		INSPECT AND MAKE READY FOR USE	ACTIVATE INTERMITTENTLY	ACTIVATE CONTINUOUSLY
MATERIAL CONDITION	YOKE	MODIFIED ZEBRA	SET ZEBRA	SET CIRCLE WILLIAM
DECON STATION		INSPECT AND MAKE READY FOR ACTIVATION	ACTIVATE ALL DECON STATIONS	
M-291	ISSUE TO ALL HANDS			
CHEMICAL SUIT	ISSUE TO BATTLE STATIONS		WORN W/O HOOD UP	HOOD UP AND SECURED (EXTERNAL PERSONNEL (DON RAIN GEAR)
MASK	ISSUE TO ALL HANDS	CARRIED (RECOMMEND FITTED WITH NEW CANISTER)	CARRIED FITTED WITH NEW CANISTER	DONNED & CHECKED FOR SEAL
GLOVES	ISSUE TO BATTLE STATIONS		CARRIED	WORN
BOOTS	ISSUED TO BATTLE STATIONS		WORN	WORN
ANTIDOTE	ISSUED TO ALL HANDS			

705. Procedures

1. CBR Attack Probable:

- a. Alert personnel to type of attack expected.
- b. Wet down exposed topside surfaces as practicable. Use installed washdown system or fire hoses. CV - Crash and Salvage Team will wet

down the superstructure and all flight deck areas as required in the CBR Defense Bill.

- c. Set condition ZEBRA and prepare to set the weather envelope.
- d. Exposed personnel shall use personnel protective equipment.
- e. To avoid panic keep personnel accurately informed of the situation.
- f. Detection tags should be worn by personnel going topside, in heavy traffic areas, in a control grid on the deck and in the ship's island. This paper tag facilitates rapid evaluation of contaminated personnel and areas. The paper should be either the M9 or M8 type.
- g. Place a high range radiac under surveillance on the bridge or alternate topside station to detect onset and direction of the radiological event. The bridge instrument should be read routinely once during each watch while at sea to assure operability and to familiarize ship control personnel with the procedure.
- h. Provide for distribution of personnel dosage measuring devices as available.

2. **CBR Attack Imminent:**

- a. When considered appropriate, sound alarm and direct personnel to deep shelter.
- b. Set weather envelope.
- c. To prevent heat exhaustion, prepare to relieve certain personnel on watch.
- d. Secure evaporators to prevent contamination of fresh water systems.

3. **Post CBR Attack:**

- a. Survey the ship to determine the extent and amount of contamination or the type of agent contacted.
- b. Determine personnel radiation dosages.
- c. Evacuate and treat the wounded.

- d. Determine the appropriate time to begin personnel decontamination. Keep in mind the effect on the ship's fighting efficiency versus the hazards of delaying decontamination.
- e. Commence primary gross decontamination as soon as practical. Washing is more effective if contaminant has not dried. Keep in mind hazards to personnel conducting the decontamination.
- f. As soon as practical and possible, flush ventilation system with clean air, and sea water systems with uncontaminated sea water.
- g. Primary attention must be given to restoring essential functions contaminated by CBR agent: conn, messing, heads and berthing are functions in this category.
- h. Consider assistance available from other ships for decontamination of topside areas and care of sick and wounded. If necessary transfer injured personnel to reduce exposure time on board.
- i. It must be assumed that biological and chemical attacks will contaminate all food in non-gas tight spaces and render other foods unavailable because of container contamination. Prepare to battle mess, receiving food by transfer at sea from uncontaminated ships. Consider area where food may be eaten with least danger from internal hazards.
- j. Carry out conventional damage control practices.

4. **Monitoring:**

- a. Immediately upon direction, the monitoring team must make a rapid internal survey of assigned areas to determine the presence and the general degree and extent of contamination.
- b. For air burst, the monitoring team can be sent out within four minutes after the nuclear detonation. However, following an underwater detonation, the teams should not be ordered out until the CONN reports the ship is clear of base surge.
- c. When directed, the monitors shall report to their assigned areas as rapidly as possible. Each team shall be composed of four men; a monitor, a recorder, a marker, and a messenger. Each team shall be equipped with protective masks and clothing.
- d. The monitor handles the radiac instrument, chemical agent or biological sampling kit as appropriate. The recorder carries the plan of the area to be

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monitored and records results. The marker will mark in chalk on bulkheads and decks the contamination readings and the time of the reading. The messenger will deliver messages as directed by the monitor.

e. Heavily contaminated areas will be roped off. After determining that an area is contaminated, the monitor will notify persons in charge of stations within the area. They will be advised that their personnel are contaminated and the approximate degree of contamination in the area.

f. When monitoring is complete, or when so directed, the team will report to the nearest personnel decontamination station.

g. Action of Monitoring Teams:

(1) **First Survey.** When ordered, make a rapid preliminary internal survey at assigned check points (vital stations) and report the intensity and time of reading to DCC. This survey should be made from inside the weather envelope.

(2) **Second Survey.** When ordered, make a rapid preliminary external survey at assigned check stations (vital stations) and report the intensity and time of reading to DCC.

(3) **Third Survey.**

(a) Upon completion of primary gross decontamination survey or when ordered, a third survey must be conducted. This survey should be a detailed survey. To ensure coverage of all spaces, equipment, and systems and to simplify accurate reporting, the use of pre-assigned checkpoints are recommended. These points should be located to adequately cover all areas and should be permanently listed on the monitor's detailed survey report form and the DCA's status board.

(b) Upon locating a contaminated area, determine boundaries of the area.

(c) The recorder or messenger will pass the report to DCC as rapidly as possible.

(d) The monitor team will rope off and post the area. "Roping Off" includes positive securing of access to the

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area. Post "Contaminated Keep Out" or similar signs at the area boundaries.

(e) The machinery space monitors will make verbal reports to the officer in charge of the space who in turn will relay them to MED and to DCC. The machinery space monitor(s) will not be required to wear protective clothing.

706. Detection Methods

1. Radiological Detection. Monitoring of material and personnel is accomplished by using current NAVSEA allowance radiac instruments in the hands of trained monitoring teams from each repair party.

2. Chemical Detection:

a. Detection by odor. The sense of smell is used. This method is not reliable.

b. Detection by observation. Certain types of chemical warfare agents may be detected by observing symptoms produced in personnel. In some cases the chemical affect will be visible in the form of pools of liquid, droplets, or a vaporous cloud.

c. Detection by use of identification devices. Performed through the use of chemical agent detector kits, liquid visicant detecting paper and crayons. Chemical agent detection devices are restricted to use by trained and qualified personnel.

NOTE: *WHEN A CHEMICAL AGENT IS SUSPECTED TO BE PRESENT, PERSONNEL SHOULD DON PROTECTIVE MASK AND CLOTHING.*

707. Reporting Contamination

1. Contamination reports will be made directly to Damage Control Central over the appropriate JZ circuit. Radiation readings will be reported in Roentgens/Milliroentgens per hour. The time of radiation measurement and the location of the contamination will be included in the report, i.e., "1615 reading 73 R per hour at frame 92 port side main deck". Chemical contamination reports will specify the agent present. The time is not required.

2. Radiological Monitoring (RADMON) Report. Information provided by the DCA to Command Control for use in making the RADMON report shall include time of cessation and dose received.

3. **Material Decontamination.** Decontamination operations shall begin as soon as possible following a CBR attack. Decontamination teams will remain fully clothed at all times. Masks and protective clothing are required only when aerosol creating operations (such as fire hosing, scraping and chipping) are being carried out, and then only if initial deposit intensities exceed 5R/hour. Essential stations should be decontaminated first. The priority is assigned to those areas where the greatest personnel hazards exist. Individual ships shall include in their manual a definite priority for secondary gross decontamination. When possible, the general rule is to decontaminate the ship, working from top to bottom, bow to stern. To limit re-contamination, parties should approach contaminated areas from the windward side.

708. Decontamination Responsibilities

CV/CVN Repair 7 will decontaminate the flight deck and island. Repair 1 will decontaminate the hangar deck.

709. Decontamination Organization

Each repair party shall have decontamination squads organized according to function (i.e., 1-1/2" hose primary gross, or secondary gross decontamination). Squads will normally consist of a squad leader and assistant equipped as necessary for the particular type of decontamination involved. The leader will wear an arm band. Additional men may be detailed from the repair party or from nearby stations if conditions warrant.

710. Decontamination Procedures

1. Complete instructions on Radiological decontamination are detailed in NAVSEA Technical manual, Chapter 070.
2. Complete instructions on BW and CW decontamination are detailed in NAVSEA Technical manual, Chapter 470.
3. The technical community has not developed procedures to decontaminate aircraft at sea on an aircraft carrier. Until standard policies are in place, each ship, in conjunction with the Battle Group Commander and assigned Carrier Airwing Commander, must develop a concept of operations for employment and decontamination and flight crew rotation in a CBR environment.

711. Personnel Decontamination

Personnel decontamination stations are used both for chemical/biological and radiological decontamination and defined in NAVSEA Technical manual Chapter 070.

712. Contamination Control Area/Decontamination Stations

The contamination control/decontamination process area for removing the CBR ensemble should be a space adjacent to and with access from the weather deck or on a weather deck with overhead cover. Either area must also have access to the interior of the ship. Doff rain gear and battle dress (life preservers and mask carrying case) outside of the contaminated area. Gross decontaminate the mask and gloves using the M291 decontamination kit. Immerse boots in a pan of HTH/water. Attendants will cut away the CBR protective clothing. Once the ensemble is removed, the personnel proceed to the decontamination station where the inner garments (fatigues, work clothes, undergarments - except protective mask) are removed. The personnel then shower with soap and water, and are then monitored to ensure that all contamination possible has been removed. Inner garments are placed in bags and monitored. Personnel remain masked until monitoring determines that unmasking may occur. Masks are stored in bags for decontamination and reissue.

713. Nerve Agents

1. Signs and Symptoms. Nerve agent poisoning can be identified from characteristic signs and symptoms. If exposure to vapor has occurred the pupils will be very small, usually pinpoint. If exposure has been percutaneous (through the skin), or by ingestion, the pupils may be normal or only moderately reduced in size or even enlarged. In this event the other symptoms of nerve agent poisoning must be relied on to establish the diagnosis. Only nerve agents produce the characteristic muscular twitching and rapidly developing pin-point pupils, and other nervous system signs. Nerve agents are cumulative poisons and repeated exposures to low concentrations, if not too widely separated, will eventually produce the symptoms.

a. **Mild Poisoning.** Signs and symptoms vary with the route and severity of poisoning. Some agents, such as GA and GB, usually act in forms of vapors, the other VX may act directly as a liquid. Vapors attack principally by the respiratory route, and liquids mainly through the skin. In the case of mild poisoning, signs and symptoms may become noticeable within a few minutes of inhalation of even low concentrations of agent. Symptoms include tightness of the chest, discharge from the nose, salivation, pin-pointing of the pupils with dimming vision and headache. These signs and symptoms are largely due to local absorption of nerve agents and may be

expected to persist for only a few hours, although headache and visual difficulties may last from 24 hours to two weeks.

b. **Moderate Poisoning.** In unprotected personnel, moderate exposure to vapor or aerosol rapidly results in pinpointed pupils with impaired vision, mucous discharge from the nose, tightness in the chest, difficulty in breathing and nausea.

c. **Severe Poisoning.** If the exposure is massive, the local effects will soon be followed by more general symptoms as the compound reaches the circulatory system after being absorbed from the respiratory tract, the skin, and the eyes. Thus, in varying sequences would appear nausea, vomiting, involuntary defecation and urination, mild to severe mental signs, convulsions, paralysis (especially of respiratory muscles), lack of oxygen and mucous discharge in the bronchial tubes. Death may occur within minutes. Should the exposure be through the skin (percutaneous), the sequence of signs and symptoms will be different, usually beginning with muscle jerking and twitching. Because of slow passage of the agent through the skin, death may not occur for one or more hours following such exposures, except when the dose is massive. Absorption through the mouth produces initial symptoms similar to those seen after percutaneous exposure, except that local effects are absent. Nausea, vomiting and diarrhea are followed by fatigue, weakness, perhaps mental signs, convulsions and paralysis leading to death. The time may be minutes to hours depending on the dose.

2. Self/First Aid: The four principles of therapy for nerve agent poisoning are:

- a. Atropine injections (3 each).
- b. Enzyme reactivation ((2-PAM) Cl (oxime)).
- c. Decontamination.
- d. Assisted ventilation (CPR or respirator).

Exposure to a nerve agent, because of its rapid action, produces effects which require immediate self treatment. The onset of an unexplained nasal secretion, tightness or constriction of the chest, shortness of breath, constriction of the pupils, muscular twitching or nausea and abdominal cramps call for immediate intramuscular injection of atropine. From 1 to 3 automatic injection devices, each containing 2 mg of atropine are carried by each person. These should be administered as self-aid at 10 - 15 minutes intervals to control symptoms. Further treatment is required and provided by medical personnel.

714. Blister Agents (Vesicants), Mustard (HD) and Nitrogen Mustards (HN-1, HN2, HN-3)

1. Signs and Symptoms:

a. Skin. The skin symptoms can be divided into four phases:

(1) Inactive Period

(2) Redness of the Skin.

(3) Blistering.

(4) Decay of Tissue.

It should be noted that HN-3, owing to its low volatility, does not constitute a grave VAPOR danger to the skin in free air. The penetration is not noticed, because it is painless. The inactive period is decreased as the dose of the toxic agent, the temperature and the humidity of the air are increased. For mustard, this phase usually lasts 4 - 8 hours, but the duration may vary between one hour and several days. Redness is accompanied by intensive itching. The sensitivity of the top layers of the skin is not the same everywhere; it depends on the thickness of the skin and on the density of the sweat glands. Apart from mucous membranes, the most sensitive areas are the face, the arm pits, the genitals, the neck, the skin between the fingers and the nailbeds.

b. Eyes. In the eye, mustard penetrates without causing pain. Only after several hours do tearing and inflammatory reactions appear. There is intense pain, intolerance of light, and inflammation of the eye lids.

c. Respiratory Tract. Mustard attacks all the mucous membranes of the respiratory tract. After a latent period of 4 - 6 hours it irritates and congests the mucous membranes of the nasal cavity and the throat as well as the lining of the trachea and the bronchi. Symptoms start with nasal secretion, burning pain in the throat, and the voice becomes hoarse. Often the vocal cords become paralysed, causing loss of voice. There is a pronounced difficulty in breathing. Consequently, the lower airways become easily infected, causing pneumonia. If inhaled dose is sufficiently high, death occurs within a few days.

d. Gastro-intestinal Tract. Here mustards also cause destruction of the mucous membranes. Symptoms are nausea, vomiting, pain, bloody diarrhea and exhaustion. Shock may also occur.

e. Systemic Action. The symptoms, described thus far, are due to a direct local action of the mustards. However, these agents can also cause problems in distant tissues. Mustards are absorbed from the oral and respiratory routes and even through the skin. The general signs and symptoms are the same as those caused by nuclear radiation: headache, nausea, vomiting, anorexia, stomach pain, anemia, etc..

2. Self/First Aid:

a. Skin:

(1) Erythema. The skin turns red and itches intensely. This itching can be diminished by local application of cooling preparations i.e. calamine lotion or creams containing a local anesthetic or amylsalicylate.

(2) Blisters. Large blisters should be covered with sterile vasoline gauze. Typical antibiotics (bacitracin, etc.) May be applied. Do not change the dressing too often and do not apply strong antiseptics. Draining of the blisters is to be done by trained medical personnel.

(3) Eyes. When the lesion is not very serious, to control pain apply an analgesic solution. To prevent infection treat with appropriate anti-bacterial preparations. When the lesion proves more serious (blistering of the eyelids) continue application of the anti-bacterial preparation at more frequent intervals.

b. Respiratory Tract. Mild injury with hoarseness and sore throat only, usually requires no treatment. If necessary, relieve the irritation of the throat by a gargle and depress the cough with codeine.

c. Gastro-intestinal Tract. In case of nausea, vomiting and diarrhea, give 0.5 mg atropine sulfate and sedatives. Every effort should be made to eat properly and replace the fluid.

715. **Lewisite (L)**

1. Signs and Symptoms:

a. Skin. The vesicant properties of Lewisite are the same as those of HD, although quicker. Irritation is noted very shortly after contact with the toxic agent and redness of the skin is usually evident within 30 minutes. Blisters appear on the first or second day and the tissue destruction is deeper and pain more intense than with mustard.

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b. **Eyes.** Lewisite causes an immediate burning sensation in the eye. The symptoms are the same as for mustard but appear more rapidly. Inflammation of the mucous membranes occurs within an hour following contact. Moreover, the risk of permanent blindness or permanent lesion of the cornea is higher than for mustard.

c. **Respiratory Tract.** Here also, the symptoms are the same as for mustard but develop more rapidly. Lewisite immediately acts on the mucous membranes and, initially, as an incapacitant by severely irritating the respiratory passages.

d. **Systemic Action.** Lewisite can provoke gastro-intestinal disorders with bloody diarrhea, liver and kidney disorders, and the general weakness characterized by low blood pressure and subnormal body temperature.

2. Self/First Aid:

a. **Skin.** Blisters from Lewisite are treated in the same way as those from mustard. Calimine lotion may be applied to reduce itching and produce a soothing effect.

b. **Eyes.** If performed within 2 minutes the application of an ointment may diminish the effects of Lewisite. (This is of questionable value if performed later). The safest treatment, if the eyes are contaminated, is to flush them immediately with water. Lesions due to Lewisite are treated in the same way as those caused by mustard.

c. **Other Effects.** The effects of Lewisite on the respiratory and intestinal tracts are treated in the same way as described for mustard. Use BAL in oil for heavy metal poisoning.

716. Halogenated Oximes

1. **Signs and Symptoms.** The action on the skin is immediate. Phosgene oxime initially provokes an irritation resembling that following contact with a stinging nettle. In higher doses, the intensity of the pain increases rapidly and radiates from the area of direct contact. Within a minute this area turns white while being surrounded by a reddening of the skin. In an hour this whole area is swollen. The next day the skin is brown and blisters appear. After some days, scaling and deadening of the skin is observed, followed by crust formation and pus discharge. Recovery takes 1 - 3 months. Phosgene oxime also irritates and swells the eyes and the respiratory tract, possibly leading to permanent lesions of the cornea resulting in blindness, and to accumulation of fluid causing pneumonia.

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2. Self/First Aid. Immediately following decontamination apply dressings soaked in sodium bicarbonate solution. From this point on treat the effects as burns.

717. Choking Agents (CG, DP)

1. Signs and Symptoms. The symptoms occurring during and immediately after the exposure are: tearing, sore throat, coughing, tightness of the chest, nausea, vomiting, and headache. They are caused by the irritating action of phosgene in the air. In dry and warm weather the irritating action is very mild. Irritation quickly disappears after termination of the exposure and is followed by a symptomless period of 2 - 6 hours after which the first symptoms occur. The patient shows signs of uneasiness and fear. He is seized with serious attacks of coughing producing large quantities of white or yellow - sometimes bloody-frothy fluid. Nausea, vomiting and gastric pain caused by phosgene-containing saliva may occur. Breathing is quick, shallow and painful. The pulse is fast and faint. The patient ultimately goes into shock, followed by death through cardiac arrest or asphyxia.

2. Self/First Aid. After inhalation of a high dose of phosgene the lungs fill with fluid. The casualty will need rest and warmth. Further treatment, such as sedation and oxygen, are to be administered by medical personnel. As long as no symptoms occur, combat tasks are continued. In case of tightness of the chest and coughing however, the patient must immediately take complete rest. He must be evacuated in a semi-seated position and must be kept warm.

718. Blood agents (AC, CK, SA)

1. Signs and Symptoms. The odor of blood agents can be detected in low concentrations. However, in high concentration the ability to detect the odor is lost due to paralysis of the nerves in the nose. They act very quickly when concentrations are high (10,000 mg/m) and death may result in 15 seconds. At lower concentrations, poisoning has two phases, an active phase and a passive phase. The active phase is characterized by convulsions and heavy labored breathing. The passive phase is characterized by a drop in blood pressure, due to lack of oxygen, and painful breathing, followed by death. Autopsies reveal a bright red color of the blood and the muscles.

2. Self/First Aid. High concentrations of blood agents activate very rapidly and leave very little time for therapy. However, if the patient is still alive after the cloud has passed, he probably will recover spontaneously. Further treatment will be administered by medical personnel.

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719. Nuclear Weapons Burst Information

1. Personnel Countermeasures Against Nuclear Weapons Burst
 - a. Symptoms of Radiation Sickness

TIME AFTER EXPOSURE	500-600 ROENTGENS	300-500 ROENTGENS	100-300 ROENTGENS
FIRST DAY	NAUSEA AND VOMITING	NAUSEA AND VOMITING	NAUSEA AND VOMITING
FIRST WEEK	NO DEFINITE SYMPTOMS DIARRHEA, VOMITING INFLAMMATION OF MOUTH AND THROAT	NO DEFINITE SYMPTOMS	NO DEFINITE SYMPTOMS
SECOND WEEK	FEVER, RAPID LOSS OF WEIGHT, DEATH (MORTALITY ABOUT 95%)	BEGINNING HAIR LOSS, LOSS OF APPETITE AND GENERAL SICK FEELING	
THIRD WEEK		FEVER, SEVERE INFLAMMATION OF MOUTH AND THROAT PALLOR, SKIN HEMORRHAGES, DIARRHEA AND NOSE BLEEDS, RAPID LOSS OF WEIGHT, DEATH (MORTALITY ABOUT 50% AT 450 ROENTGENS)	HAIR LOSS, LOSS OF APPETITE GENERAL SICK FEELING, SORE THROAT, PALLOR, SKIN HEMORRHAGES, DIARRHEA, MODERATE LOSS OF WEIGHT (RECOVERY LIKELY UNLESS COMPLICATED BY POOR PREVIOUS HEALTH OR SUPER-IMPOSED INJURIES OR INFECTION)

b. Casualty Estimates. The following table may be of value to the Commanding Officer in making his decision as to personnel exposure. The effects tabulated are for periods of time over which total dose is received. The best percentage figures are based on the best current available evidence. They will probably be lower when personnel receive adequate medical treatment.

	1 DAY		3 DAYS		1 WEEK		1 MONTH		3 MONTHS	
0-75R	0	0	0	0	0	0	0	0	0	0
100R	2	0	0	0	0	0	0	0	0	0
125R	15	0	2	0	0	0	0	0	0	0
150R	25	0	10	0	2	0	0	0	0	0
200R	50	0	25	0	15	0	2	0	0	0

300R	100	20	60	0	40	0	15	0	0	0
450R	100	50	100	25	90	15	50	0	0-5	0
650R	100	+95	+100	90	100	40	80	10	5-0	0
	SICK	DIE								

If the recurring dose rate is not too high, partial recovery can begin even while the body is exposed to nuclear radiation. A delay of about 12 hours should be granted. This is the apparent time required for appreciable recovery while irradiation proceeds. For exposures of less than 12 hours, the total dosage received - and not the dose rate - determines the seriousness of the injury. For longer exposure times, there is a certain degree of recovery during the period of exposure and a larger total dose is necessary to produce a given effect. A dose of 200 roentgens in a short time will result in vomiting and nausea in about 50 percent of the exposed personnel, and these individuals would become combat casualties. On the other hand, a series of eight exposures of 25 roentgens each at weekly or longer intervals, would be expected to have little effect on combat ability. A total of 480 roentgens over 32 days is expected to have roughly the same effect as 360 roentgens over 6 days or an acute dose of less than 200 roentgens.

c. Probable Effect of Chronic Whole Body Gamma Radiation Doses

DAILY CHRONIC DOSE	DAYS EXPOSURE	ACTUAL TOTAL DOSE	ACUTE DOSE EQUIVALENT (LESS THAN)
60R	6	360R	200R
30R	5	150R	100R
30R	14	420R	200R
15R	12	180R	100R
15R	32	480R	200R

d. Thumb Rules for Estimating Radiological Intensity or Dosage

(1) Rule No. 1 - Decay Rate Rule. If you double the time since detonation you reduce the intensity to one-half its present value.

Example: Intensity at one hour after detonation is 240 R/hr. Find the intensity at H+2, +4 and +8 hours.

$$\begin{aligned} H+1 &= 240 \text{ R/hr} \\ H+2 &= 120 \text{ R/hr} \\ H+4 &= 60 \text{ R/hr} \\ H+8 &= 30 \text{ R/hr} \end{aligned}$$

(2) Rule No. 2 - Dose for Short Period of Time (Up to One Hour). For short periods of time (up to one hour), the intensity in any area may be assumed to remain constant. The dose received during a short period of time is equal to the product of time-of-stay in hours, times the intensity at the time of entry.

Example: The intensity in an area is 100 R/hr and a person remains in the area for 30 minutes. What dose would he receive?

FORMULA: $D = \text{Time of Stay (T.S.)} \times \text{Intensity}$

Limitation: The formula is valid for the first half of the half-life period. If exposure time is greater than one half of a half-life, but less than a whole half-life, the dose for the entire apparent half-life will be used.

$$\begin{aligned} D &= \text{T.S.} \times I \\ D &= .5 \times 100 \text{ R/hr} \\ D &= 50 \text{ R} \end{aligned}$$

(3) Rule No. 3 - Dose to Infinity Rule. The maximum dose that can be received in an area is equal to five times the intensity times the number of hours after detonation that the intensity was taken.

Example: A person enters a contaminated area at H+8 hours and the intensity at this time is 4 R/hr. What dose would be received if he stayed about three years?

$$\begin{aligned} \text{FORMULA: } D &= 5 \times I \times T \\ D &= 5 \times 4 \text{ R/hr} \times \text{H+8 hours} \\ D &= 160 \text{ R} \end{aligned}$$

(4) Rule No. 4 - Dose per Half-Life Period. The dose received during a half-life period is equal to one-half the product of the INTENSITY and TIME when the intensity was taken, i.e., $D \frac{1}{2} \text{ Life} = \frac{1}{2} I \times T$. The dose received during one half-life period will be approximately equal to 1/10 the total to infinity.

Example: At H+4 hours a monitor sends in an intensity reading of 50 R/hr. What dose will he receive during the next half-life period?

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$$\begin{aligned} H+8 &= \frac{1}{2} I \times T \\ D &= \frac{1}{2} \times 50 \times 4 \\ H+4 &= 100 R \end{aligned}$$

720. CBR-Bill Information / Considerations

1. **CBR Defense Bill.** The detailed plan for phased implementation of CBR countermeasures is contained in the CBR bill. This bill should be a ship specific application of doctrinal concepts and technical procedures. The rapid technical changes in CBR countermeasures mandates that all departments maintain an ongoing review and revision of the CBR-D bill. It is highly recommended that the first step is to review the DCA's library of available doctrine to ensure its completeness, that publications are of latest revision, that related message traffic and other information is considered, and that the person(s) implementing the bill are well oriented in CBR defense countermeasures and procedures.
2. **Recommended Enclosures to the CBR Bill.** The DCA may also add additional enclosures to the bill to ease operation in a CBR environment, such as CBR survey sheets, dose rate charts (nuclear), log-log graphs, information on CBR detection, information on CBR equipment operation, information on CBR self and first aid, and information on the set up and operation of the CCA/decon station.

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CBR-D ON-STATION SURVEY RECORDING SHEET (NUCLEAR)

TIME	TOPSIDE		BRIDGE		REPAIR 2		REPAIR 3		DC CENTRAL		DEEP SHELTER	
	INT	DOSE	INT	DOSE	INT	DOSE	INT	DOSE	INT	DOSE	INT	DOSE
H+1												
H+2												
H+4												
H+6												
H+8												
H+10												
H+12												
H+14												
H+16												
H+18												
H+20												
H+22												
H+24												
H+26												
H+28												
H+30												
H+32												
H+34												
H+36												
H+												
H+												
H+												
H+												
H+												

NOTE: TAILOR TO SHIP. INCLUDE STATION RESIDUAL NUMBERS. RECOMMENDED LAMINATION COPY FOR: L/L, PLOTTER, RECORDER, PHONES.

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RADIOLOGICAL SURVEY FORMS

SHIP: _____
 TYPE SURVEY: _____
 ROUTE NUMBER: _____
 SHEET NUMBER: _____ OF _____
 EXIT: _____

DATE: _____
 MONITOR: _____
 INSTRUMENT TYPE: _____
 INSTRUMENT SERIAL: _____
 REENTRY: _____

RADIOLOGICAL SURVEY FORM

NUMBER	AREA/OBJECT	TIME	METER READING / INDICATION		
			POSITION	SHIELD OPEN	SHIELD CLOSED

INSTRUCTIONS:

1. Routes to be established in advance.
2. Do not record radiac measurements in SHIELD OPEN column. Note either BETA or NO BETA.
3. Time of wipe test is the time measurements are made, not time sample was taken.
4. Do not record RADIAC measurement on uncontrolled wipe test. Note RC for removable contamination NO RC if there is none. Enter NO RC in SHIELD OPEN column if the RADIAC reading does not change from the SHIELD OPEN measurement.
5. POSITION column notations indicate location at which measurement is taken: 3' ABOVE DECK to indicate waist height area monitoring; OPERATOR to indicate normal watchstander position at waist height; CONTROLLED WIPE TEST and UNCONTROLLED WIPE TEST to indicate wipe sample.
6. Readings may fluctuate as RADIAC instrument is rotated through various orientations at the same position. Always record highest measurement obtained.

COMNAVAIRPAC/
COMNAVAIRLANTINST 5400.27C

SHIP: _____
 TYPE SURVEY: Rapid Internal Survey
 ROUTE NUMBER: 2
 SHEET NUMBER: 1 OF 1
 EXIT: N/A

DATE: _____
 MONITOR: _____
 INSTRUMENT TYPE: _____
 INSTRUMENT SERIAL: _____
 REENTRY: N/A

RADIOLOGICAL SURVEY FORM

NUMBER	AREA/OBJECT	TIME	METER READING / INDICATION		
			POSITION	SHIELD OPEN	SHIELD CLOSED
1	CCA #1		3' ABOVE DECK 3' INBOARD OF ENTRANCE		
2	DECON STATION #1		3' ABOVE DECK 3' AFT OF ENTRANCE		
3	CIC		3' BELOW RED CIRCLE ON OVERHEAD		
4	CIC TRACK SUPERVISOR CONSOLE		OPERATOR		
5	BRIDGE RADAR REPEATER		OPERATOR		
6	CAPTAIN'S CHAIR		OPERATOR		
7	HELM		OPERATOR		

INSTRUCTIONS:

1. Routes to be established in advance.
2. Do not record radiac measurements in SHIELD OPEN column. Note either BETA or NO BETA.
3. Time of wipe test is the time measurement is made, not time sample was taken.
4. Do not record RADIAC measurement on uncontrolled wipe test. Note RC for removable contamination NO RC if there is none. Enter NO RC in SHIELD OPEN column if the RADIAC reading does not change from the SHIELD OPEN measurement.
5. POSITION column notations indicate location at which measurement is taken: 3' ABOVE DECK to indicate waist height area monitoring; OPERATOR to indicate normal watchstander position at waist height; CONTROLLED WIPE TEST and UNCONTROLLED WIPE TEST to indicate wipe sample.
6. Readings may fluctuate as RADIAC instrument is rotated through various orientations at the same position. Always record highest measurement obtained.

SHIP: _____
 TYPE SURVEY: Rapid External Survey
 ROUTE NUMBER: 3
 SHEET NUMBER: 1 OF 1
 EXIT: Door 02-60-4, Port Side 02 level aft of Bridge
stbd

DATE: _____
 MONITOR: _____
 INSTRUMENT TYPE: _____
 INSTRUMENT SERIAL: _____
 RE-ENTRY: Door 1-110-5 Main Deck
entrance to Decon #2

RADIOLOGICAL SURVEY FORM

NUMBER	AREA/OBJECT	TIME	METER READING / INDICATION		
			POSITION	SHIELD OPEN	SHIELD CLOSED
1	PORT BRIDGE WING		3' ABOVE DECK 3' OUTBOARD OF DOOR		
2	PORT GYRO REPEATER		UNCONTROLLED WIPE TEST		
3	FLYING BRIDGE		3' ABOVE DECK CENTERLINE		
4	GYRO REPEATER ON FLYING BRIDGE		UNCONTROLLED WIPE TEST		
5	MACHINE GUN		OPERATOR UNCONTROLLED WIPE TEST		
6	STBD BRIDGE WING		3' ABOVE DECK 3' OUTBOARD OF DOOR		
7	PORT BRIDGE WING		UNCONTROLLED WIPE TEST		

INSTRUCTIONS:

- Routes to be established in advance.
- Do not record radiac measurements in SHIELD OPEN column. Note either BETA or NO BETA.
- Time of wipe test is the time measurement is made, not time sample was taken.
- Do not record RADIAC measurement on uncontrolled wipe test. Note RC for removable contamination NO RC if there is none. Enter NO RC in SHIELD OPEN column if the RADIAC reading does not change from the SHIELD OPEN measurement.
- POSITION column notations indicate location at which measurement is taken: 3' ABOVE DECK to indicate waist height area monitoring; OPERATOR to indicate normal watchstander position at waist height; CONTROLLED WIPE TEST and UNCONTROLLED WIPE TEST to indicate wipe sample.
- Readings may fluctuate as RADIAC instrument is rotated through various orientations at the same position. Always record highest measurement obtained.

COMNAVIAIRPAC/
COMNAVIAIRLANTINST 5400.27C

SHIP: _____
 TYPE SURVEY: Supplementary Survey
 ROUTE NUMBER: 1
 SHEET NUMBER: 1 OF 2
 EXIT: _____

DATE: _____
 MONITOR: _____
 INSTRUMENT TYPE: _____
 INSTRUMENT SERIAL: _____
 RE-ENTRY: _____

RADIOLOGICAL SURVEY FORM

NUMBER	AREA/OBJECT	TIME	METER READING / INDICATION		
			POSITION	SHIELD OPEN	SHIELD CLOSED
1	CREW'S MESS GALLEY 2-90-2		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
2	CREW'S MESS SCULLERY 2-90-2		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
3.	CREW'S MESS DINING AREA 2-70-2		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
4	CREW'S BERTHING 3-110-0		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
5	CREW'S HEAD 3-110-1		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
6	CREW'S HEAD DECON #2 1-120-2		3' ABOVE DECK HIGHEST MEASUREMENT IN COMPT.		
7	CREW'S HEAD DECON #2 1-120-2		CONTROLLED WIPE TEST SHOWER CONTROLS		

INSTRUCTIONS:

1. Routes to be established in advance.
2. Do not record radiac measurements in SHIELD OPEN column. Note either BETA or NO BETA.
3. Time of wipe test is the time measurement is made, not time sample was taken.
4. Do not record RADIAC measurement on uncontrolled wipe test. Note RC for removable contamination NO RC if there is none. Enter NO RC in SHIELD OPEN column if the RADIAC reading does not change from the SHIELD OPEN measurement.
5. POSITION column notations indicate location at which measurement is taken: 3' ABOVE DECK to indicate waist height area monitoring; OPERATOR to indicate normal watchstander position at waist height; CONTROLLED WIPE TEST and UNCONTROLLED WIPE TEST to indicate wipe sample.
6. Readings may fluctuate as RADIAC instrument is rotated through various orientations at the same position. Always record highest measurement obtained.

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SHIP: _____
 TYPE SURVEY: Detailed Survey
 ROUTE NUMBER: 1
 SHEET NUMBER: 1 OF 10
 EXIT: Entrance to Decon #1 Door 1-40-4
1-40-4

DATE: _____
 MONITOR: _____
 INSTRUMENT TYPE: _____
 INSTRUMENT SERIAL: _____
 RE-ENTRY: Entrance to Decon #1 door

RADIOLOGICAL SURVEY FORM

NUMBER	AREA/OBJECT	TIME	METER READING / INDICATION		
			POSITION	SHIELD OPEN	SHIELD CLOSED
1	FO'C'SLE		FRAME 1 CENTERLINE		
2	FO'C'SLE		FRAME 2 PORT SIDE		
3	FO'C'SLE		FRAME 2 STBD SIDE		
4	FO'C'SLE		FRAME 3 PORT SIDE		
5	FO'C'SLE		FRAME 3 CENTERLINE		
6	FO'C'SLE		FRAME 3 STBD SIDE		
7	FO'C'SLE		CONTROLLED WIPE TEST		

INSTRUCTIONS:

1. Routes to be established in advance.
2. Do not record radiac measurements in SHIELD OPEN column. Note either BETA or NO BETA.
3. Time of wipe test is the time measurement is made, not time sample was taken.
4. Do not record RADIAC measurement on uncontrolled wipe test. Note RC for removable contamination NO RC if there is none. Enter NO RC in SHIELD OPEN column if the RADIAC reading does not change from the SHIELD OPEN measurement.
5. POSITION column notations indicate location at which measurement is taken: 3' ABOVE DECK to indicate waist height area monitoring; OPERATOR to indicate normal watchstander position at waist height; CONTROLLED WIPE TEST and UNCONTROLLED WIPE TEST to indicate wipe sample.
6. Readings may fluctuate as RADIAC instrument is rotated through various orientations at the same position. Always record highest measurement obtained.

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EXTERNAL SAMPLING SHEET (CHEMICAL)

STATION NO.	LOCATION	NOUN NAME	SAMPLE RESP.	TIME OF SAMPLE	RESULTS OF SAMPLING M-8 / 9 M-256A1	

NOTE: REPORTING PROCEDURES

NOTE: SAMPLING AND MATERIAL DECON TEAM INFORMATION:

- 1. C.C.A. LOCATION / ENTRANCE:
- 2. DECONTAMINATION STATION LOCATION / ENTRANCE:
- 3. SAMPLING / DECON. ROUTE:
- 4. CASUALTY COLLECTION STATIONS:

NOTE: FILL IN BLANKS AS REQUIRED, LAMINATE AND USE IN REPAIR LOCKERS, DC CENTRAL AND BRIDGE. (RECOMMENDED)

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DAMAGE CONTROL REPAIR STATIONS (DCRS) CBR ASSIGNMENTS

NUCLEAR DEFENSE

<u>Number required</u>	<u>Assignment</u>	<u>Dress out</u>
1	Locker leader	(Full battle dress with anti-flash gear & mask)
1	Scene leader	
1	Internal Monitor (AN/PDR-43)	
1	External Monitor (AN/PDR-43)	
1	Relief Monitor	
1	Internal Recorder	
1	External Recorder	
4-6 personnel	Material Decontamination Team	
2	Decon Station Activation	
1	Exit Monitor (AN/PDR-27)	
2	Internal Monitor (CP-95)	
1	Internal Traffic Controller	
1	External Traffic Controller	

CHEMICAL DEFENSE

1	Locker leader	Yes
1	Scene leader	Yes
1	Internal Sampler (M-256 Kit)	Yes
1	External Sampler (M-256 Kit)	Yes
4-6 personnel	Material Decontamination Team	Yes
1	Decon Station Activation	Yes
1	Internal Recorder	Yes
1	External Recorder	Yes
1	Internal Traffic Controller	Yes
1	External Traffic Controller	Yes
2	Stretcher Bearers	Yes

BIOLOGICAL DEFENSE

1	Locker Leader	Yes
1	Scene Leader	Yes
1	Internal Recorder	Yes
1	External Recorder	Yes
1	Internal Sampler	Yes
1	External Sampler	Yes
1	Decon Station Activation	Yes
1	Internal Traffic Controller	Yes
1	External Traffic Controller	Yes
2	Stretcher Bearers	Yes
4-6 personnel	Material Decontamination Team	Yes

NOTES:

1. All assignments must be reflected on the DCRS organization chart.
2. For all situations; CMWD, Circle WILLIAM, and ZEBRA assigned by name and fitting number.
3. Ensure personnel assigned for purge ship, and striking below topside non-essential porous/absorbent materials as per CBR bill.

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CHAPTER 8

CV/CVN FLIGHT DECK/HANGAR BAY FIRE DOCTRINE

801. References

- (a) NSTM Chapter 555, Shipboard Fire Fighting
- (b) NAVAIR 00-80R-14, NATOPS U.S. Navy Aircraft Firefighting and Rescue Manual

802. Purpose

The purpose of this section is to outline responsibilities, cooperation and support of the DCA and Air Officer for guidelines on the coordination of firefighting efforts for Flight Deck and Hangar Bay casualties.

803. Procedures

In the event of a fire on the flight/hangar deck:

- 1. The Air Officer has overall responsibility for aircraft firefighting, salvage, jettison, personnel rescue and aviation fuels repair in accordance with NAVAIR 00-80R-14.
- 2. The Damage Control Assistant shall:
 - ___ Man Damage Control Central.
 - ___ Order effected AFFF and Transfer Stations manned.
 - ___ Ensure Electrical/Mechanical isolation of area is complete and status passed to On-Scene Leader.
 - ___ Establish communications with Air Officer/Hangar Deck Officer.
CKT:
 - ___ Establish communications with appropriate AFFF Stations on X50J circuit.
 - ___ Establish communications with the appropriate repair locker and muster the At Sea Fire Party or IET.

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___ Set fire boundaries:

Top: _____

Aft: _____ Forward: _____

Bottom: _____

3. The On-Scene Leader shall:

___ Report Flying Squad manned and ready.

___ Provide fire fighting personnel to flight deck as requested by the Air Officer

___ Provide fire fighting personnel to hangar bay OSL as available.

___ Establish communications with Flying Squad at the Scene.
CKT:

4. In the event the fire in the Hangar Bay/Flight Deck is out of control, the DCA or Air Officer will request the ship go to General Quarters.

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MASTER BIBLIOGRAPHY

1. **OPNAVINST 3120.32 (Series), Standard Organization and Regulations of the U.S. Navy (SORM)**
2. **NWP 3-20.31, Surface Ship Survivability**
3. **NSTM Chapter 555, Shipboard Firefighting**
4. **NATOPS 00-80R-14, U.S. Navy Aircraft Firefighting and Rescue Manual**
5. **COMNAVAIRPAC/COMNAVAIRLANT 3500.20 (Series)**
6. **NSTM Chapter 079, Volume 2, Practical Damage Control**
7. **Hazardous Material Information System (HMIS)**
8. **OPNAVINST 5100.19 (Series), Navy Occupational Safety and Health Program Manual for Forces Afloat**
9. **Ship's Damage Control Book**
10. **NSTM Chapter 079, Volume 1, Stability and Buoyancy**
11. **OPNAV P-03C-01-89, U.S. Navy Cold Weather Handbook for Surface Ships**
12. **NSTM Chapter 079, Volume 3, Engineering Casualty Control**
13. **NSTM Chapter 070, Radiological Recovery of Ships after Nuclear Weapons Explosions**
14. **NSTM Chapter 470, Shipboard BW/CW Defense Countermeasures**
15. **NAVMED P-5041 dtd 05/94, Treatment of Chemical Agent Casualties and Conventional Military Chemical Injuries**