Note: November 2022.

This Directive may no longer be current. Please check with the program office responsible for this Directive to determine if there are any updates or if the Directive is no longer in use.

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United States Coast Guard

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COMDTINST M9555.1B
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COMMANDANT INSTRUCTION M9555.1B

Subj: MACHINERY SPACE FIREFIGHTING DOCTRINE FOR CLASS BRAVO FIRES

Ref:
(a) Naval Ships' Technical Manual, Chapter 074, V3
(b) Naval Ships' Technical Manual, Chapter 079, V2
(c) Naval Ships' Technical Manual, Chapter 079, V3
(d) Naval Ships' Technical Manual, Chapter 555, V1
(e) NTTP 3-20.31 (Series), Surface Ship Survivability
(f) Cutter Training and Qualification Manual, COMDTINST M3502.4 (Series)
(g) Naval Engineering Manual ,COMDTINST M9000.6 (Series)

1. PURPOSE. This Manual promulgates the Machinery Space Firefighting Doctrine (MSFD) for Coast Guard cutters and establishes Coast Guard policy for fighting class BRAVO fires in machinery spaces. MSFD templates have been developed for each cutter class to address the configuration, equipment and proven effective procedures for combating machinery space fires on each cutter class.

2. ACTION. All CG unit Commanders, Commanding Officers, Officers-in-Charge, Deputy/Assistant Commandants, and Chiefs of Headquarters staff elements shall comply with the provisions of this manual. Internet release is authorized.

3. DIRECTIVES AFFECTED. COMDTINST M9555.1A is cancelled.

DISTRIBUTION - SDL No. 152

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4. DISCUSSION.

   a. References (a) through (g) contain the best guidance on military shipboard firefighting available today. Because of differences in equipment, ship design policy, and watchstanding, the Machinery Space Firefighting Doctrine in reference (d) is not entirely applicable to Coast Guard cutters. However, Coast Guard doctrine is based on, and closely follows, references (a) through (e). Recent changes to reference (d) re-entry procedures, including ventilation before re-entry, re-entry by an assessment team, and use of indirect attack procedures if the installed fire extinguishing system is ineffective, are applicable in their entirety to Coast Guard cutters. These changes resulted from machinery space fire testing performed by the U.S. Navy and closely monitored by the Coast Guard.

   b. This Manual is written for use by all cutters, 65 feet and longer. The enclosures provide a consolidated source of predetermined information that will be relied upon during a machinery space class BRAVO fire response. This Manual contains references to equipment which may not be available to all cutters. Such references must be deleted from specific cutter class doctrines. Appendix (A) list cutter class templates that are available as an additional resource to this Manual. The enclosures included in each cutter class template, incorporate best practices for that unique cutter class. With the exception of verifying configuration for space isolation purposes, these templates are usable as is. Cutters without a class specific MSFD template shall develop a MSFD based on this Manual, and route to Surface Forces Logistics Center (SFLC) for approval. This doctrine applies to fighting class BRAVO fires in manned or unmanned machinery spaces inport and underway. This Manual has been revised to reflect changes to references (d) and (e).

5. PROCEDURE.

   a. All cutters shall maintain a robust Fire Marshal program as defined by reference (e) in support of this Manual.

   b. Commanding Officers and Officers in Charge of cutters 65 feet and longer, shall update their cutter class MSFD templates into a unit specific MSFD by validating unit isolations and configurations within 180 days from the date of this Manual. This will establish a MSFD that accurately reflects the configuration of the specific vessel, while maintaining the policies and procedures of this Manual and the class specific MSFD to the maximum extent possible. Cutters may modify the mechanical and electrical isolations within the appropriate enclosures to the extent necessary to allow for cutter differences within a class. These modifications will be limited to cutter specific space isolations, not to procedures outlined in the MSFD.

   c. Cutter class MSFD templates are available for those cutter classes listed in Appendix (A) and can be downloaded from CG Portal at: https://cgportal.uscg.mil/lotus/myquickr/machinery-space-firefighting-doctrine-templates. Where conflicts exist between this Manual and a cutter class specific template, this Manual takes precedence.

d. Cutter crews shall conduct machinery space firefighting training in accordance with reference (f). If not already established, cutters shall formalize a local fire department agreement IAW Enclosure 8, and shall conduct cutter familiarization training at least biannually, within one month of a Commanding Officer change of command, or following a 55% or more cutter crew personnel turnover.

e. Cutters participating in recurring training involving Afloat Training Group (ATG) personnel, to include but not limited to Tailored Ship's Training Availability (TSTA), will have the MSFD closely evaluated during the initial portion of the training cycle, e.g. during the Command Assessment of Readiness for Training (CART) inspection. This evaluation will entail a comparison of the cutter's MSFD against both this Manual, and the cutter class template. If during this detailed review, an identified portion of a cutter configuration requires modification (e.g. a fan controller power panel number), the cutter is authorized to incorporate that change when compatible with this Manual, references (a) through (g), and other Commandant and FORCECOM directives.

f. Cutters not regularly scheduled for CART/TSTA shall have their MSFD reviewed by the cognizant FORCECOM subordinate command for compliance with this Manual.

g. For cutters equipped with Engineering Operational Sequencing System (EOSS) the Engineering Operation Casualty Control (EOCC) procedures contained therein will take precedence for the immediate and controlling action phases of the casualty response. This manual will cover all follow-on actions not specified within EOSS.

h. Compact Disk (CD) copies of this Manual are available from Commandant (CG-45) upon request.

6. CHANGES. Recommended changes to this Manual shall be forwarded to Commandant (CG-45) for approval. Recommended changes to the cutter class MSFD templates provided as Appendix (A) shall be forwarded to the applicable Product Line Manager at SFLC for approval.

7. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. Environmental considerations were examined in the development of this Manual and have been determined not to be applicable.

8. FORMS/REPORTS. None.

T. P. OSTEBO /s/
Rear Admiral, U.S. Coast Guard
Assistant Commandant for Engineering and Logistics

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(7) Rapid Response Team / Damage Control Training Team Personnel
(8) Local Fire Department Agreement
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CHAPTER 1 GENERAL

A. Purpose. The purpose of this doctrine is to identify equipment, systems, and procedures used to prevent, control, extinguish and overhaul* a Class BRAVO fire in a machinery space*. Words used for the first time which are defined in the glossary, are **marked with an asterisk (*).** This doctrine covers the preferred sequence of events during a major oil leak* or machinery space fire. Reference (d) provides additional guidance on fighting shipboard fires. Where conflicts arise between this doctrine and References (b), (c), (d) and (e), this doctrine takes precedence. This doctrine does not replace use of good judgment by all hands. All hands must be familiar with the cutter's firefighting systems and equipment. A thorough understanding of the best agent or firefighting system to use for different fires is also vitally important. **When a fire starts, it is too late to read this doctrine.**

B. Introduction. One of the most hazardous shipboard casualties both to human life and machinery is the machinery space Class BRAVO fire. This doctrine is structured to provide the basis for proper decisions and actions in response to a machinery space fire or major oil leak. This doctrine addresses fire prevention, firefighting systems' capabilities and limitations, considerations necessary in choosing the correct firefighting equipment, and the actions necessary both in and external to the affected space* if a major oil leak or a fire occurs. The Machinery Space Firefighting Doctrine shall* be accessible in damage control central, main control/central control station, [engineering assist team location], repair lockers, the pilothouse, and each main space*. Unforeseen circumstances may dictate variations to this guidance. Also, restricted maneuvering policies and judgments may require departure from this guidance.

[NOTE: Square brackets ([]) are used in the text to highlight items which may vary from cutter to cutter. Some are notes, such as this paragraph, some give specific words to include if appropriate, **some require cutter generated text,** and some indicate when follow-on text should be included. Edit material in square brackets and delete the square brackets from individual cutter doctrines.]

C. Prevention. The risks of fire in machinery spaces can be significantly reduced by the preventive measures below. The following principles shall be enforced to reduce fire hazards:

1. Frequent Inspections. The Engineer Officer, Safety Officer, and principal assistant(s); or fire marshal; shall make regular and daily inspections including, but not limited to, the items discussed in C.2, 5, 6, and 8 below.

2. Properly stow and protect all combustibles.

3. Test and inspect fire suppression and flammable systems routinely, as well as after repairs.

4. Reduce the likelihood of fire by performing fire drills frequently and educating all hands to eliminate and preclude fire hazards.

5. Enforce the following fire prevention policies and practices:

    a. Maintain flange shields on required flammable liquid piping.

    b. Maintain proper covers on flammable liquid strainers; keep sounding tube caps in place and isolation valves closed.

    c. Take immediate action to stop and repair all oil leaks.

    d. Clean up oil spills and leaks.

    e. Keep ventilation ducts free of oily residue.

    f. Keep bilges free of oil and trash.

    g. Prevent stockpiling excess or unauthorized flammables.

    h. Do not use uptake spaces as storerooms for combustible materials.

6. Properly maintain all firefighting equipment.

7. Operate and maintain systems and equipment per references (a) through (g) and consistent with good engineering practice.

8. Properly maintain all machinery space damage control closures and fittings.

9. Follow electrical and mechanical tag out procedures.

D. Hazards. Lead acid batteries can be a serious hazard during and after a machinery space fire. Hydrogen gas, given off by batteries, is combustible and can be explosive. As the batteries become hotter, more gas is given off and the danger increases. The acid in the batteries is very corrosive. If the battery leaks acid from a melt down or explosion, the acid could be harmful to the ship and/or firefighters. Using water on a battery fire can also cause an explosion. Additionally, when salt water and sulfuric acid are mixed they give off chlorine gas, which is toxic. All cutters, with lead acid batteries in machinery spaces, shall include special guidance in the MSFD for firefighting and overhauling fire in the vicinity of lead acid batteries.

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CHAPTER 2 DUTIES AND RESPONSIBILITIES

[Cutters develop and list Duties and Responsibilities, and install a checklist in Enclosure (2), as they pertain to a Machinery Space Fire, for the following:] A list of Duties and Responsibilities for each of the following personnel is found in Enclosure (2).

A. Damage Control Assistant

B. Officer of The Deck (Inport/Underway)

C. Engineering Duty Officer

D. Repair Locker Leaders

E. Repair Locker On Scene Leaders

F. Repair Lockers

G. Inport (Include personnel onboard not in duty section)

H. Attack Team Leader (Thermal Imager operator)

I. Engineering Watch Standers

J. Repair Party Electrician

K. Halon/HFP/CO2 Activating Personnel

L. Emergency Generator Operator

L. AFFF/Water Mist Operator

M. Medical

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CHAPTER 3 PERSONNEL PROTECTION

A. General. The proper use of personnel protection clothing, equipment, and procedures is required to reduce the risk of injury and help extinguish the fire. The nozzlemen and hose tenders on each hose team [and the team leader] shall wear firefighter ensembles. Repair locker leaders are responsible for rotating personnel to prevent heat exhaustion and for monitoring activation times for OBAs/SCBAs. In fighting major fires, firefighters should* leave the fire area after no more than 30 minutes (in conjunction with the OBA/SCBA timer alarm) and firefighter ensembles (FFEs) cycled to fresh personnel to minimize personnel heat stress. Some general considerations are:

1. Oxygen Breathing Apparatus/Self Contained Breathing Apparatus (OBA/SCBA). All personnel shall wear an OBA/SCBA when entering the smoke control zone* until the atmosphere is certified safe for reentry* without OBAs/SCBAs. Activate OBAs/SCBAs when smoke is present or on the order of the on scene leader. The OSL shall report light off times to the repair locker, which shall then report same to Damage Control Central.

2. Clothing. Reentry into a machinery space that has been evacuated because of a fire requires protective clothing for firefighters. FFEs or Fire Protective Gear (FPGs), including one-piece coverall, firefighter's gloves, firefighting (e.g. PBI-gold) anti-flash hood, helmet and steel-toed rubber boots, are required.

3. OBA/SCBA MANAGEMENT. [Cutter should insert here: 1) Location of all OBAs/SCBAs and canisters/cylinders. 2) Location of SCBA recharging station and how empty and recharged cylinders will be transported to and from the SCBA cylinder change out location. 3) Primary and secondary OBA/SCBA, canister/cylinder change out locations. 4) How expended canisters are properly stowed until disposal. 5) How/where expended canisters are disposed of. 6) Who will order activation of OBAs/SCBAs. 7) Who will inspect firefighters prior to entering the space for proper wearing and activation of all PPE. 8) Who will pass on to the RLL: each person that enters the space, position in the fire party, OBA/SCBA start times. 9) Who will order relief of the OBA/SCBA wearing team members. 10) How will the relief process be conducted. 11) Who is in charge of the relief process and relief OBA/SCBA wearing team members prior to them reporting to the OSL. 12) Who will be the relief firefighters, and where do they muster.]

4. Firefighter's Heat Stress Prevention. [Cutters should insert here:]

   a. Who will monitor the firefighters for heat exhaustion and heat stroke.
   b. How will this monitoring be accomplished.
   c. Where do relieved firefighters muster and rest.

d. Who is in charge of the recovery/triage area* to ensure the relieved firefighters are provided with fluid replacements (room temp.)(i.e. water, Gatorade etc.) and energy replacement (i.e. snacks).
e. How long of a resting period are the firefighters allowed before they are allowed to be reused.
f. To minimize heat stress, how shall the FFE/FPGs be worn prior to entering the space (relief firefighters) and after exiting the space.
g. Do provisions need to be made to provide suitable dry clothing for the firefighters after exiting.

NOTE: "Corfam" Shoes. "Corfam" shoes melt at low temperatures and can cause severe foot injuries, especially during fires. Since emergencies happen unexpectedly, "Corfam" shoes shall not be worn aboard ship. They may be worn for inspections at the Commanding Officer's discretion.

CHAPTER 4 COMMUNICATIONS

A. Communications. Use standard damage control communications in fighting machinery space fires, in accordance with reference (b). In addition, it is very important that the damage control organization be briefed on the status of plant securing and isolation, personnel status, and on the exact location and cause of the fire. If possible, the EOW or space supervisor should brief the on scene leader as well as Damage Control Central (DCC). Otherwise, DCC shall be briefed and pass the word to others in the damage control organization. [Where installed] Notify DCC of the exact time when Halon, HFP, CO2 or Water Mist is activated. [Insert list of primary and secondary communications for each station and procedures for establishing them, include subsections according to Enclosure (1).] [Insert inport procedures here.]

NOTE: Portable Radios. Portable radios reduce the need for the scene leader and investigators to write messages. However, this does not eliminate the need for all crew members not normally assigned to controlling stations to continue to train in message writing and maintain their skills in the event portable radios become unusable. ***A complete record of all reports received at the repair locker and at each controlling station must be maintained.*** In addition to the plotting record, message blanks, log books, or other approved methods shall be used to maintain this record of report. The writing of message blanks is a fundamental damage control skill which must not be lost.

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CHAPTER 5 FIREFIGHTING SYSTEMS

A. Capabilities and Limitations. The firefighting systems and equipment described below are installed on [insert cutter's name]. Each has capabilities and limitations which must be understood by firefighting personnel to ensure quick and proper selection of equipment.

B. Water (Firemain System). The firemain system shall be kept intact so water is available for producing Aqueous Film Forming Foam (AFFF) and for cooling. Water is useful for cooling hot bulkheads in spaces adjacent to the fire, for extinguishing ordinary combustible (Class ALPHA) fires, and for indirect attack. When a direct hose line attack is needed to extinguish a flammable liquid fire, water fog may be used as the primary extinguishing agent. However, the time required to fight the fire will be longer, more firefighters will be needed, increased fire damage can be expected and risk of reflash is greater than if AFFF were used.

C. P-100 Fire Pumps. P-100 fire pumps shall be lit off and standing by to pressurize the firemain if needed. Man this secondary pump and establish communications with Damage Control Central. [Include specific details on where to locate the P-100, where to connect into the firemain, and how to establish communications with DCC.] These pumps must be able to provide a pressure of 100-125 psi to the firemain. Generally, the P-100 pumps must be rigged in series (e.g. discharge of first pump into the suction of second pump) to provide the pressure and volume required for larger cutters. [If all fire pumps are in one machinery space] The only source of pressurized water for fires in [insert space with fire pumps] is the P-100 emergency fire pump. [Insert instructions for configuration of P-100 pumps to fight a fire in the machinery space with all fire pumps].

D. Carbon Dioxide (CO2). Carbon dioxide portable extinguishers are used primarily for small electrical fires (Class CHARLIE). These extinguishers have limited effectiveness on small Class BRAVO fires of low heat intensity and an involved surface area of four square feet or less. A successful attack requires a close approach due to an effective range of four to six feet. [Fixed carbon dioxide hose reels are used for Class CHARLIE fires also but have a larger capacity than portable CO2 extinguishers.]

NOTE: Exercise caution when using CO2, especially when more than one extinguisher is discharged, as CO2 displaces breathable oxygen.

E. Dry Chemical (PKP). PKP is a dry chemical agent (potassium bicarbonate) stored in portable extinguishers. Portable 18 lb. and 27 lb. PKP extinguishers are very effective on small, isolated Class BRAVO pool fires (fires less than 10 square feet). The effective range for the 18 lb. extinguisher is 19 feet and the 27 lb. extinguisher has an effective range of 21 feet. PKP is intended for use by unprotected operators who are in the best position to take initial action to extinguish a fire at its onset. Successful use of PKP for initial action is time critical. Application of PKP is required before the fire is out of control*. PKP is not designed for use on a fire which is out of control or for reentry. Simultaneous action to secure the source of fuel is required. When PKP is applied to

fire, the dry chemical extinguishes the flame by breaking the combustion chain. PKP does not have cooling capability.

CAUTION

Caution should be exercised when using PKP to avoid breathing difficulties and reduced visibility. PKP should not be used in electrical controllers or cabinets where relays and delicate electrical contacts are present. PKP does not produce a lasting inert atmosphere above the surface of a flammable liquid; consequently, its use will not result in permanent extinguishment if ignition sources such as hot metal surfaces or persistent electrical arcing are present.

F. Aqueous Film Forming Foam (AFFF). AFFF is a surfactant* produced by mixing water with AFFF concentrate [either by a fixed, balanced pressure foam proportioning unit or] with an inline eductor used with a hose line and vari-nozzle. AFFF can be applied from an installed AFFF hose reel with vari-nozzle, from a separate fire plug and hose with portable inline eductor and vari-nozzle, or from a bilge or overhead sprinkling system. AFFF, the primary agent used for space reentry, is effective on Class BRAVO bilge fires, in vapor securing* surfaces, and in preventing large scale reflash. When making a hose line attack to extinguish a flammable liquid fire, use AFFF if available. If AFFF is expended, use water fog. A good match between the flow rate of the vari-nozzle and eductor is required for efficient foam application. The Akron Brass inline eductor style 2901 shall be used with 95 gpm vary-nozzles, e.g., Akron Brass style 3019 or Elkhart Brass Model SFL-GN-95. **Mechanical foam nozzles and 60 gpm (LP-6) eductors are not permitted.** Refer to Cutter Standard Repair Locker Inventory, COMDTINST M9664.1 (Series).

NOTE: There must be a minimum firemain pressure of 65 psi for proper foam generation.

G. [AFFF Bilge Sprinkling. AFFF bilge sprinkling is a fixed fire extinguishing system designed to extinguish bilge fires or to vapor secure* the bilge by laying a blanket of foam over the bilge. When there is a major oil leak or Class BRAVO fire, start a fire pump and activate the AFFF bilge sprinkling system. To prevent running the system dry, operate AFFF bilge sprinkling no longer than four minutes. Do not operate the system when the concentrate level is not visible in the tank sight glass. Prompt manning of the AFFF proportioner station is essential to speed tank replenishment. AFFF bilge sprinkling shall be used to:

1. Vapor secure the bilge to minimize the potential for a bilge fire from a major oil leak;

2. Extinguish bilge fires independently;

3. Vapor secure the bilge during and after a Class BRAVO fire, thus minimizing the potential for fire or reflash in the bilge.]

H. [Halon 1301. Halon 1301 is an effective gaseous agent for extinguishing oil spray and other Class BRAVO fires by totally flooding the space. Activate the Halon system when a machinery space is evacuated because of fire. [For cutters with a two shot capability] The

second shot is installed to combat the fire if the first shot fails to extinguish it. Operation of the Halon system will activate visual and audible alarms and will shut down space ventilation and air consuming equipment which draws air from within the space. Halon discharges after a time delay to allow engine room ventilation systems and air consuming equipment to stop before discharge. **Verify the release of Halon.** [Assign designated personnel] shall check that Halon did release after the time delay. If not, the installed bypass shall be used to release Halon. **All hands shall know how to operate the Halon system.** After Halon is released, the space should be allowed to cool for a minimum of 15 minutes before commencing ventilation. However, make an earlier check of the space to be sure that Halon was effective. [Include how this check will be performed.]] Once evident that the fire is extinguished by Halon, the fire is reported contained and it is then necessary to ventilate the compartment for at least an additional 15 minutes to minimize fuel vapor explosion potential during re-entry and Hydrogen Fluoride (HF) acid gas concentration. Do not attempt re-entry for at least 15 minutes after ventilation has been established.

WARNING

Personnel shall leave the space when the Halon system is actuated in the presence of fire. Halon produces toxic Hydrogen Fluoride (HF) acid gas when exposed to fire. HF has a Permissible Exposure Limit (PEL) of 3 ppm and an Immediately Dangerous to Life or Health (IDLH) of 30 ppm, per NSTM 074 Volume 3. HF airborne concentrations will typically reduce with time as HF reacts with metal surfaces within the space. If the fire reflashes, exposed Halon will produce additional quantities of HF acid gas.

I. [CO2 Fixed Flooding System. CO2 is a colorless, odorless gas that is 1.5 times heavier than air. When a CO2 fixed flooding system is actuated, the CO2 is released in concentrations of 30 – 70% and will displace the oxygen which is sustaining combustion. The CO2 fixed flooding system is manually actuated and has a time delay with audible alarm to allow for personnel evacuation. CO2 is extremely hazardous to personnel and should not be actuated until the affected space has been evacuated.]

WARNING

Immediate egress is the only sure safety action for personnel in a CO2 flooded space. CO2 can be absorbed through the skin and can be a hazard even if wearing OBA or SCBA respiratory protection.

J. [Water Mist Fire Suppression System. The water mist system is a high pressure (approximately 1000 psi) freshwater firefighting system. Although it operates at 1000 psi, the nozzle discharge will not penetrate the skin even at close range and does not pose a personnel hazard. It functions by removing heat from the fire triangle. This system is effective on oil pool, oil spray (BRAVO Fires), and ALPHA fires, but will not completely extinguish deep seated fires. Some small BRAVO fires may remain in isolated areas that will need to be extinguished by the assessment or fire team. As such, timely action by the fire party is required. Water mist is not toxic. However, the presence of toxic fire gases and reduction of oxygen by the fire will require evacuation of personnel without breathing

protection. Water mist in air is not electrically conductive and there is no risk from simply coming near an energized conductor. The time for mist to accumulate and create a conductive path depends on the deposition rate of the mist and the configuration of the electrical equipment. Water mist will not create a personnel electrical shock hazard from un-damaged energized electrical equipment for at least 5 minutes. If water mist is discharged into a space without a fire, personnel do not need to evacuate immediately. They should avoid touching electrical equipment and should evacuate if discharge continues past 5 minutes. If water mist is discharged into a space with a fire, personnel should evacuate immediately and commence isolation actions. Personnel with SCBA, engineering overalls, firefighter's gloves, boots, and flash hoods may be in the space or reenter to conduct investigation, isolation, and extinguishing actions. Due to its cooling effect, where there is an operating water mist system in the fire space that is controlling the fire and removing the source of heat, fire boundaries may be checked periodically in lieu of setting a permanently manned hose. For a compartment with a functioning water mist system, exhaust ventilation should be used during space reentry to improve visibility and reduce toxic fire gases. Since water mist cools and maintains the space below the flash-point temperature of common shipboard fuels and lubricants, desmoking during reentry will pose minimal risk of reflash. Maintain desmoking with installed ventilation and water mist operation until all remaining fire has been manually extinguished and overhauled, AFFF bilge sprinkling has been operated, source of oil secured, space cooled, and all fuel washed into the bilge.]

K. [Heptaflouropropane (HFP)/(FM200)/(FE-227). HFP is a non-ozone depleting, environmentally friendly replacement for Halon. It extinguishes fire via a combination of chemical-based fire inhibition and cooling. It is very effective in removing heat energy from a fire so the fire can not sustain itself. HFP also releases small amounts of free radicals upon exposure to flame which in turn inhibit the chain reaction responsible for combustion. With no fire present, HFP is non-toxic and non-suffocating. However, if HFP should be inadvertently actuated when no fire exists, personnel should be immediately evacuated to limit unnecessary exposure. HFP produces toxic Hydrogen Fluoride (HF) acid gas when exposed to flames or hot surfaces in excess of 1300 deg F. High concentrations of HF can be hazardous even to personnel with breathing protection. Reentry to an affected space should not be attempted if the HF acid gas concentration is above 90 ppm, the maximum that can be detected with shipboard gas tube detectors. **Ventilate compartment for a minimum of 15 minutes and retest.** Only when ordered by the Commanding Officer and when HF level is measured below 90 ppm can the affected space be entered while wearing OBAs/SCBAs. HF level must be below the Threshold Limit Value (TLV) of 3 ppm for it to be considered safe for personnel without OBAs/SCBAs.]

WARNING

Personnel shall leave the space when the HFP system is actuated in the presence of fire. HFP produces toxic Hydrogen Fluoride (HF) acid gas when exposed to fire. HF has a Permissible Exposure Limit (PEL) of 3 ppm and an Immediately Dangerous to Life or Health (IDLH) of 30 ppm, per NSTM 074 Volume 3. HF airborne concentrations will typically reduce with time as HF reacts with metal surfaces within the space. If the fire reflashes, exposed HFP will produce additional quantities of HF acid gas. Space desmoking and reentry procedures shall be strictly followed before re-entry to minimize exposure of HF acid.

CHAPTER 6 CHOOSING THE CORRECT FIREFIGHTING EQUIPMENT

A. Considerations. The proper choice of firefighting equipment should be based on:

1. Phase. The phase of firefighting action (action against an oil leak, a Class BRAVO fire, a Class BRAVO fire out of control, or action for reentry).

2. Flow Rate. The flow rate of the flammable liquid released and whether the fuel source can be secured quickly.

3. Spill or Spray. Whether the flow is a spill or spray.

4. Extent. The extent of the area covered by the spill, spray, or fire.

B. Firefighting Phase. Give consideration to the particular phase of firefighting action when selecting firefighting systems and equipment. Systems are listed in order of effectiveness. Use the most effective available system(s) [which are installed onboard the cutter.]

1. Firefighting Equipment Used To Prevent Fire During Major Oil Leaks.

   a. Use AFFF [from an AFFF hose reel, or individual 1-1/2 or 1-3/4 inch hose line with an inline foam eductor and vari-nozzle] to prevent ignition and to wash oil from deck plates, bulkheads and machinery into the bilge.

   b. Use AFFF [from a bilge sprinkling system, AFFF hose reel, or individual 1-1/2 or 1-3/4 inch hose line with an inline foam eductor and vari-nozzle] to vapor secure the bilge.

2. Firefighting Equipment Used For Initial Action Against Class BRAVO Fires.

   a. Use PKP from portable extinguishers to extinguish a Class BRAVO fire confined to a small area. Initial action, using portable extinguishers may not extinguish the fire when the spray or pool fire covers an area greater than 10 sq. ft. Using PKP on large fires may extinguish or knock down the fire temporarily and allow added time to secure the source of fuel. However, use PKP with caution on large fires because it is difficult to get within the effective range of 19 – 21 feet without getting burned.

b. [If installed] Use the AFFF bilge sprinkling system to fight a Class BRAVO fire confined to the bilge. [If bilge sprinkling is not installed] Use AFFF from an AFFF hose reel within the affected space to fight bilge fires. [If none of these systems is installed] Initial action against large bilge fires should not be attempted except when necessary to gain more time to secure fuel sources before space evacuation. Initial action against a bilge fire larger than 10 sq. ft. is appropriate only if the fire is confined to the bilge and the source of fuel can be secured quickly.

c. Use AFFF [from a AFFF hose reel within the affected space] to fight confined pool fires larger than 10 sq. ft. Initial action using one of these systems is appropriate when the fire is confined and the source of fuel can be secured quickly. [The EOW may order activation of the Water Mist system or personnel in the space may make the decision to activate Water Mist to extinguish the fire as deemed necessary.]

d. Initial action is not recommended against large unconfined Class BRAVO fires or when the fuel source cannot be secured quickly unless such actions are required to gain essential time to secure controls and evacuate the space.

3. Firefighting Systems Used Against Class BRAVO Fires Out of Control. [If installed] Activate the Halon system, HFP, CO2 fixed flooding system, or Water Mist after evacuating the space. [If Halon/HFP/CO2/Water Mist is not installed] the fire must be extinguished by repair party firefighters using AFFF hose lines. [Where installed] Activate the AFFF bilge sprinkling system to vapor secure the bilge or to extinguish a bilge fire. [If bilge sprinkling is not installed] The bilge must be vapor secured by repair party firefighters after reentry using AFFF hose lines.

NOTE: Flammable Liquid Spray Fires are automatically considered a **Class BRAVO Fire Out of Control.**

CHAPTER 7 SMOKE CONTROL

A. Smoke Boundaries. Due to the large volume of dense smoke that typically is produced by class BRAVO fires, inner and outer smoke boundaries shall be set quickly around accesses to the affected space. Smoke boundaries shall be set using structure that is at least fume tight.

1. Establish Boundaries. Set smoke boundaries (IAW Enclosure (3)), then set Zebra (starting from the affected space out). Establish smoke boundaries around the affected space to prevent the spread of smoke and provide controlled areas for local firefighting. First, establish a Smoke Control Zone (SCZ)* by closing those hatches and doors immediately adjacent to the access to the affected space.

NOTE: Only personnel with Oxygen Breathing Apparatuses (OBA) or Self Contained Breathing Apparatuses (SCBA) shall enter the smoke control zone. Activate OBAs/SCBAs when smoke is present or on orders from the scene leader. When practical, set a second boundary around the smoke control zone to check the spread of smoke and provide a safe area for firefighting personnel without OBAs/SCBAs. Use smoke curtains to control the spread of smoke where accesses must be open for the passage of equipment, hoses, or personnel.

2. During initial in-space firefighting, during fire space re-entry, or during indirect attack into the fire space, set positive ventilation (supply on high and exhaust off) in the SCZ to minimize smoke migration into the SCZ. Setting positive ventilation is intended to prevent smoke from entering unaffected spaces.

3. Set the Boundaries. Machinery space fire and smoke boundaries must be set upon space evacuation.

B. List of Primary and Secondary Smoke Boundaries. [(Insert in Enclosure (3) a list of the primary and secondary smoke boundaries for each machinery space listed in Enclosure (1).) A list of the Primary and Secondary Smoke Boundaries is found in Enclosure (3). Smoke curtains, in accordance with reference (b), may be used where hatches and doors may be required to remain open for firefighting purposes. (List locations designated for smoke curtains in Enclosure (3).)]

C. Ventilation. If the fire is declared out of control, secure ventilation in the affected space when personnel are evacuated. Otherwise, when a machinery space fire is reported, ventilation shall be set as follows:

1. In the affected machinery space.

a. [If possible] Set negative ventilation* (exhaust on high, supply low).

b. [On cutters with interlocked fans and remote controls with a remote emergency exhaust button] activate emergency exhaust (exhaust high and supply off).

c. [On cutters with fans interlocked through a local master switch but with independent control on controllers inside the space], set negative ventilation using local controllers if conditions permit.

d. [On other cutters with interlocked fans] The ventilation system shall remain operating.

2. In spaces surrounding the affected machinery space other than smoke control zones.

a. [Where possible] Set positive ventilation* (supply on high, exhaust off) to limit smoke movement to unaffected spaces*.

b. [On cutters with fans interlocked through a local master switch inside the space but with independent control on controllers] Set positive ventilation using local controllers.

c. [On other cutters with interlocked fans] The ventilation system shall remain operating.

d. If smoke is ingested into adjacent machinery spaces from the weather, [shift ventilation supply to intakes on opposite side of cutter] or maneuver the cutter to clear the vent intakes or secure ventilation. (This should be added to OOD's check off list in Enclosure (1).

NOTE: Establishing positive air pressure on the damage control deck to control smoke by breaking condition ZEBRA in transverse fire and smoke boundaries and opening accesses to unaffected spaces is not recommended. Paths for fire to spread from the affected space to unaffected spaces by way of the damage control deck will exist.

D. List of Fans and Controllers. [Enclosure (4) of this doctrine shall have a list of supply intake and exhaust discharge locations on the weather decks and a list of fans and associated controllers affecting the machinery space(s) and adjoining spaces. Include the location of controllers, their designation and areas served.][In this section designate ventilation setup for fires in each machinery space listed in Enclosure (1)] A list of all supply intake and exhaust discharge locations on the weather decks and a list of fans and associated controllers affecting the machinery space(s) and adjoining spaces is found in Enclosure (4). Also, for ready reference, this list is maintained separately in DCC and each repair locker.

CHAPTER 8 SPACE ISOLATION

A. General. 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 electrical hazards. Before a Class BRAVO fire gets out of control, the machinery space should be isolated with the exception of firefighting systems, lighting and ventilation. Once the fire is out of control, secure all systems, with the exception of lighting if possible. Each ship shall supplement its doctrine with a list of local and remote controls (valves, switchboards, circuit breakers, and so forth), for rapid space isolation IAW Ship's Casualty Control Manual. The designation, location, function and area served by each control shall be provided.

B. Fire Boundaries. Establish fire boundaries around the affected space to confine the fire and designate bulkheads to be checked for heat. These boundaries are generally the watertight bulkheads and decks immediately adjacent to the affected space. The minimum degree of tightness for a fire boundary is fume tight. [The ship may designate the setting of material condition ZEBRA, in whole or in part, or general quarters to establish fire boundaries.]

C. List of Fire Boundaries. [Each ship shall provide a list of designated fire boundaries for machinery spaces listed in Enclosure (1). This list shall be in Enclosure (5). List all fittings and closures, by number and class.] A list of Fire Boundaries is in Enclosure (5).

D. Mechanical Isolation*. Make every effort to secure and/or isolate systems, machinery, and tanks which have the potential to feed or otherwise contribute to the intensity of the fire. Not all systems have remote securing or isolation capabilities. Along with other concurrent firefighting actions, locally secure those systems without remote securing or isolating capabilities as soon as possible. Familiarity with location and type of local securing and isolating capabilities and with casualty control procedures is required. These capabilities and procedures are in the Engineering Casualty Control Manual, NSTM Chapter 079, VOL 3, Ship's Engineering Casualty Control Manual, and applicable machinery manuals. Establish communications and exercise care to prevent cascading casualties to equipment necessary to maintain propulsion, electrical power and firemain pressure in unaffected spaces. Fuel, oil, steam and air systems and fuel tanks located close to space boundaries are of particular concern. Systems to secure include in order of priority:

1. Fuel Piping plus Transfer, Service, and Stripping Pumps and Centrifugal Purifiers.

2. Lube Oil Piping, Pumps and Centrifugal Purifiers.

3. Hydraulic Systems.

4. High Pressure, Low Pressure, and Starting Air Systems.

5. Air Compressors.

6. Steam Systems.

7. Fuel (DFM and JP-5) Tanks.

8. Lube Oil Tanks.

9. [Damage Control Deck Cutout Valve to AFFF Station. Do not isolate AFFF systems unless personnel are evacuated.]

E. Electrical Isolation*. Do not secure lighting and power to firefighting equipment and ventilation before evacuation of personnel. Complete electrical isolation will be very difficult due to the number of cables within and transiting any given space. To the extent possible, secure all electrical equipment from outside the affected space at the cutter's service, [Interior Communications and emergency switchboard,] load center(s) or distribution panel(s). When possible, do not secure the lighting.

F. Mechanical & Electrical Isolation Bills. [Enclosure (6) shall have a list of local and remote controls (valves, switchboards, circuit breakers, etc.) for space isolation. Include the designation, location, function and area served by each control. Clearly indicate which controls the machinery space personnel should secure, include subsections according to Enclosure (1).] Enclosure (6) has a breakdown of the Mechanical and Electrical Isolation Bills. These bills include: List of local and remote control valves, switchboards, breaker and distribution panel locations etc. for total space isolation.

NOTE: Mechanical and electrical isolations should be consistent with the Restricted Maneuvering Doctrine.

G. Fuel Tanks. Transfer of fuel to a safe location to remove fuel contents puts the empty fuel tank at maximum risk to fire. Therefore, transfer of fuel from the fire area should not be attempted. Pressing up the vapor space in a fuel tank with seawater to protect tank contents **shall not be done,** because experience indicates that ignition has not occurred in fuel tanks exposed to fire, conditions for ignition within the tank are highly unlikely, and no accurate method exists to verify the vapor space has been eliminated. In addition, the fuel tank will become contaminated with seawater. In summary, the only action necessary to prevent tank contents from contributing to a machinery space fire is to isolate and secure the fuel system.

CHAPTER 9 FIREFIGHTING AND MAJOR OIL LEAKS

A. Major Oil Leak Scenario. [Include subsections to this section as designated in enclosure (1).] Any major flammable fuel leak* presents an immediate fire hazard which must be dealt with quickly. An oil leak which forms a spray can ignite when it comes in contact with any hot surface or equipment capable of electrical arcing. Rapidly securing the oil source and using AFFF to cover liquid surfaces will greatly reduce the risk of fire. In addition, small problems (i.e., non-securable drips) may become large problems. **DEAL WITH THEM PROMPTLY.** Take the following actions when a major oil leak occurs:

1. Report the Leak. At sea, the person discovering the leak shall report the leak immediately to the space supervisor or the EOW to begin concurrent actions. [Each cutter must delineate what concurrent actions are.] The Engineer Of the Watch (EOW) shall report the leak to the Officer Of the Deck (OOD). Notify the [quarterdeck watch][OOD] when in port. General Emergency will be sounded by OOD/Quarterdeck Watch, as directed by ships policy. [List all appropriate pipes to be made by the OOD/Quarterdeck Watch.][This maybe done in a separate enclosure.]

2. Secure the Source. The leak should* be stopped or isolated as quickly as possible by locally or remotely closing system cutout valves or shutdown controls. Initiatives, such as rag wraps and collection using a bucket can control the flow of oil effectively or deflect it away hot surfaces. When consistent with the Casualty Control Manual or Restricted Maneuvering Doctrine of the cutter, securing an engine or other piece of equipment may be the quickest way of reducing or stopping the flow of oil.

3. Apply AFFF. Start the fire pumps [and activate the installed AFFF systems]. Use AFFF to wash oil from deck plates, bulkheads, and machinery into the bilge. Water may* be used to flush the oil to the bilge; however, be careful to prevent disturbing AFFF blankets which provide a vapor barrier covering the bilge and other areas of heavy fuel buildup. Discharge AFFF into the bilge to cover liquid surfaces to prevent ignition of the oil. Reapply AFFF as necessary to maintain blanket coverage.

4. Concurrent Actions. As time and personnel permit, the space supervisor or EOW shall direct the following be accomplished:

   a. Per the Casualty Control Manual, secure operating machinery in the vicinity of the leak to control the casualty. [If possible] Provide propulsion, electrical power and firemain pressure from unaffected spaces*.

   b. [If installed] Man the foam proportioning station and activate AFFF bilge sprinkling for [one to two minutes] to cover all bilge surfaces with a blanket of AFFF.

c. Pump out the bilge to the dirty oil/oily waste holding tank or, with the permission of the Commanding Officer, pump overboard. When cleaning up the fuel spill, place clean-up rags in a suitable container.

B. Initial Firefighting Actions. Work rapidly because Class BRAVO fires and smoke can spread quickly and the fire can grow out of control in seconds. The person discovering the fire, the space supervisor and/or EOW should take the following initial actions in conjunction with procedures in the Casualty Control Manual:

1. Report the Fire. The person discovering the fire shall report the cause and location of the fire immediately to the space supervisor or EOW to begin concurrent actions.

2. Size Up the Fire. EOW/space supervisor shall assess the report of the fire and either direct watch standers to extinguish the fire or direct them to evacuate the space.

NOTE: Watch standers or day workers lacking adequate breathing and flash/burn protection will likely be the ones taking initial action. Therefore, it may be impossible to take initial action without risk of severe personal injuries. However, if the fire is localized and small enough, attack the fire with appropriate firefighting equipment, listed in Chapter 6, based on the size and anticipated behavior and travel of the fire. Good judgment must dictate the course to pursue.

NOTE: As soon as firefighting and plant securing efforts allow, personnel in the space should obtain and carry an Emergency Escape Breathing Device (EEBD). EEBDs are designed for escape only and shall not be used for firefighting purposes. When evacuating machinery spaces, don EEBDs.

NOTE: Flammable Liquid Oil Spray Fires should not be attacked. Past experience and fire testing have demonstrated that a pressurized release of a flammable liquid can create a fire that is unapproachable. Life threatening conditions created by extreme heat, smoke and toxic gases can occur, especially on the upper level, in as little as 60 seconds. Under such conditions the only prudent action, time permitting, is to secure the propulsion plant, don EEBDs and evacuate. Such fires are commonly fueled by an oil source which cannot be quickly and completely secured.

3. Secure the Oil Source. Stop or isolate the leak as quickly as possible by locally or remotely closing system cutout valves or shutdown valves. Initiatives, such as rag wraps and collection using a bucket can control the flow of oil effectively or direct it away from hot surfaces. When consistent with the Casualty Control Manual or Restricted Maneuvering Doctrine of the cutter, securing an engine or other piece of equipment may be the quickest way of reducing or stopping the flow of fuel. The mechanical and electrical isolation bills, section 8.F. and Enclosure (6), list critical controls including those for the machinery space watch to secure.

4. Fight the Fire. Fight the fire using portable PKP extinguishers, installed AFFF Systems, or other installed firefighting systems if they can be brought to bear quickly.

C. Class BRAVO Fire Scenario (Contained*). [Include subsections according to Enclosure (1).] Take the following actions for a machinery space Class BRAVO fire generated by pooled oil.

1. Initial Actions. Take appropriate initial actions per section 9.B.

2. Concurrent Actions. The following concurrent actions, specifically assigned per the Watch, Quarter, and Station Bill, shall be accomplished:

   a. The EOW shall inform the OOD and all engineering spaces of the fire. Report the Class BRAVO fire to the OOD, give its location and source, OOD will [sound General Quarters] [cutter shall insert ships' appropriate pipes], as directed by ships policy. Notify OOD of maximum speed available. Establish communications with Damage Control Central (DCC) on 2JV or engineering circuit. Keep DCC advised of progress on firefighting and securing checklists so repair personnel can complete their checklists in case the machinery space must be evacuated quickly. The EOW is in charge of all firefighting actions until the affected space is evacuated and the repair parties are manned and ready.

   b. Start all fire pumps. [If installed] Start the AFFF system and immediately man the machinery space foam proportioning station to speed AFFF tank replenishment.

   c. Repair party personnel shall rig and start at least one P-100 to supply water in the event that firemain pressure is lost or falls below 65 psi, as directed by DCC and RLL.

   d. [Where installed] For a bilge fire, activate the AFFF bilge sprinkling system long enough to ensure all bilge surfaces are vapor secured. [The time required to achieve a complete foam blanket should be determined and incorporated in the ship's doctrine. If the required time is not known, operate bilge sprinkling for one minute.] When AFFF bilge sprinkling system and reentry attack hoses have a common supply, avoid simultaneous application to conserve AFFF.

   e. [On Cutters with more than one main space] Isolate the affected space mechanically and electrically per Chapter 8. [When the fire is in a cutter with one main space] Only secure machinery and equipment affected by, or contributing to, the fire process. When in doubt, secure the equipment.

   f. Set ventilation per Chapter 7.

g. Set fire and smoke boundaries* (IAW Enclosure (3)) around the affected space to prevent the spread of fire and smoke to other parts of the cutter. See Chapter 7 for further information on smoke control. Set material condition Zebra to help isolate the affected space and establish fire and smoke boundaries throughout the cutter rapidly. [Use smoke curtains when boundaries must be broken to allow passage of people and firefighting equipment.]

D. Class BRAVO Fire Scenario (Out of Control). [Individual doctrines shall include subsections according to Enclosure (1).] A Class BRAVO fire, especially a flammable liquid spray fire, or a fire fueled by an unsecurable oil source, can get out of control within seconds. When this happens, evacuate the space and remotely secure mechanical and electrical systems. Firefighters shall combat the fire using installed systems and the reentry techniques outlined in Chapter 10. Take the following actions when faced with a fire out of control:

1. Size Up the Fire. When the fire covers a large area, is fed by an oil source which cannot be secured, or is threatening firefighting or escape, consider the fire out of control and evacuate. A small fire that is not extinguished rapidly can generate large volumes of smoke and deadly gases thereby forcing space evacuation.

2. Mechanical and Electrical Isolation.

   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.

   b. When a space is abandoned due to fire, the space should be mechanically and electrically isolated to the greatest extent possible, with the exception of lighting.

   c. The Commanding Officer may choose not to electrically isolate a damaged space or selected equipment due to safety or tactical considerations.

   d. The Scene Leader may direct firefighting efforts to commence before electrical isolation is complete. Firefighting efforts **should not be** delayed awaiting complete electrical isolation unless there is a serious risk to personnel.

   e. The decision to secure lighting may be made by the scene leader.

3. Evacuate. [Where installed] Evacuate the affected space before activating the Halon, HFP, or CO2 system. When evacuating machinery spaces, don Emergency Escape Breathing Devices (EEBDs). Secure access doors, hatches and scuttles when all personnel are out of the space. Muster shall be taken at [insert location] by [insert designated person]. [Note: Muster location should be a safe location outside the fire and smoke boundaries and preferably on a weather deck. A safe haven to muster may not be available on the damage control deck.] Account for all personnel at muster. Report when evacuation of the space is complete to Damage Control Central. Reassign uninjured personnel to assist with firefighting. The EOW is in charge of firefighting efforts until the affected space is evacuated and the repair parties are manned and ready. Control of firefighting then passes to the [Damage Control Assistant (DCA)]. Transfer control of machinery in unaffected spaces to the main control general quarters watch. If the normal general quarters watch station is within the affected space, control the unaffected machinery plant from [designate.]

4. Establish Communications. Establish communications per Chapter 4. The EOW shall advise the OOD and DCC when the fire is declared out of control. The space supervisor or EOW should brief the repair party scene leader on the location and cause of the fire, personnel status, and plant status.

5. Contain and Fight the Fire. Take the following actions and report them to the Engineer Officer (EO), DCA, or Damage Control Central as appropriate:

   a. [If installed] Activate Halon/HFP/CO2/Water Mist and AFFF bilge sprinkling systems as applicable. Note times of system activations. Verify that ventilation was automatically secured following Halon/HFP/CO2 activation. [Designate means of determining Halon/HFP/CO2 activation] Investigate for installed system effectiveness 15 minutes after activation.

   b. [If installed] Continue to man, monitor, and replenish AFFF foam stations. For the initial foam blanket, operate the AFFF bilge sprinkling system no longer than four minutes to prevent running the system dry. Stop operating the system if the concentrate level in the tank sight glass is not visible. [Cutter shall insert who will replenish the tank and locations of spare foam canisters for replenishment] [If bilge sprinkling is not installed] Apply an initial foam blanket after reentry.

   c. Secure the space mechanically and electrically per Chapter 8.

   d. Reentry and firefighting shall take place per the guidance given in Chapter 10. Repair [designate] shall reenter through [designate access] [Repair [designate] shall stand by to assist as directed] Use proper personnel protection per Chapter 3.

   e. After the fire has been extinguished, take the post fire actions discussed in Chapter 11.

E. Inport/Auxiliary Steaming/Cold Iron Class BRAVO Fires. Watch standers shall take the following actions in the event an oil fire occurs in a machinery space while inport:

1. Fight the Fire if you can. Follow the procedures in Section A of this chapter.

[NOTE: If adequate cutter firefighting resources are available, the fire may be fought by the cutter. If cutter is unable to combat fire, rescue and assistance shall be requested from nearby afloat or shore units.]

2. Call the Local Fire Department, SOPA, Port Authority as applicable. [A checklist for inport actions shall be added as a separate enclosure.]

3. Brief Fire Department. The EOW or OOD should brief the fire department personnel when they arrive, giving fire and plant status to a fire department supervisor if the fire department is to fight the fire. The cutter's commanding officer or direct representative (OOD) is responsible to make the decision to use the fire department and is ultimately responsible for the cutter. Such decisions are difficult to make under the stress of a major fire. Therefore, it is required that each cutter have standing agreements with their homeport fire departments to address span of control and decision making procedures for the participants in the case of a major shipboard fire. Any cutter specific assistance required from the fire department shall be included in this agreement (Example: Provide firemain pressure to FPL 1-345-1 if moored starboard side to the pier, and 1-336-4 if moored port side to the pier.) Additional guidance on the agreement is found in Enclosure (8).

4. Standby to Assist. The EOW or OOD shall standby to advise and assist the fire department supervisor. Shipboard personnel should assist as directed by EOW or fire department supervisor on scene.

CHAPTER 10 REENTRY AND FIREFIGHTING

A. General. Reentry to a machinery space to fight a fire out of control is the most critical part of the firefighting evolution and the most dangerous to personnel. The primary functions of the reentry team are to attack and extinguish the fire, to rescue trapped personnel, to be sure the source of fuel is secured, and to overhaul the affected space (including cooling surfaces and desmoking). At the time of reentry, a backdraft explosion* or an intensifying fire may occur as accesses to the affected space are opened and hot fire gases are relieved into the smoke control zone. **Firefighters should use caution to position themselves to the side of the access when the door, hatch, or scuttle is initially opened.** In general, follow standard repair party firefighting procedures. Specific guidelines for machinery space reentry follow:

B. Reentry Point. The primary reentry point is [designate.] The secondary reentry point is [designate.] Repair [designate] is the primary repair party responsible for reentry. [Repair [designate] shall assist as directed. Include subsections according to Enclosure (1).]

NOTE: Primary reentry should be lowest readily accessible point of reentry to the affected space.

C. Indirect Attack. An indirect attack is the application of water fog into the fire space through an existing access or through a hole cut in a bulkhead or overhead. The goal is to distribute water throughout the hot upper layer in a compartment and generate steam to effect extinguishment or to gain control and reduce compartment temperatures. When heat or other conditions deny access to the fire space, an indirect attack may improve conditions to permit reentry for a direct attack. When the compartment boundaries are not breached by major openings, as may occur from weapons effects, indirect attack can often extinguish the open flaming of a Class A and Class B fire in an enclosed space.

NOTE: Do not conduct an indirect attack when people are in the fire space or when a direct attack is underway. Indirect attack will generate steam and hot water drops which can pose a moderate hazard to firefighters if they are in the compartment.

D. Hoses. As a minimum, reentry teams shall use two attack 1-1/2 or 1-3/4 inch AFFF hoses, with vari-nozzles. AFFF for the lead hose may be supplied [If installed] either from a balanced pressure proportioner or from 5-gallon cans using an inline eductor. Supply AFFF for the backup hose shall come from 5-gallon cans using an inline eductor and 95 gpm vari-nozzle for the cutter's appropriate AFFF percentage (3% or 6%). Maintain enough distance between the first and second hoses to permit maneuverability and prevent firefighting progress from being impaired. During a direct attack, the backup hose team should attack the primary blaze by approaching it from a different direction or enter the affected space after the lead attack hose. The back-up hose team should keep heat off the lead hose team and extinguish any fires that form behind the lead hose team. Both hose teams have to be aggressive but careful not to get trapped by the fire. [If an additional person is available to

act as team leader] [A team leader, in a firefighter's ensemble, should enter the space and direct the actions of the hose teams. The team leader should use the thermal imager to locate the fire and direct the hose teams to it.] Additional hose handlers may be needed to maneuver the hoses. Hose handlers must have proper personnel protection in accordance with Chapter 3. Ensure hose handlers are properly spaced to maintain communications with the on scene leader.

NOTE: Nozzle Patterns. Repeated efforts may be necessary to gain access to the space. The nozzleman should use the reentry AFFF hose with wide-angle fog to protect himself. The vari-nozzle 30 degree fog pattern or "narrow fog" should be used to attack the fire, cool metal surfaces, and lay down vapor securing AFFF blankets. Adjust the nozzle pattern to suit the particular tactical situation. Additional nozzle patterns, to be used during both direct and indirect attack, and the hose handling techniques are described in further detail in reference (d).

D. Conserving AFFF. Sufficient AFFF is normally available to cover a machinery space bilge eight or more times. Reentering the space may be a lengthy and awkward process. Use the AFFF you need but do not waste it. Use water hoses to cool accesses but water hose teams should not enter the affected space as they will impair the effectiveness of the AFFF hose teams. To conserve AFFF, hoses equipped with inline eductors can discharge saltwater if pickup tubes are removed from AFFF cans. The eductor will continue to function with reinsertion of the pickup tube into the AFFF containers. [Include directions for water only supply from installed AFFF stations.]

E. [When Halon/HFP/CO2 and AFFF Bilge Sprinkling Is Installed:]

1. Increase AFFF in Bilge. Operate the AFFF bilge sprinkling system for 2 minutes to increase the foam blanket. The initial foam application may have been disturbed by the fuel source.

2. Wait 15 Minutes. Reentry should not be made for at least 15 minutes after Halon/HFP/CO2 discharge and then only by personnel wearing personnel protection in accordance with Chapter 3. The 15 minute wait allows the space to cool, limiting the probability of reflash if air enters during reentry. Waiting may not be justified in a battle situation. Reenter before 15 minutes only on direction from the Commanding Officer. [When a two shot Halon/HFP/CO2 system is installed] if the first shot of Halon/HFP/CO2 is ineffective in putting out the fire, use the second shot immediately. [If the second shot also fails] If the evidence is that Halon/HFP/CO2 has not extinguished the fire, reentry should be attempted as quickly as possible after the space is evacuated and mechanically isolated. Electrical isolation, although ongoing, should not delay space reentry.

NOTE: **When Halon/HFP is used to extinguish the fire;** After 15 minute Halon/HFP soak period, operate exhaust ventilation if available, for at least an additional 15 minutes to reduce the airborne HF acid gas concentration. Do not attempt reentry for at least 15 minutes after ventilation has been established. If exhaust ventilation is not available, wait an additional 30 minutes after the 15 minute Halon/HFP soak period before reentry. The HF acid gas

concentration must be below 90 ppm for reentry by personnel in OBAs/SCBAs.

3. Reenter Through a Safe Access. Reenter through an access which is not obstructed by the fire. Choice of access should be made by the DCA/repair locker leader upon receipt of plant status and fire location from the EOW or space supervisor.

4. Fight the Fire. Once inside the space, report when the fire is located, extinguished, reflash watch is set and fire is overhauled. Visibility will likely be extremely limited. [On units so equipped] If the location of the fire is not obvious, [insert designated person] in a firefighting ensemble should follow the lead attack nozzleman/team leader with a thermal imager. This person will direct the hose teams until relieved. If encountered, extinguish any class ALPHA fires within the space using AFFF (Halon/HFP is not effective on smoldering ALPHA fires). Secure fuel sources and cover all flammable liquids with AFFF. To conserve AFFF, use water to cool the space after the fire is out and overhauled. **To protect against reflash, firefighters should take care to replenish AFFF blankets covering flammable liquids that are disturbed by water.**

F. [When Halon/HFP/CO2 Is Installed and AFFF Bilge Sprinkling Is Not Installed:]

1. Wait 15 Minutes. Reentry should not be made for at least 15 minutes after Halon/HFP/CO2 discharge and then only by personnel wearing personnel protection in accordance with Chapter 3. The 15 minute wait allows the space to cool, limiting the probability of reflash when air enters during reentry. Waiting may not be justified in a battle situation. Reenter before 15 minutes only on direction from the Commanding Officer. [When a two shot Halon/HFP/CO2 system is installed] if the first shot of Halon/HFP/CO2 is ineffective in putting out the fire, use the second shot immediately. [If the second shot also fails] If the evidence is that Halon/HFP/CO2 has not extinguished the fire, reentry should be attempted as quickly as possible after the space is evacuated and mechanically isolated. Electrical isolation, although ongoing, should not delay space reentry.

2. Reenter Through a Safe Access. Reenter through an access which is not obstructed by the fire. Choice of access should be made by the DCA/repair locker leader upon receipt of plant status and fire location from the EOW or space supervisor.

NOTE: **When Halon/HFP is used to extinguish the fire;** After 15 minute Halon/HFP soak period, operate exhaust ventilation if available, for at least an additional 15 minutes to reduce the airborne HF acid gas concentration. Do not attempt reentry for at least 15 minutes after ventilation has been established. If exhaust ventilation is not available, wait an additional 30 minutes after the 15 minute Halon/HFP soak period before reentry. The HF acid gas concentration must be below 90 ppm for reentry by personnel in OBAs/SCBAs.

3. Fight the Fire. Once inside the space, report when the fire is located, extinguished, reflash watch is set and fire is overhauled. Visibility will likely be extremely limited. [On units so equipped] If the location of the fire is not obvious, [insert designated person] in a firefighting ensemble should follow the lead attack nozzleman/team leader with a thermal imager. This person will direct the hose teams until relieved. If encountered, extinguish any class ALPHA fires within the space using AFFF (Halon/HFP is not effective on smoldering ALPHA fires). Secure fuel sources and cover all flammable liquids with AFFF. To conserve AFFF, use water to cool the space after the fire is out and overhauled. **To protect against reflash, firefighters should take care to replenish AFFF blankets covering flammable liquids that are disturbed by water.**

G. [When Halon/HFP/CO2 Is Not Installed and AFFF Bilge Sprinkling Is Installed:]

1. Increase AFFF in Bilge. Operate the AFFF bilge sprinkling system for 2 minutes to increase the foam blanket. The initial foam application may have been disturbed by the fuel source.

2. Reenter Quickly. Reentry should be attempted as quickly as possible after the space is evacuated and mechanically isolated. Electrical isolation, although ongoing, should not delay space reentry.

3. Reenter Through a Safe Access. Reenter through an access which is not obstructed by the fire. Choice of access should be made by DCA/repair locker leader upon receipt of plant status and fire location from the EOW or space supervisor.

4. Fight the Fire. Once inside the space, report when the fire is located, extinguished, reflash watch is set and fire is overhauled. Visibility will likely be extremely limited. [On units so equipped] If the location of the fire is not obvious, [insert designated person] in a firefighting ensemble should follow the lead attack nozzleman/team leader with a thermal imager. This person will direct the hose teams until relieved. Extinguish class ALPHA fires within the space using AFFF. Secure fuel sources and cover all flammable liquids with AFFF. To conserve AFFF, use water to cool the space after the fire is out and overhauled. **To protect against reflash, firefighters should take care to replenish AFFF blankets covering flammable liquids that are disturbed by water.**

H. [When Halon/HFP/CO2/Water Mist and AFFF Bilge Sprinkling Are Not Installed:]

1. Reenter Quickly. Reentry should be attempted as quickly as possible after the space is evacuated and mechanically isolated. Electrical isolation with the exception of lighting will be completed. Electrical isolation, although ongoing, should not delay space reentry.

2. Reenter Through a Safe Access. Reenter through an access which is not obstructed by the fire. Choice of access should be made by DCA/repair locker leader upon receipt of plant status and fire location from the EOW or space supervisor.

3. Fight the Fire. Once inside the space, report when the fire is located, extinguished, reflash watch is set and fire is overhauled. Visibility will likely be extremely limited. [On units so equipped] If the location of the fire is not obvious, [insert designated person] in a firefighting ensemble should follow the lead attack nozzleman/team leader with a thermal imager. This person will direct the hose teams until relieved. If encountered, extinguish any class ALPHA fires within the space using AFFF. Secure fuel sources and cover all flammable liquids with AFFF. To conserve AFFF, use water to cool the space after the fire is out and overhauled. **To protect against reflash, firefighters should take care to replenish AFFF blankets covering flammable liquids that are disturbed by water.**

I. [When Water Mist and AFFF Bilge Sprinkling Is Installed:]

1. Increase AFFF in Bilge. Operate the AFFF bilge sprinkling system for 2 minutes to increase the foam blanket. The initial foam application may have been disturbed by the fuel source.

2. Reenter Quickly. Reentry should be attempted as quickly as possible after the space is evacuated, mechanically isolated, and water mist system is activated. Exhaust ventilation should remain on while water mist system is in operation. Electrical isolation, although ongoing, should not delay space reentry. A 15 minute delay, as provided for space cool down and agent soak time with Halon/HFP/CO2 protected spaces, is not required for water mist protected spaces.

3. Reenter Through a Safe Access. Reenter through an access which is not obstructed by the fire. Choice of access should be made by DCA/repair locker leader upon receipt of plant status and fire location from the EOW or space supervisor.

NOTE: If the operating water mist system appears effective and is maintaining tenable space temperatures, space investigation may be expedited by having independent DC personnel navigate throughout the machinery space, separate from the manned AFFF hose.

4. Fight the Fire. Once inside the space, investigate for any residual fires. Report if a fire is located, when it is extinguished, reflash watch is set and fire is overhauled. Visibility may be limited. [On units so equipped] If the location of the fire is not obvious, [insert designated person] in a firefighting ensemble should follow the lead attack nozzleman/team leader with a thermal imager. This person will direct the hose teams until relieved. If encountered extinguish any class ALPHA fires within the space using AFFF (water mist may not be effective on smoldering ALPHA fires). Secure fuel sources and cover all flammable liquids with AFFF. To conserve AFFF, use water to cool the space after the fire is out and overhauled. **To protect against reflash, firefighters should take care to replenish AFFF blankets covering flammable liquids that are disturbed by water.**

CHAPTER 11 POST FIRE ACTIONS

A. General. After the fire is out, the space shall be desmoked and atmospherically tested safe for remanning. Post a reflash watch with AFFF hoses to extinguish quickly any fires which may reignite. Report when the reflash watch is set and when overhaul is completed.

B. Desmoking. When a BRAVO fire has been extinguished and overhauled, combustible gases may still be present. Operating electric controllers to start fans may ignite these gases. Leave circuit breakers and other protective devices, which tripped automatically during the fire, in the tripped position until system damage is assessed. It is considered a reasonable risk to reactivate ventilation fans during a machinery space casualty to remove heat, smoke and toxins prior to verification of electrical integrity. Examine the electrical distribution system and, if possible, and with the Engineer Officer's approval, reestablish power to the installed ventilation 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 operable or inoperable, desmoking will take longer, but can be accomplished by using portable water driven, explosive proof and electrically grounded blowers, operable installed fans or positive pressure from adjacent spaces. Desmoking with the installed ventilation system can proceed with minimal risk when:

1. Halon/HFP/CO2 and AFFF bilge sprinkling have been used to extinguish the fire and the fire has been overhauled.

2. The space has been allowed to cool.

3. The source of fuel has been secured and all fuel has been washed into the bilges, pumped to dirty oil/oily waste tank, or pumped overboard with permission of Commanding Officer.

4. No damage has been sustained to the electrical distribution system.

[NOTE: On cutters without Halon/HFP/CO2 and AFFF bilge sprinkling, the safest way to desmoke machinery spaces is to exhaust with portable blowers or to use positive pressure from adjacent spaces. These methods minimize the risk associated with igniting flammable liquids that have not been vapor secured with AFFF.]

C. [Desmoking Water Mist Protected Spaces. It is considered a reasonable risk to re-activate ventilation fans during a machinery space casualty to remove heat, smoke and toxins prior to verification of electrical integrity. If the ventilation system has been operated during space reentry, maintain desmoking with installed ventilation and water mist operation until all remaining fire has been manually extinguished and overhauled, AFFF bilge sprinkling has been operated, the source of oil secured, the space cooled, and all fuel washed into the bilges. After all remaining fire is extinguished and if fans are fully operational, run all fans on high for a minimum of 15 minutes to remove remaining smoke and toxic gases. If the installed system is partially or fully inoperable, desmoking will take longer, but can be

accomplished either by using positive pressure provided by the ship's ventilation systems in the adjacent smoke control zone, or portable desmoking equipment.

D. Atmospheric Testing.

1. Desmoke First. Desmoking shall precede atmospheric testing because combustible gas analyzers will not operate reliably in a Halon/HFP atmosphere and oxygen analyzers will not operate reliably if the sensor is exposed to excessive moisture, heat, or particulates found in a post-fire atmosphere. When the space is clear of smoke, test for oxygen, combustible gases, and toxic gases per NSTM 074, Volume 3. Oxygen shall be between 19.5-22 percent, combustible gases shall be less than 10 percent of the lower explosive limit, and all toxic gases below their threshold limit values before the space can be certified safe for personnel to enter without OBAs/SCBAs.

2. Authorized Personnel. Shipboard personnel authorized to conduct post-fire atmospheric tests for the purpose of certifying the space safe for personnel are afloat gas free engineers and afloat gas free engineering petty officers (E-5 and above) as defined by NSTM 074, Volume 3.

3. Extent of Test. After a flammable liquid fire has been extinguished, toxic gas tests for hydrocarbons, carbon dioxide, carbon monoxide, hydrogen chloride, hydrogen cyanide, and chlorine are required. (ship shall list the threshold limit values for each gas here) If Halon or HFP have been discharged, a test for hydrogen fluoride shall also be conducted. Tests should be conducted near the center and all four corners on each level, taken high and low, with a minimum of ten (10) test points taken. At least one satisfactory test shall be obtained at each location tested.

NOTE: A compartment is considered "safe", only after satisfactory test results at all test locations is obtained, during the latest round of tests.

NOTE: An "unsatisfactory" test result at any test point will require further desmoking, and retesting at all test points. The use of portable water driven, explosive proof and electrically grounded blowers and ventilation trunks may be used to remove trapped gases in low portions of compartments.

E. Dewatering. The DCA shall direct the space to be dewatered with the Commanding Officer's permission and in accordance with standard operating procedures. [Insert commands standard operating procedures for dewatering.] Retest the space for toxic gases after dewatering, since water can trap toxic gases and release them during dewatering.

F. Remanning. Once the space is certified as safe for personnel to reenter without OBAs/SCBAs, remanning can begin.

G. Investigating Damage. The EO shall direct the damage investigation and shall determine which, if any, equipment or machinery may be restarted.

H. Reenergizing Unaffected Systems & Equipment. The EO shall direct the line-up, starting and energizing of mechanical and electrical equipment only after a detailed assessment of the damage shows that these operations can be conducted without endangering personnel or the cutter. This may include retesting the affected space for explosive gases to be sure that it is safe to start machinery or equipment which could produce a spark or provide hot surfaces sufficient to cause a fire or explosion.

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AVAILABLE CUTTER CLASS MSFD TEMPLATES

Cutter class MSFD templates can be downloaded from CG Portal at https://cgportal.uscg.mil/lotus/myquickr/machinery-space-firefighting-doctrine-templates . Where conflicts exist between this Manual and a cutter class specific template, this Manual takes precedence.

Available templates:

420’	Icebreaker	WAGB
418’	National Security Cutter	WMSL
399’	Polar Class Icebreaker	WAGB
378’	High Endurance Cutter	WHEC
270’	Medium Endurance Cutter	WMEC
240’	Seagoing Buoy Tender/Icebreaker	WLBB
225’	Seagoing Buoy Tender	WLB
210’	Medium Endurance Cutter	WMEC
175’	Coastal Buoy Tender	WLM
179’	Patrol Coastal	WPC
160’	Inland Construction Tender	WLIC
140’	Icebreaking Tug	WTGB
110’	Patrol Boat	WPB
100’	Inland Buoy Tender	WLI
87’	Coastal Patrol Boat	WPB
75’	River Buoy Tender	WLR
75’	Inland Construction Tender	WLIC
65’	River Buoy Tender	WLR
65’	Inland Buoy Tender	WLI
65’	Small Harbor Tug	WYTL

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LIST OF SPACES REQUIRING SUBSECTIONS

All cutters shall develop subsections to the Machinery Space Fire Doctrine (MSFD) to cover space unique actions.

Compartments that require subsections are listed below by class:

WMSL: Aft Main Machinery Room, Forward Main Machinery Room, Auxiliary Machinery Room, #3 SSDG Room, JP-5 Pump Room, Incinerator Room

POLAR SEA/HEALY: Diesel Generator Room 1, Diesel Generator Room 2, Gas Turbine Room, Motor Room, Motor and Gear Room, Boiler Room, JP-5 Pump Room, Emergency Generator Room, Incinerator Room, Aux Machinery Room.

378' WHEC, 270' and 210' WMEC: Main Machinery Space, After Steering, JP5 Pump Room, Auxiliary Machinery Room(s), Waste Handling Room (378), and Diesel Oil Purifier Room (378).

MACKINAW: Engine Rooms, Aux Diesel Generator Room, Forward Hydraulics, Reefer Equipment Room, Motor Generator Room, and Azipod Space.

225’ WLB: Main Machinery Room, Aux Machinery Room, Emergency Generator Room, Bow Thruster Room, Stern Thruster Room, and SORS Machinery Room.

175’ WLM: Engine Room, Hydraulic Equipment Room, Propulsion Thruster Room.

179’ WPC: Forward Engine Room, Aft Engine Room.

140’ WTGB: Engine Room, Main Motor Room, After Steering, Aux Machinery Space., ATON Barge Engine Room (if applicable).

All Other Cutters: Main Machinery Rooms, Aux Machinery Rooms, ATON Barge Engine Rooms as applicable.

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DUTIES AND RESPONSIBILITIES OF PERSONNEL

(Cutters shall develop and list Duties and Responsibilities, as they pertain to a main or machinery space fire, for personnel listed in Chapter 2.)

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PRIMARY AND SECONDARY SMOKE BOUNDARIES, SMOKE CURTAINS, AND SMOKE CONTROL ZONES

[Cutters shall develop and list all primary and secondary smoke boundaries, smoke curtain locations, and smoke control zone locations for each main or machinery space listed in Enclosure (1).]

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FANS, CONTROLLERS, SUPPLY INTAKES, EXHAUST DISCHARGE

[Cutters shall list supply intake and exhaust discharge locations on the weather decks and a list of fans and associated controllers affecting the main space(s), machinery space(s) and adjoining spaces that comprise the smoke control zones. Include the location of controllers, their designation and compartments served.]

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FIRE BOUNDARIES

[Cutters shall make a list of designated fire boundaries for main and machinery spaces listed in Enclosure (1).]

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MECHANICAL AND ELECTRICAL ISOLATION BILLS

[Cutters shall develop mechanical and electrical isolation lists for all main and machinery spaces listed in Enclosure (1).]

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RAPID RESPONSE TEAM / DAMAGE CONTROL TRAINING TEAM PERSONNEL

[Cutters shall develop guidelines for Rapid Response Team (RRT) and Damage Control Training Team (DCTT) personnel.]

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LOCAL FIRE DEPARTMENT AGREEMENT

[Cutters shall develop agreements with local fire departments that detail procedures to be followed when outside firefighting assistance is required while inport. The local fire department may be a base, county, state, volunteer, or other fire department or organization as determined by the Commanding Officer. The agreement shall cover, at a minimum, the role of the local fire department, the assistance required of the local fire department during main or machinery space fires, and a plan for carrying out biannual routine cutter familiarization and hazard identification training with the local fire department. A general sample is provided below.]

(SAMPLE)
MEMORANDUM OF AGREEMENT
BETWEEN
UNITED STATES COAST GUARD (CG CUTTER)
And
(FIRE DEPARTMENT)

This Memorandum of Agreement (MOA), entered into this_____day of ____, (YEAR) between the United States Coast Guard (CG CUTTER) and (FIRE DEPARTMENT) is for the purpose of providing fire protection, emergency medical services and confined space rescue services, by (Fire Department) to (CG CUTTER). (FIRE DEPARTMENT) and (CG CUTTER) agree that:

1. On request made to (FIRE DEPARTMENT) via telephone number (NUMBER) by a representative of the (CG CUTTER) designated in this agreement, firefighting, emergency medical services or confined space rescue services, equipment and personnel of (FIRE DEPARTMENT) shall be dispatched to (CG CUTTER) as determined and directed by (FIRE DEPARTMENT).

2. Any dispatch of equipment and personnel pursuant to the MOA is subject to the following conditions:

   a. All requests for fire or emergency medical equipment and personnel shall be made by telephone, unless that number is inoperative or unavailable for any reason.

   b. Any request for aid under this agreement will include a description by (CG CUTTER)'s representative of the type and nature of the fire, or emergency to which response is requested, and will specify the location to which the equipment and personnel are to be dispatched; however, the amount and type of equipment and number of personnel to be furnished will be determined by (FIRE DEPARTMENT).

3. (FIRE DEPARTMENT) equipment and personnel will report to the quarterdeck / brow of (CG CUTTER). (CG CUTTER) shall provide a representative to meet the equipment and personnel at the quarterdeck / brow and provide (FIRE DEPARTMENT) personnel applicable information concerning the location and extent of emergency services required. All actions of (FIRE DEPARTMENT) fire and rescue equipment and personnel in responding to the emergency shall be at the sole directions of (FIRE DEPARTMENT).

4. Reimbursement to (FIRE DEPARTMENT) for cost of firefighting on (CG CUTTER) is governed

by section 2210, title 15, United States Code, and the implementing regulations set forth in Title 44, part 151, of the Code of Federal Regulations. Any such claim for reimbursement for firefighting costs may also include costs associated with emergency medical services to the extent normally rendered by a fire service in connection with a fire.

5. All equipment used by (FIRE DEPARTMENT) in carrying out this agreement will, at the time of action hereunder, be owned by and /or, under the control of (FIRE DEPARTMENT), or is being employed by (FIRE DEPARTMENT) in accordance with existing Mutual Aid Agreements independent of this MOA. All personnel acting for (FIRE DEPARTMENT) under this MOA will, at the time of such action, be an employee or volunteer member of (FIRE DEPARTMENT) or acting in accordance with an existing Mutual Aid Agreement independent of this MOA.

6. Reporting requirements: **(Reporting requirements must be stated, even if there are none. The following is suggested).** Following all emergency responses under this MOA, (FIRE DEPARTMENT) shall forward a copy of the incident report in its customary format to the (CG CUTTER) point of contact shown below. **(Provisions must be made to safeguard the confidentiality of medical information of individual members)**. Communications between (FIRE DEPARTMENT) and (CG CUTTER) to discuss details of the incident, response to the incident or recommend modifications to procedures to improve response to future incidents under this MOA shall be between the points of contact shown below.

7. As an aid to implementing this agreement, members of (FIRE DEPARTMENT) may, with prior arrangement with the Commanding Officer or his designated point of contact listed below, tour (CG CUTTER) and any of its structures for the purpose of preparing pre-fire plans. Access to the Cutter will be granted at least **biannually, within 30 days of a Commanding Officer change of command, or following a greater than 50% cutter crew personnel turnover** for the purpose of reviewing and updating pre-fire plans and conducting inport fire response training.

8. Points of contact for each party to this MOA shall be:

For (CG CUTTER)	For (FIRE DEPARTMENT)
(NAME)	(NAME)
(TITLE and/or POSITION)	(TITLE)
(ADDRESS)	(ADDRESS)
(PHONE)	(PHONE)
(FAX)	(FAX)
(EMAIL)	(EMAIL)
(WEBSITE)	(WEBSITE)

9. This MOA shall become effective upon the date subscribed by both original signatories, and their successions in office.

10. This MOA may be modified by a written agreement signed by both original signatories, and their successors in office.

11. This MOA shall terminate upon 30 days written notice by either party.

The authority for (CG CUTTER) to enter into this agreement is found in 14 U.S.C. § 141 (1999) and the Safety and Environmental Health Manual, COMDTINST M5100.47.

GLOSSARY

1. **AFFECTED SPACE -** A space involved in a major oil spill or fire.

2. **BACKDRAFT EXPLOSION -** An explosion which results from combining fresh air with hot flammable fire gases which have reached their auto-ignition temperatures.

3. **CONTAINED** – The oil/fuel leak/spill is controlled and not allowed to spread.

4. **ELECTRICAL ISOLATION** – Used to describe the de-energizing of all electrical equipment in and to the affected space.

5. **FIRE AND SMOKE BOUNDARIES -** Any physical barrier can be a fire boundary. Ideally primary boundaries are the bulkheads, deck and overhead surrounding the fire. Secondary fire boundaries are generally set at fire zone bulkheads or watertight subdivisions. Most fire boundaries are not insulated and cooling by water spray may be required. Cooling water may be required on all sides of the compartment, particularly when the fire is in an advanced stage. **It is very important to set boundaries over the fire as quickly as possible, since fire tends to spread faster vertically than horizontally.** Combustibles in contact with fire-exposed decks, bulkheads and overheads should be removed to avoid ignition and spread of fire. Smoke boundaries shall be set using structure that is at least fume tight, and are normally set with fire boundaries. The scene leader decides initially when and where boundary men with charged hoses are needed. The amount of water used to keep a fire boundary cool shall be minimized to the greatest extent possible.

6. **MACHINERY SPACE -** A main machinery or auxiliary machinery space which contains any of the following: installed firefighting systems, oil fired boilers, internal combustion engines, gas turbines, or fuel transfer equipment.

7. **MAIN SPACE -** A machinery space with internal combustion engines, gas turbines, or boilers used for propulsion.

8. **MAJOR OIL LEAK** – A major oil leak is defined as a flammable liquid leak (lube oil, fuel oil, or hydraulic oil), more than a drip, that can not be controlled with a rag by a watch stander in a normal round.

9. **MAY -** When application of a procedure is optional.

10. **MECHANICAL ISOLATION** – Used to describe the securing of all machinery and piping systems in and to the affected space

11. **NEGATIVE VENTILATION** – The most effective way to provide enough oxygen to a compartment with watch standers/personnel still inside without supplied air breathing apparatus, without supplying additional oxygen to the fire. Supply on LOW or OFF, exhaust on HIGH. This is only to be used in affected space while watch standers are

present. If evacuation is required, ventilation shall be secured upon exit of the affected space.

12. **OUT OF CONTROL FIRE** – A fire that creates conditions due to heat and smoke which forces personnel to abandon the space. Flammable liquid spray fires are automatically considered a **Class BRAVO Fire Out of Control.**

13. **OVERHAUL** – Determine the extent of the fire while extinguishing residual, embedded fires, followed by clean up operations.

14. **OSS** – Operational Sequencing System. OSS is a set of systematic and detailed written procedures, diagrams, and status boards tailored to the individual ship, providing the necessary information for proper equipment/system operation and casualty control. OSS standardizes operations, reduces operational costs, accelerates casualty response, significantly reduces uncertainty and improper actions/responses, and provides for safe operation of equipment and systems.

15. **POSITIVE VENTILATION** - Supply on high, Exhaust on Low or off. Set adjacent to the smoke control zone outside the secondary smoke boundary. Setting Positive Pressure Ventilation (PPV) in the smoke control zone once fire overhaul is complete may be an effective way to desmoke an affected space.

16. **RECOVERY/TRIAGE AREA** – A space designated by DCC for the treatment and recovery of personnel.

17. **REENTRY** – Used to describe when a fire team reenters an affected space after it has been evacuated

18. **SHALL** – When application of a procedure is mandatory.

19. **SHOULD** – When application of a procedure is recommended.

20. **SMOKE CONTROL ZONE -** An enclosed area immediately adjacent to the entrance to the affected space, i.e., between the primary and secondary smoke boundaries. The smoke control zone is monitored by the DC response organization for smoke buildup and removal. Ventilation within the smoke control zone is initially established by securing ventilation fans serving the smoke control zone and by closing appropriate ventilation dampers, if installed, in accordance with the cutter's doctrine. During initial in-space firefighting, during fire space re-entry, or during indirect attack into the fire space, Positive Pressure Ventilation (PPV) should be used to minimize smoke migration into the Smoke Control Zone (SCZ) to augment follow-on firefighting efforts.

21. **SURFACTANT** – A large group of surface acting compounds that includes detergents, wetting agents, and liquid soaps.

22. **UNAFFECTED SPACE** – Any space other than the space involved in a major oil

leak/spill or fire.

23. **VAPOR SECURE** – Establishing a film or foam blanket over flammable liquids to prevent vaporization thereby isolating the fuel source from oxygen and heat.

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