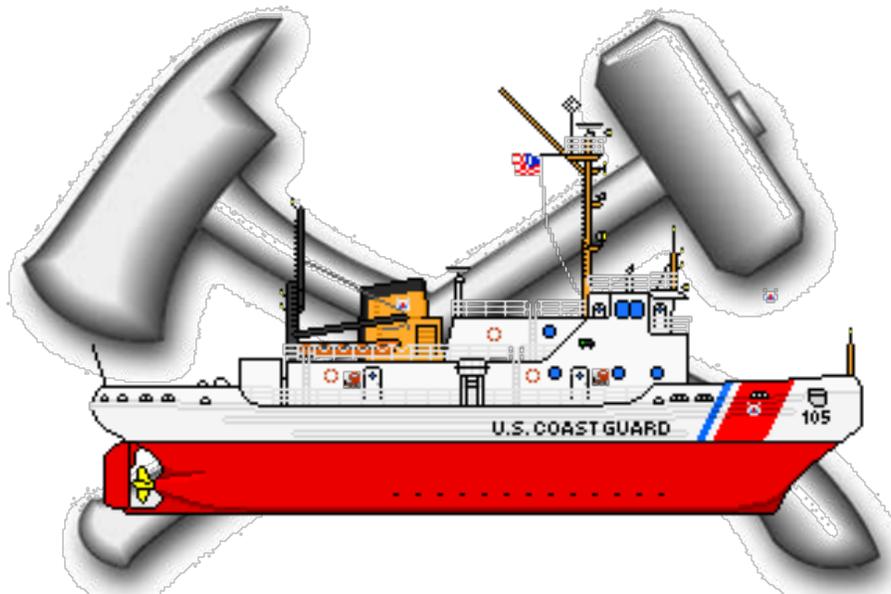




Machinery Space Firefighting: Icebreaking Tug (WTGB) Tactics, Techniques, and Procedures (TTP)



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CGTTP 3-91.10
8 Oct 2015

COAST GUARD TACTICS, TECHNIQUES, AND PROCEDURES 3-91.10

Subj: MACHINERY SPACE FIREFIGHTING: ICEBREAKING TUG (WTGB)
TACTICS, TECHNIQUES, AND PROCEDURES CGTTP 3-91.10

Ref:

- (a) Naval Ships' Technical Manual (NSTM), Chapter 555, Volume 1 Surface Ship Firefighting
- (b) Naval Ships' Technical Manual (NSTM), Chapter 079, Volume 3 Damage Control Engineering Casualty Control
- (c) Naval Ships' Technical Manual (NSTM), Chapter 233, Diesel Engines
- (d) Naval Ships' Technical Manual (NSTM), Chapter 074, Volume 3 Gas Free Engineering

1. PURPOSE. To provide Coast Guard personnel responding to a machinery space fire onboard cutters with usable tactics, techniques, and procedures (CGTTP) to be used on Icebreaking Tug Cutters (WTGB) class ships.
2. ACTION. This CGTTP publication applies to WTGB. Internet release authorized.
3. DIRECTIVES/TTP AFFECTED. None.
4. DISCUSSION. This TTP publication provides specific equipment, systems, and procedures used to prevent, control, extinguish, and overhaul fires in WTGB machinery spaces.
5. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is itself a rule. It provides guidance for Coast Guard personnel and does not impose legally-binding requirements on any party outside the Coast Guard.
6. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. While developing this publication, Integrated Process Team (IPT) members examined environmental considerations under the National Environmental Policy Act (NEPA) and determined they are not applicable.

7. DISTRIBUTION. FORCECOM TTP Division posts an electronic version of this TTP publication to the CGTTP Library on CGPortal. In CGPortal, navigate to the CGTTP Library by selecting **References > Tactics, Techniques, and Procedures (TTP)**. FORCECOM TTP Division does not provide paper distribution of this publication.
8. RECORDS MANAGEMENT CONSIDERATIONS. Integrated Process Team (IPT) members thoroughly reviewed this publication during the TTP coordinated approval process and determined there are no further records scheduling requirements per Federal Records Act, 44 U.S.C. Chapter 31 § 3101 et seq., NARA requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This publication does not have any significant or substantial change to existing records management requirements.
9. FORMS/REPORTS. None.
10. REQUEST FOR CHANGES. Submit recommendations for TTP improvements or corrections via email to FORCECOM-PI@uscg.mil or through the TTP Request form on CGPortal. In CGPortal, navigate to the TTP Request form by selecting **References > Tactics, Techniques, and Procedures (TTP) > TTP Request**.

Send lessons learned applicable to this TTP publication via command email to FORCECOM TTP Division at CMD-SMB-CG-FORCECOM.

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By Direction of Commander,
Force Readiness Command

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Chapter 1: Introduction

Introduction

This chapter overviews the contents of this tactics, techniques, and procedures (TTP) publication. It also defines the use of notes, cautions, and warnings in TTP publications.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Introduction	1-2
B	Notes, Cautions, and Warnings	1-3

Section A: Introduction

A.1. Introduction

The machinery space Class B fire is one of the most hazardous shipboard casualties, both to human life and machinery. If a major fuel/lube oil leak or a fire occurs, this TTP provides a basis for proper decisions and actions. It addresses fire prevention, firefighting systems capabilities and limitations, considerations for choosing firefighting equipment, and actions necessary inside and outside the affected space.

This TTP provides best practices and procedures to prevent, control, extinguish, and overhaul a Class B fire in a machinery space. This does not replace good judgment, a familiarity with firefighting systems and equipment, and an understanding of which agent or firefighting system to use for different fires.

WHEN A FIRE STARTS, IT IS TOO LATE TO READ THIS TTP!

A.2. Deviations

This TTP publication cannot cover every scenario that might arise. Such cases might result in the need to deviate from guidance in this publication. You may deviate from the TTP as necessary to complete the task with greater safety, effectiveness, or efficiency. Do not take such deviations lightly. Temper any decision to deviate with maturity and a complete understanding of the mission, members' capabilities, and equipment. Whenever possible, consult your unit chain of command before deviation. Report TTP adjustment needs per the Request for Changes paragraph in the letter of promulgation.

Section B: Notes, Cautions, and Warnings

B.1. Overview The following definitions apply to notes, cautions, and warnings found in TTP publications.

NOTE: An emphasized statement, procedure, or technique.

CAUTION: A procedure, technique, or action that, if not followed, carries the risk of equipment damage.

WARNING: *A procedure, technique, or action that, if not followed, carries the risk of personnel injury or death.*

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Chapter 2: Fundamental Principals

Introduction This chapter discusses general fire hazards and prevention.

In This Chapter This chapter contains the following sections:

Section	Title	Page
A	Fire Prevention	2-2
B	Special Hazards	2-3

Section A: Fire Prevention

A.1. Risk Mitigation

Preventive measures significantly reduce the risk of fire in machinery spaces. Per the ship fire bill, regular and frequent inspections by the fire marshal include, but are not limited to, the following inspections:

- Properly stow and protect all combustibles.
 - Per preventative maintenance requirements and consistent with good engineering practice, routinely test and inspect portable and installed fire suppression systems and equipment, including after repairs.
 - Reduce the likelihood of fire by:
 - Minimizing combustibles.
 - Performing frequent and thorough watch standing rounds.
 - Exercising frequent fire drills.
 - Educating all hands to eliminate fire hazards.
 - Enforce the following fire prevention policies and practices:
 - Maintain flange shields on required flammable liquid piping.
 - Maintain proper covers on flammable liquid strainers; keep sounding tube caps in place and isolation valves closed.
 - Take immediate action to stop and repair all oil leaks.
 - Clean up oil spills and leaks.
 - Keep ventilation ducts free of oily residue.
 - Keep bilges free of oil and trash.
 - Empty flammable/trash cans daily.
 - Prevent stockpiling excess or unauthorized flammables.
 - Do not use uptake spaces to store combustible materials.
 - Properly maintain all firefighting equipment.
 - Operate and maintain systems and equipment per applicable manuals and consistent with good engineering practice.
 - Properly maintain all machinery space damage control closures and fittings.
 - Follow electrical and mechanical tag out procedures.
-

Section B: Special Hazards

B.1. Lead Acid Batteries

During and after a machinery space fire, lead acid batteries are a serious hazard. Hydrogen gas, given off by batteries, is combustible and can be explosive. As the batteries become hotter, they give off more gas increasing the danger. 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 mixed with sulfuric acid from the battery, give off a toxic chlorine gas.

Lead acid batteries are located:

- Port aft engine room.
- Service diesel generator (SSDG) starting battery – bank port side between frames 54 and 57.
- Bubbler batteries – aft bulkhead 61, just off centerline.

Additionally, on the 120' ATON barges, lead acid batteries are located:

- STBD side outboard the HPU diesel engine.
- Port side FWD of the generator sets.
- Mid-ship just forward of the BPU diesel engine.
- In the STBD deckhouse just off the buoy deck.

WARNING:

Extinguish lead acid battery fires with carbon dioxide (CO₂) portable extinguishers only. Additional corrective responses are any normal form of firefighting.

WARNING:

Using water (H₂O) on a lead acid battery fire might cause an explosion. Always use self-contained breathing apparatus (SCBA) when combating battery fires due to the hazardous gases given off. If using water, maintain a minimum of 4 feet from the fire and angle spray at 30-60 degrees. After any fire near lead acid batteries, a gas free engineer (GFE) tests for the presence of chlorine gas.

WARNING:

Acid from leaks is very corrosive. Use extreme caution and appropriate personal protection.

**B.2.
Lead-Based
Paint, Asbestos,
and PCBs**

Be aware of potential exposure risks from fires and other emergency events that disturb asbestos, lead (Pb), or polychlorinated biphenyls (PCBs). Damage control operations, including access and overhaul activity can cause significant damage to asbestos-containing material and lead-containing paint.

Cutters do not have the equipment or expertise to certify a space safe for re-entry by unprotected personnel after the release of asbestos fibers, lead dust, or after formation of dioxins when PCBs burn.

Clearing smoke after a fire may increase exposure risks for unprotected personnel near exhaust locations since exhaust probably contains hazards.

Therefore, after a fire or other event involving potentially damaged or disturbed asbestos containing material, lead, or PCBs, do the following:

- Clear smoke in vents by exhausting downwind, toward unoccupied restricted areas.
 - After firefighting, place clothing (i.e., firefighter's ensemble (FFE)) in trash bags and seal up.
 - Restrict access to affected compartments.
 - Only enter these compartments while donning SCBAs and protective clothing and follow proper decontamination and personal hygiene procedures.
 - Protective clothing prevents contaminants from contacting bare skin and decreases the risk of spreading lead dust to other spaces.
 - Boot/shoe covers or smooth rubber boots prevent contaminants from adhering to footwear and carrying to other spaces.
 - Disposable gloves prevent contamination and reduce the hand-to-mouth exposure risk.
 - Contact HSWL SC for assistance with air monitoring and surface wipe sampling to certify spaces safe for re-entry.
-

Chapter 3: Personnel Actions

Introduction This chapter discusses actions and priorities for personnel upon discovery of a machinery space leak or fire.

In This Chapter This chapter contains the following sections:

Section	Title	Page
A	Underway Actions	3-2
B	Inport Actions	3-5
C	Communications	3-6

Section A: Underway Actions

A.1. Person Discovering the Leak/Fire

If you discover a leak or fire,

- Report the leak/fire, location, source/cause, and action being taken.
- Request the officer of the deck (OOD) sound the alarm and make an appropriate pipe.
- Secure affected equipment and the source of the leak as per the cutter's restricted maneuvering doctrine.
- Set ventilation to low.
- Take initial action to combat the leak/fire.
- If a leak/fire is uncontrollable or escape is threatened, evacuate the space immediately.

A.2. Engineer of the Watch

Oversee engineering watchstanders and ensure safe operation of engineering equipment.

- Initiate actions for a lube/fuel oil leak/fire and follow-up mitigation actions.
 - If leak is uncontrollable or fire is out of control, activate the water mist system and/or aqueous film forming foam (AFFF) system and turn firefighting efforts to Engineering Officer (EO).
 - Brief EO on firefighting efforts, actions taken to isolate space, plant status, personnel status, status of firefighting equipment, etc.
-

A.3. Officer of the Deck (OOD)

Primary concern is overall safety of the ship and crew.

- Sound general emergency.
 - Retain control of the general announcing system or 1 main circuit (1MC) until damage control central (DCC) comes online.
 - Continue safe navigation of the ship.
 - Slow the ship and maneuver to provide the most stable platform so firefighters can control damage, fight the fire, and control smoke.
 - Slow ship as much as possible to maximize P-100 pump suction.
 - Notify the engineering control room (EOW) of maneuvering tactics that might prohibit normal casualty control procedures or keep main propulsion machinery online (i.e., restricted maneuvering rules in effect).
 - Notify operational control (OPCON) and vessels in the area.
-

A.4. Engineering Officer (EO)

Assist the EOW in any manner possible during a general emergency.

- Take actions independently in support of EOW firefighting efforts.
 - Assume damage control and firefighting responsibilities from the EOW after a fire is out of control, a leak is uncontrollable, and the machinery space is evacuated.
-

A.5. DCTT/RRT Personnel

Duty damage control training team and rapid response team (DCTT/RRT) provides damage control (DC) training and assist engineering watchstander in evaluating the situation and taking initial actions.

A.6. On-Scene Leader

The on-scene leader is in charge of damage control at the scene. These responsibilities include:

- Ensure fire party members properly don required personal protection.
 - Approve of SCBA activation periods, the number of repair locker leader (RLL) personnel, and firefighter relief coordination.
 - Assemble all assigned personnel.
 - Ensure personnel entering the smoke control zone don an SCBA.
 - Assign personnel to all AFFF and water mist systems.
 - Activate all fixed fire-extinguishing systems when appropriate.
 - Approve of SCBA activation times and number of DCC personnel.
-

A.7. Repair Electrician

The repair electrician electrically isolates the affected space. When directed by EOW, the electrician also:

- Secures ventilation, or sets it to low.
- Assesses damage to electrical and ventilation systems.
- With a passing assessment, re-start ventilation to desmoke the area and test the atmosphere.

A.8. P-100 Pump Team

The P-100 pump team has the following tasks:

- Establishes communications with DCC and RLLs.
- Rig two P-100 pumps on the fantail, in tandem, and connect to the firemain via jumper lines. Upon notification, start P-100 pumps to send emergency firefighting water to the firemain.
- Rig a third P-100 pump on the fo'c'sle for backup.
- Prepare breathing air compressor (BAC).
- Refill SCBA bottles as directed. Ensure the intake is clear of any smoke or exhaust.

A.9. Staging Area, Person-in-Charge

The Person-in-Charge has the following tasks:

- Establishes communications with DCC and RLLs.
 - Assemble non-essential (extra) personnel. Provide relief fire party personnel as requested.
 - Investigate/set topside fire/smoke boundaries and make reports to RLL.
-

Section B: Inport Actions

B.1. Watchstander

Watchstanders take the following actions for a leak or fire in the engine room while inport:

- Report the leak/fire, location, source/cause, and actions taken.
- Sound the alarm and make appropriate pipes.
- Ensure all personnel onboard are accounted for and aware of the situation.
- Secure affected equipment and the source of the leak.
- Secure ventilation and set Zebra around affected area.
- Take initial action to combat the leak/fire.
- If a leak is uncontrollable, fire becomes out of control, or escape threatened:
 - Evacuate the space.
 - Call the local fire department as per the unit's established MOA (an example MOA is in [Cutter and Local Fire Department Memorandum of Agreement \(MOA\) Template](#)).
 - Brief rescue and assistance teams and fire department personnel when they arrive; summarize fire and plant status.
 - OOD directs inport watchstanders and onboard personnel (not in the duty section standby) to assist R&A teams and fire department personnel as direct by the OOD.
 - Secure as much power as possible to isolate the affected space.

B.2. Off-Duty Personnel

When general emergency sounds, off-duty personnel assemble on the pier, or place designated by the OOD, and standby to assist as necessary.

Section C: Communications

C.1. Underway Communications Use standard damage control communications in fighting machinery space fires. Brief the damage control organization on the exact location and cause of the fire, status of plant securing and isolation, and personnel status. If possible, the EOW or space supervisor briefs DCC and they pass the information to others in the damage control organization.

Establish communications as per [Appendix B: Machinery Space Firefighting Communications Plan](#).

The primary source of communication is the 1JV sound-powered phone (SPP) circuit.

The secondary source of communication is a portable hand-held VHF/UHF radio. Provide radios for the bridge, on scene leader, and investigator.

In the event primary and secondary communications are lost, rig emergency communications X40J phone circuit (pumpkin line) on the 02 level to the on scene leader. If portable radios cannot be used, the on-scene leader (OSL) communicates directly with the repair locker via message blanks. If message traffic cannot be maintained, use any available means to maintain communications between the repair party and the repair locker.

NOTE:

Portable radios can act as primary communications for all watch stations underway. Portable radios eliminate the need for the OSL and investigators to write messages. Radios provide a fast and accurate way to communicate between stations.

C.2. Inport Communications The primary mean of communications is portable radios between the watchstander and the OOD. If portable radios cannot be used, the watchstander communicates directly with the OOD via ship phone. If message traffic cannot be maintained, use any available means to maintain communications between the watchstander and the OOD.

NOTE:

To plot and maintain a record of communication, record all reports received in the repair locker on message blanks. Become adept at writing message blanks, a fundamental damage control skill.

Chapter 4: Personnel Protection

Introduction This chapter discusses proper use of personnel protection clothing, equipment, and procedures.

In This Chapter This chapter contains the following sections:

Section	Title	Page
A	Personnel Protection	4-2

Section A: Personnel Protection

A.1. General

The proper use of personal protective clothing, equipment, and procedures reduces the risk of injury. The nozzle man, hose tenders, and attack team leader, each don a firefighter's ensemble (FFE). Repair locker leaders rotate personnel to prevent heat exhaustion and monitor self contained breathing apparatus (SCBA) activation periods. Rotate firefighters from the fire area after a maximum of 30 minutes, or when the SCBA low air alarm sounds. New personnel reuse FFEs.

WARNING:

Per reference (a), Naval Ships' Technical Manual, Chapter 555, Volume 1, paragraph 7.5.10, Reliefs, "In a high-heat-stress-environment, personnel endurance in a firefighter's ensemble may be limited to less than 10 minutes. The maximum time for personnel to function in a firefighter's ensemble is 30 minutes."

A.2. Clothing

The following describes appropriate clothing for personnel during a fire.

A.2.a. Firefighting Ensembles

All attack team members don FFE, which includes:

- Self contained breathing apparatus (SCBA)
- Fire protective gear
- Firefighter's hood
- Damage control helmet
- Firefighter's gloves
- Firefighter's boots

WARNING:

If machinery space is evacuated because of fire, firefighters don protective clothing before reentry.

A.2.b. Fire Retardant Clothing

Personnel not exposed to an immediate threat of injury from flash or flame, do not don fire protective equipment.

A.2.c. Battle Dress

At a minimum, all other personnel use proper battle dress and flash gear.

WARNING:

"Corfam" shoes melt and cause severe foot injuries during fires. Since emergencies happen unexpectedly, do not wear "Corfam" shoes aboard ship, except at the Commanding Officer's discretion.

A.3. SCBA Management

Until a designated GFE certifies the atmosphere safe for reentry without SCBAs, each person entering a smoke control zone or an affected machinery space must don an SCBA. Turn on SCBAs when smoke is present or when directed by the OSL. If relief personnel are not in a smoke control zone or affected machinery space, they should don SCBAs in the standby position. Once relieved firefighters clear the smoke control zone, they remove SCBA masks & open the tops of their FFEs.

WARNING:

All personnel must be trained on how to properly use SCBAs.

A.3.a. SCBA Locations

SCBAs are in the following spaces:

- [tug] 4 are in the main deck passageway.
- [tug] 4 are in the bo's'n hold (2-8-0-Q).
- [barge] 2 are on the crane pedestal in the cargo hold (2-40-0-Q).
- [barge] 4 are in the DC locker (1-3-1-A).

A.3.b. SCBA Spare Bottles

Spare SCBA bottles of compressed air are in the following locations:

- [tug] 8 bottles at bo's'n hold (2-8-0-Q).
- [tug] 14 bottles at DC repair locker (1-48-1-Q).
- [barge] 16 bottles at barge repair locker (1-3-1-A).

The primary change out of SCBA bottles is on the fo'c'sle. The secondary location is on the fantail.

A.3.c. Refilling Empty SCBA Bottles

Refill empty SCBA bottles at:

- [tug] Onboard compressor on the 01 deck, port side, or at a suitable shore facility upon return to port.
- [barge] Compressor in stbd aft quarter.

A.3.d. On-Scene Leader (OSL)

The OSL:

- Inspects firefighters for proper donning and activation of all gear.
- Reports to the repair locker leader those persons donning SCBAs, and their respective activation periods.
- Orders relief of SCBA personnel as necessary.

WARNING:

When 10 minutes remain on SCBAs, the bridge logs SCBA times and notifies the OSL.

A.4. Reliefs

Hose tenders are the primary relief for firefighters. Select additional firefighters on an "as available" basis.

**A.5. Firefighter's
Heat Stress
Prevention**

In fighting major fires, leave the fire area after a maximum of 30 minutes to minimize heat stress and rotate fresh personnel to the fire scene.

Designated first aid qualified individual:

- Continually observes firefighters' physical condition (i.e., movements, flesh tone, speech), monitoring for possible heat exhaustion and heat stroke.
 - Ensures relieved firefighters have room temperature fluid (i.e., water, fluid replenishment drinks, etc.) and energy replacements (i.e., snacks).
 - Provides dry clothing, towels, and blankets for firefighters after they exit a space for relief.
-

A.6. Recovery

Relieved firefighters assemble in the recovery area on the fo'c'sle.

WARNING:

Relieved firefighter must rest for a minimum of 30 minutes before returning to the fire scene.

Chapter 5: Firefighting Systems

Introduction

This chapter discusses firefighting systems and equipment installed onboard the WTGB 140'. To quickly select proper equipment, firefighting personnel should understand each ship's capabilities and limitations.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Water (Firemain System)	5-2
B	Aqueous Film Forming Foam	5-4
C	Water Mist	5-6
D	Carbon Dioxide	5-7
E	Dry Chemical	5-9
F	Choosing the Correct Firefighting Equipment	5-10

Section A: Water (Firemain System)

A.1. Firemain System The firemain system provides water for producing AFFF. AFFF extinguishes ordinary combustible (Class A) fires, major lube oil fires, fuel leak fires, and also cools hot bulkheads in spaces adjacent to a fire. Two fire pumps in the engine room provide pressure to the firemain system. The fire pump capacity is rated at 500 gallons per min with 140-145 pounds per square inch (psi) each.

A.1.a. Fire Pump Protocol

The fire pumps are started from the following locations:

- Engineering control center (ECC) touch screen on the propulsion control panel.
- Port fire pump controller on aft bulkhead 61 above the ballast manifold.
- Starboard local control in the engine room by the aft ladder.

The pumps are on the lower level port (2-50-2) and starboard side (2-50-1) of the engine room below the deck plates.

CAUTION:

Until ship's power is secured, leave fire pumps on during an engine room fire.

CAUTION:

Always keep engine room controllers in remote operation mode.

NOTE:

Fire pumps use ships power. During a main space fire, all power is secured. For this reason, the P-100 is the primary source of direct firefighting water.

A.1.b. Water Fog

If water fog is the primary extinguishing agent instead of AFFF and you use a hose attack method to extinguish a flammable liquid fire, the time to fight the fire might be longer, require more firefighters, and increase fire damage and reflash risk.

**A.2.
ATON Barges
(hulls 102 & 103)**

A single fire pump rates at 250 gallons per minute at 125 psi. Single pumps in the machinery room supplies pressure to the installed firemain system. Keep the firemain system intact so water is available for firefighting, de-watering, cooling, and producing AFFF.

- The installed firemain is the primary source of water for a major lube/fuel oil leak scenario. Use AFFF in conjunction with firefighting water. Installed at the fire stations are in-line eductors that produce foam.
- Start the fire pump using the remote switch in the pump room or the controller above the pump.
- Keep the fire pump on during a main space fire until power is secured to the machinery space.

**A.3.
Tug Fire Pump**

When a barge is coupled to a tug, a jumper hose connects them. If the machinery space loses power, the tug provides fire-fighting water.

**A.4.
P-100 Fire Pump**

During a loss of electrical power to all main fire pumps, P-100 portable fire pumps supply firefighting water to the firemain system. In case of fire, start two P-100 fire pumps in tandem on the fantail and stand by to pressurize the firemain if needed.

**A.4.a.
Pressurizing the
Firemain**

Rig a third pump with an eductor as an emergency egress hose. Connect to the firemain but do not open valves until directed by the RLL. Pump water overboard at a minimum rate through a trigate connected hose. When P-100 pumps are ready to supply water to the firemain inform the RLL. Maintain communications by messenger or radio.

A.4.b. Limitations

The P-100 portable fire pump requires time and expertise to operate. Read the operating instructions, and practice before you need the skill.

A fixed standpipe on the STBD side of pilothouse provides suction for the primary P-100s. To prime the pump faster, use the installed vacuum assist line.

During adverse weather or cutter maneuvering, if a P-100 pump is attached to a suction hose, it might be difficult to keep the hose end submerged.

Section B: Aqueous Film Forming Foam

B.1. Aqueous Film Forming Foam

AFFF is a surfactant produced by mixing water and AFFF concentrate. As the primary agent for space reentry, it is effective on Class B fires, on vapor securing surfaces, and on preventing large scale reflash. AFFF can be applied:

- From a portable AFFF extinguisher.
- As part of an installed 36-gallon AFFF hose reel with vari-nozzle.
- From a fire plug and hose with portable inline eductor and vari-nozzle.
- From the bilge sprinkling system.
- From the P-100 pump using a portable inline eductor.

B.1.a. Portable AFFF Extinguisher

Use portable AFFF extinguishers to fight small alpha & bravo fires of less than 20 square feet. One bottle provides approximately 55-65 seconds of continuous discharge. AFFF extinguishers are nitrogen pressurized. Note that the range drops as pressure decreases.

AFFF extinguishers are found:

- 2 in the engine room.
- 1 in the motor room (4-61-0-E).
- 1 in the galley (1-48-4-D).
- 1 in Aux 1 (2-19-0-E)

B.1.b. AFFF Bladder Tank Proportioning System

The AFFF bladder tank proportioning system injects foam concentrate into the water supply at a certain percentage. Water and foam are supplied and portioned through two orifices.

The water supply simultaneously feeds the ratio controller (venturi-type proportioner) and pressurizes the foam concentrate through an elastomer bladder in the tank separating the foam concentrate from the water.

During foam operation, the water outside the bladder gradually displaces the foam concentrate inside the bladder. The bladder will continue to collapse until the foam supply is exhausted. Shut down the system, drain the tank and refill bladder with foam concentrate.

NOTE: **Foam concentrate cannot be refilled during system operation.**

AFFF tanks can be found at the following locations:

- One 36-gallon AFFF tank with hose reel in Aux 1 (2-19-0-E).
- One 36-gallon AFFF tank with hose reel in vestibule 1-58-1-L, accessible from fantail QAWTD 1-67-1.

B.1.c. Bilge
Sprinkler System

The AFFF bilge sprinkling system is a fixed fire extinguishing system designed to extinguish bilge fires or to vapor secure the bilge by covering the hazard with a blanket of foam. When a major oil leak or Class B fire occurs, start a fire pump and the AFFF bilge sprinkling system. Do not operate the system when the concentrate level is not visible in the tank sight glass. Tank replenishment depends on prompt manning of the AFFF proportioner station.

B.1.d. Hose Line

When extinguishing a Class B fire with a hose line attack, use AFFF. The primary hose line is from one of the 36-gallon AFFF hose reels. The backup hose has an in-line eductor.

B.2. Supplies

AFFF cans are stowed in the following locations.

- 4 cans in Aux 1 (2-19-0-E)
- 8 cans at the AFFF tank (1-52-1-L)
- 4 cans in the engine room (3-32-0-E)
- 8 cans in bo's'n hold (2-8-0-Q).

NOTE:

One five gallon AFFF must have 65 psi to generate foam for approximately 60 seconds.

WARNING:

After laying down a layer of AFFF, be careful if using water fog. The water can wash away the AFFF, possibly leading to the fire restarting.

Section C: Water Mist

C.1. General

The Marioff HI-FOG fire extinguishing system uses water under high pressure, as fine fog (mist). The small droplets provide efficient cooling of the fire and surrounding gases. The high speed of the droplets enables the fog mist to penetrate hot flue gases and reach the combustion source. The system arrangement provides a fog mist suppressant for at least 30 min.

Start the system manually from the panel in ECC or locally at the bottles in the upper motor room. The system discharges automatically unless the sequence is altered manually. It operates even without ships' power.

Water mist is non-toxic, but the nitrogen propellant may displace enough oxygen to be of concern. If water mist is discharged into a space, evacuate personnel and begin space isolation. Personnel reentering to investigate, isolate, or extinguish a fire should don SCBA and FFEs to improve visibility and reduce toxic gases. Since water mist cools and maintains the space below the flash-point temperature of common shipboard fuels and lubricants, re-ignition of the fire during desmoking is minimal.

WARNING:

Nitrogen displaces oxygen, immediate egress is the only sure safety action for personnel in a nitrogen flooded space.

C.2. Activating the System

On the Marioff HI-FOG fire extinguishing system, press M1 (for engine room) or M2 (for paint locker) button to start the system. The M1 or M2 button and the HI-FOG ACTIVATED indicator should light up. The gas pump unit starts immediately.

- If the M1 or M2 indicators do not light up, manually open the appropriate section valve. See the placard at the section valves.
- If the gas-operated pump unit (GPU) does not start after opening the section valve, press the EMERGENCY MANUAL START button.
- If the system still does not start, open the primary gas cylinder solenoid valve on bottle 16 by manually pulling the lever.

C.3. Stopping the System

Press the RESET button for 3 seconds.

- M1 or M2 button light turns off.
- HI-FOG ACTIVATED light turns off.
- Close the main valve on the gas pump unit.

To restart the system after resetting it, manually re-open the main valve on the gas pump unit and press M1 or M2 button.

Section D: Carbon Dioxide

D.1. Carbon Dioxide

Carbon dioxide (CO₂) is an odorless, colorless gas. CO₂ extinguishers work by displacing oxygen. Use CO₂ portable extinguishers primarily on small electrical fires (Class C). CO₂ also has limited effectiveness on small Class A and Class B fires of low heat intensity on a surface area of four square feet or less. A successful attack requires a close approach due to the CO₂ extinguisher's effective range of four to six feet. CO₂ extinguishers are in the following spaces:

- Engine room (3-32-0-E)
 - 15# CO₂ (3-61-2). aft of #2 SSDG
 - 15# CO₂ (3-32-2). port side fwd engine room
 - 15# CO₂ (3-39-1) stbd side fwd engine room
- Motor room (4-61-0-E)
 - 15# CO₂

D.2. CO₂ Extinguisher Locations

QTY	TYPE	DECK	COMPARTMENT	
1	15 lb	1 st	AFFF Passageway	1-52-1-L
2	15 lb	1 st	ECC	1-58-0-C
1	15 lb	2 nd	Aux 1	2-19-0-E
1	15 lb	3 rd	Aux 2	3-19-0-E
1	15 lb	2 nd	Laundry	2-25-2-Q
1	15 lb		Pilot House (stbd side)	
3	15 lb	3 rd	Engine Room	3-32-0-E
1	15 lb	4 th	Passageway (motor room)	4-61-0-E

WARNING:

CO₂ extinguishers displace oxygen. Use with care when in an enclosed space or when discharging more than one extinguisher.

WARNING:

Immediate evacuation is the only sure safety action for personnel in a CO₂ flooded space. CO₂ is absorbed through the skin and is hazardous even if donning SCBA respiratory protection.

D.3.
ATON Barges
(hulls 102 & 103)

The machinery space has a fixed CO₂ flooding system. There are two locations to discharge the CO₂ into the machinery space. One pull station is in the cargo hold just outside the machinery space door and the second is outside the workshop door on the main deck. There are two pull handles at each station. One handle activates the CO₂ flooding system and the second handle opens a cut out valve in the supply line to the machinery space. Pull both handles to release CO₂ into the machinery space. This system has a 30-second time delay to secure ventilation and machinery before CO₂ discharge into the space. This delay also allows personnel within the space to exit before the discharge. Account for all personnel before activating the system.

Section E: Dry Chemical

E.1. Purple-K Purple-K (PKP) is a dry-chemical fire suppression agent that extinguishes a fire by interrupting the chemical chain reaction. PKP comes in either 18 lb or 27 lb portable extinguishers. PKP is very effective on small, isolated Class B pool fires less than 10 square feet and on three-dimensional spray fires. The maximum range for the extinguisher is about 20 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. PKP is not designed for use on a fire that is out of control (unless needed for evacuation) or for reentry. PKP extinguishers are located throughout the vessel.

**E.2. PKP
Extinguisher
Locations**

QTY	TYPE	DECK	COMPARTMENT	
1	18 lb	01	pilot house	01-22-0-C
1	18 lb	01	passageway	01-32-0-L
2	18 lb	main	passageway	1-29-0-L
1	18 lb	main	galley/scullery	1-48-2-Q
1	18 lb	main	AFFF passageway	1-52-1-L
1	27 lb	main	repair party locker	1-48-5-Q
1	18 lb	main	AFFF passageway	1-58-1-L
1	27 lb	2 nd	auxiliary machinery room 1	2-19-0-E
1	18 lb	2 nd	general stores	2-27-0-Q
1	18 lb	2 nd	engineer's workshop	2-19-2-A
1	18 lb	2 nd	passageway	2-76-1-L
2	18 lb	2 nd	miscellaneous stores	2-8-0-Q
1	27 lb	3 rd	auxiliary machinery room 2	3-19-0-E
2	27 lb	3 rd	engine room	3-32-0-E
2	27 lb	4 th	motor room	4-61-0-E

CAUTION:

PKP is corrosive in a moisture-rich environment. Avoid using on electrical equipment if CO₂ is available.

WARNING:

Exercise care when using PKP to avoid breathing difficulties and reduced visibility.

WARNING:

PKP has no cooling effect; therefore, carefully watch for reflash.

Section F: Choosing the Correct Firefighting Equipment

F.1. General

Base the choice of firefighting equipment on:

- Fire classification.
- Fire location.
- Phase of firefighting action (e.g., action against a lube oil/fuel leak, a Class B fire, a Class B fire out of control, or for reentry).
- Flow rate of the flammable liquid released and whether the source can be secured quickly.
- Whether the flow is a spill or spray.
- The extent of the area covered by the spill, spray, or fire.

F.2. Lube Oil Leak

To prevent fire during major lube oil/fuel leak:

- Use portable AFFF extinguisher to wash oil/fuel off machinery and deck plates into the bilge.
 - Use AFFF from bilge sprinkling system to vapor secure the bilge.
 - Use installed 36-gallon AFFF hose reel system to wash oil or fuel from deck plates, bulkheads, and machinery into the bilge.
 - Vapor-secure the hazard with foam blanket.
-

**F.3.
Class B Fire**

Against Class B fires:

- Use portable AFFF or PKP extinguishers on small, confined Class B fires.
- Initial action might not extinguish pool fires that cover an area greater than 10 square feet. However, AFFF or PKP might extinguish or knock down flames of large fires temporarily, allowing more time to stop the oil or fuel source. Be cautious when getting within the effective range of a portable extinguisher.
- Use the AFFF bilge sprinkling system to fight a Class B fires larger than 10 square feet and confined to the bilge.
- Unless immediate action is required to evacuate the space, it is not recommended against large unconfined Class B fires, spraying oil or fuel fires, or when the oil or fuel source cannot be secured quickly. Normally, consider these fires out of control.
- Simultaneously start the installed AFFF bilge sprinklers (for 2-minutes to vapor secure the bilge) and the water mist system, where applicable, to extinguish and cool the fire.

**F.4. Class B Fire
Out of Control**

Against Class B fires out of control:

- Activate the water mist system and evacuate the space.
- Vapor-secure the bilge before reentry using AFFF from bilge sprinkling system.

Firefighting teams use an installed 36-gallon AFFF hose reel. At the discretion of the OSL, the hose team enters with one hose. If using a one hose attack, the backup hose team remains on the fo'c'sle to assist as needed. The hose team enters the space through the forward engine room quick-acting watertight door (QAWTD) 2-32-1.

WARNING:

Personnel can remain in a space during water mist activation, but evacuate initial action personnel as soon as practical. Re-entry personnel require SCBAs due to possible oxygen displacement.

F.5.
ATON Barges
(hulls 102 & 103)

Against Class B fires out of control:

- Activate the CO₂ flooding system after evacuating the space.
- Survey the CO₂ –treated space for effectiveness by checking bulkheads and overheads for heat. Allow at least 30 minutes for the space to cool before re-entry. If CO₂ is not effective, the damage control officer and commanding officer dictate the re-entry time.
- If the CO₂ method does not extinguish the fire, directly attack the fire with the water from the tug (if coupled) or a P-100 pump as the primary source of water.

WARNING:

As soon as firefighting and plant securing efforts allow, personnel in affected spaces obtain and carry an emergency escape breathing device (EEBD). EEBDs are for escape only and not for firefighting purposes.

Chapter 6: Boundaries

Introduction

This chapter discusses the boundaries that prevent the spread of fire or smoke. Isolation of the affected space is necessary to prevent a fire from intensifying from addition of flammable liquids or oxygen and electrical hazards. Before a Class B fire gets out of control, completely isolate the machinery space. Do not restrict firefighting systems, lighting, and ventilation. Once the fire is out of control, secure all systems, with the exception of lighting, if possible, as per reference (b), Damage Control-Engineering Casualty Control, Naval Ships' Technical Manual, Chapter 079, Volume 3.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Space Isolation	6-2
B	Smoke Boundaries	6-4

Section A: Space Isolation

A.1. General Isolate the affected space to confine the fire and designate bulkheads to be checked for heat. These boundaries are generally watertight bulkheads and decks immediately adjacent to the affected space. At a minimum, a fire boundary is fume tight. Sound a general emergency alert to rapidly establish fire boundaries. Set material condition ZEBRA from the affected space outwards.

WARNING: *Set condition ZEBRA, from the affected space moving outward.*

[Appendix C: Damage Control Boundaries, Smoke Control Zones, and Curtains](#), contains a list of designated fire boundaries for machinery spaces. Fittings and closures are listed by number and class.

A.2. Mechanical Isolation Secure or isolate systems, machinery, and tanks that 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 capabilities as soon as possible.

Engineering watchstanders must know how to secure and isolate systems and their locations.

Communicate with DCC. In unaffected areas, protect equipment that maintains propulsion, electrical power and firemain pressure.

CAUTION: **It is important to mechanically isolate fuel, fuel tanks, oil, and air systems close to the fire.**

Secure the following systems as directed by the EO:

- Ventilation
- Air systems
- Hydraulic systems
- Lube oil piping, pumps, and purifier
- Fuel systems
- Lube oil tanks
- Main diesel engines
- Ship service generators
- Boilers
- Bubbler

A.3. Electrical Isolation

After personnel evacuation, secure lighting and power to firefighting equipment. Complete electrical isolation is very difficult due to the number of cables within and transiting any given space. To the greatest extent possible, secure all electrical equipment from outside the affected space at the cutter's breaker panels. The emergency ballast lighting lasts for approximately two hours.

A.4. Mechanical and Electrical Isolation Bills

[Appendix D: Damage Control Boundaries, Smoke Control Zones, and Curtains](#) lists local and remote controls (valves, switchboards, circuit breakers, etc.) for space isolation. Included are the designation, location, function and area served by each control.

NOTE:

Ensure mechanical and electrical isolations are in accordance with the restricted maneuvering doctrine. Please reference specific "restricted maneuvering doctrine."

A.5. Fuel Tanks

Moving fuel to a safe location and removing fuel puts the empty fuel tank at maximum risk to fire. The only action necessary to prevent tank contents from contributing to a machinery space fire is to isolate and secure the fuel system.

CAUTION:

Do not move fuel from the fire area and transfer fuel.

Section B: Smoke Boundaries

- B.1. General** Set smoke boundaries in accordance with [Appendix D: Damage Control Boundaries, Smoke Control Zones, and Curtains](#), then set material condition zebra (starting from the affected space moving outward). Establish smoke boundaries around the affected space to prevent the spread of smoke and provide controlled areas for local firefighting.
- Establish a smoke control zone by closing hatches and doors immediately adjacent to the affected space. Make the smoke control zone a dead air space by securing ventilation. Only personnel with SCBAs enter the smoke control zone. Activate SCBAs when smoke is present or on orders from the OSL.
- To check the spread of smoke, set a second boundary around the smoke control zone and provide a safe area for firefighting personnel without SCBAs. Where accesses must remain open for passage of equipment, hoses, and personnel, use smoke curtains to control the spread of smoke.
-
- B.2. Primary and Secondary** A list of primary and secondary smoke boundaries is in [Appendix D: Damage Control Boundaries, Smoke Control Zones, and Curtains](#).
-
- B.3. Ventilation** Once the casualty is discovered, immediately secure affected space ventilation.
- To provide a dead air space at the entrance to the affected are, secure a smoke control zone ventilation. Smoke control zones for an engine room fire are in [Appendix D: Damage Control Boundaries, Smoke Control Zones, and Curtains](#) .
-

Chapter 7: Major Leaks and Firefighting

Introduction

This chapter discusses major oil or fuel leaks. Any major flammable oil or fuel leak is an immediate fire hazard that must be dealt with quickly. An oil or fuel leak that forms a spray can ignite when it comes in contact with any hot surface or equipment capable of electrical arcing. Small unattended problems (i.e., non-securable drips) might become large problems. Rapidly securing the source and using AFFF to cover liquid surfaces greatly reduce the risk of fire.

In This Chapter

This chapter contains the following sections:

Section	Title	Page
A	Flammable Leak	7-2
B	Class B Firefighting	7-4
C	Class B Fire Contained	7-6
D	Class B Fire Out-of-Control	7-7

Section A: Flammable Leak

**A.1.
Watchstander** Watchstander shoulders EEBD and takes initial action with portable AFFF extinguisher while awaiting a wash down hose for initial action. Wash flammable liquid into bilge and cover with a foam blanket. Stand by with a PKP extinguisher until told to stand down.

**A.2.
Initial actions** Common sense and good judgment dictate when to initiate these actions, but generally wash leaks into the bilge and cover with 1" of foam.

NOTE:

Reference (c), Diesel Engines, Naval Ships' Technical Manual, Chapter 233, paragraph 13.13, provides lube oil or fuel oil leakage guidance.

**A.2.a.
Report the Leak** The person discovering the leak immediately informs the EOW about the affected machinery, the location, and amount of flammable liquid on deck. The EOW then passes this information to the bridge. When in port, the EOW passes this information to the OOD.

**A.2.b.
Bridge/OOD** If there is a flammable liquid leak, sound the alarm, follow machinery space fire doctrine and inform others of the affected machinery, location and amount of flammable liquid on deck.

**A.2.c.
Secure the Source** Stop or isolate the leak as quickly as possible by locally or remotely closing system cutout valves or shutdown controls. Attempts, such as rag wraps and collection with a bucket can control the flow of oil or fuel effectively or deflect it away from hot surfaces. If consistent with the restricted maneuverability doctrine, secure the affected piece of machinery by the quickest means possible.

**A.2.d.
Apply AFFF** Start the fire pumps and the installed AFFF bilge sprinkling system. Use a portable AFFF extinguisher to wash oil from deck plates, bulkheads, and machinery into bilge, or if there is an excessive amount of fuel, use the fixed 36 gallon AFFF system. If using water to flush the oil to the bilge, be careful not to disturb the AFFF blanket in bilge. Reapply AFFF as necessary to maintain blanket coverage.

**A.3. Concurrent
Actions**

As time and personnel permit, the space supervisors or EOW ensures the following:

- Secure operating machinery near the leak to prevent further casualty.
 - Pump contents in the bilge to the oily waste holding tank, or with the permission of the Commanding Officer, pump overboard.
 - When cleaning the oil or fuel spill, place cleanup rags in a suitable container.
 - Standby with a PKP extinguisher.
-

Section B: Class B Firefighting

B.1. Initial actions Complete initial actions quickly; a quick response is critical. Class B fires and smoke spread rapidly and a fire can grow out of control in seconds. The person discovering the fire takes the following initial actions:

B.1.a. Report the Fire Pass information to the EOW on the location of fire and the affected machinery. The EOW then informs the bridge. When in port, the EOW informs the OOD.

B.1.b. Quickly Respond Shoulder EEBD and fight the fire with an AFFF extinguisher until it is extinguished, out of control, or is beyond your capabilities. If the fire is out, stand by until relieved by dressed out fire watch or overhaul team.

B.2. Bridge/OOD For a Class B fire, sound the alarm, follow machinery space fire doctrine and inform others of the affected machinery, location and amount of flammable liquid on deck.

B.3. Size-up the Fire EOW assesses the report and directs watchstanders to either extinguish the fire or evacuate the space. When a fire is being fed by an unsecured fuel source, or threatens firefighting or escape, consider the fire out of control. Always treat atomized or misting flammable liquids as a fire out of control.

WARNING:

Watchstanders or personnel in the engine room lacking adequate breathing and flash/burn protection are likely the ones taking initial action. Therefore, it might be impossible to take initial action without risk of severe personal injuries. However, if the fire is localized and small enough, notify the bridge and attack the fire with appropriate firefighting equipment based on the size and anticipated behavior and route of the fire.

NOTE:

As defined in Machinery Space Firefighting Doctrine for Class Bravo Fires, Instruction 9555.1:
Major oil leak – 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.

NOTE:

Good judgment dictates the course of action.

**B.4.
Secure the
Source**

Stop or isolate the fire's fuel source as quickly as possible by locally or remotely closing system cutout valves or shutdown valves. Securing an engine or other piece of equipment might be the quickest way of reducing or stopping the flow of oil or fuel that is feeding the fire. The mechanical and electrical isolation bills list critical controls including those for the EOW to secure.

**B.5.
Fight the fire**

Fight small Class B fires with portable AFFF/PKP extinguishers, AFFF bilge sprinkler system and/or activate water mist system. Chapters 5 contains information on firefighting systems and on choosing the correct firefighting equipment.

Section C: Class B Fire Contained

C.1. Initial Action	Take initial action, if possible, as described in the previous section.
C.2. Concurrent Actions	<p>The EOW performs the following concurrent actions (assigned per the watch, quarter, and station bill).</p> <ul style="list-style-type: none">• Notify the OOD of the maximum speed available. Take charge of all securing actions on the check sheet and subsequent firefighting actions until you evacuate the space.• Start a fire pump and help with initial actions if needed.• Place both P-100's in immediate standby to supply water to firemain.• Set up third P-100 pump on fo'c'sle.• Conduct initial actions with an AFFF hose or portable extinguishers.• Turn on the AFFF bilge sprinkler system for 2 minutes.
C.2.a. Space Evacuation	<p>Once the EOW decides to evacuate the space, personnel don EEBDs as needed and exit using the nearest safe access. Secure access doors, hatches and scuttles when all personnel are out of the space. Assemble personnel at ECC and remove EEBDs.</p> <p>Ensure the space is evacuated prior to mechanical and electrical isolation.</p>
C.3. Activate Water Mist	For spaces protected by water mist, a soak-time delay for space cool down is not required before reentry. Check water mist system effectiveness by observing changes in smoke color (i.e., black to grey/white) and by checking temperatures of surrounding bulkheads.
C.4. Set Ventilation	<p>During a direct hose-line attack or space reentry, activate the water mist system and have the OSL deem it effective before opening a deck hatch or scuttle. Opening a hatch might vent hot gas and smoke, reduce heat and provide better visibility.</p> <p>If water mist is ineffective, attack fire with the installed bilge sprinkler system until you observe a smoke change.</p>
C.5. Set Boundaries	To prevent the spread of fire and smoke to other parts of the cutter, set smoke and fire boundaries around the affected space. When breaking boundaries to allow passage of people and firefighting equipment, use smoke curtains.

Section D: Class B Fire Out-of-Control

- D.1. Introduction** A Class B fire, especially a flammable liquid spray fire, or a fire with an unsecurable source, might get out of control within seconds. When this happens, evacuate the space and remotely secure mechanical and electrical systems. Combat the fire using installed systems. Then use reentry techniques outlined in [Section E: Reentry](#). When faced with a fire out of control, take the following actions:
-
- D.2. Evacuate the Space** A fire that is not extinguished rapidly generates large volumes of smoke and deadly gases. Evacuate the affected space.
-
- D.3. Mechanical and Electrical Isolation** The commanding officer might choose to not isolate a damaged space or selected equipment due to safety or tactical considerations.
- However, if this is not the case, secure or isolate systems and equipment that are the cause of a fire, have the potential to increase the intensity of a fire, or pose a safety hazard to repair personnel.
- When a space is abandoned due to fire, mechanically and electrically isolate the space to the greatest extent possible.
- The OSL might begin firefighting efforts before completing electrical isolation. Isolate from outside the affected space using installed firefighting systems and emergency isolation systems.
-
- D.4. Evacuate** When evacuating machinery spaces, if time allows and if practical, don emergency escape breathing devices (EEBDs). Secure access doors, hatches and scuttles once all personnel are out of the space. Take muster to account for all personnel. Send report to damage control central when evacuation of the space is complete. The EOW is in charge of firefighting until the space is evacuated and repair parties are manned and ready.
-
- D.5. Establish Communications** Establish communications as per [Chapter 3: Section C: Communications](#). The EOW notifies the bridge when the fire is declared out of control. The OSL briefs hose teams on the location and cause of the fire, personnel status, and plant status.
-

D.6. Contain and Fight the Fire

Take the following actions and report them to the EO:

D.6.a. Water Mist

Activate the water mist system. Water mist protected spaces do not need a cool-down delay before reentry.

Check effectiveness of water mist by observing changes in color of smoke (i.e., black to grey/white) and temperatures of surrounding bulkheads.

D.6.b. AFFF

Continue to man, monitor, and replenish AFFF foam stations. Engineering watchstanders apply an initial foam blanket to the bilges. For a fire in the engine room, activate installed AFFF bilge sprinklers for 2 minutes to extinguish any fire and to vapor secure the bilge. Stop operating the system if the concentrate level in the tank sight glass is not visible.

Installed AFFF system tanks provide enough finished foam to cover the bilges many times over, however, continuously replenish AFFF tanks as the level drops.

D.6.c. Re-entry

The commanding officer grants permission to the OSL before fire team space entry. If installed systems are ineffective and you are waiting for electrical isolation to complete, begin firefighting efforts unless there is serious risk to personnel. See next section for reentry.

Section E: Reentry

E.1. General

Reentry to a machinery space to fight a fire out of control is the most critical part of the firefighting and the most dangerous. Primary functions of a reentry team are:

- Rescue trapped personnel.
- Attack and extinguish the fire.
- Secure fire fuel source.
- Overhaul the affected space (including cooling surfaces and desmoking).

E.2. Reentry Location

Choice of access is at the discretion of the OSL. Primary reentry is from the lowest readily accessible point of reentry to the affected space. Never reenter the affected space through a fire-obstructed access.

WARNING:

When the affected space is reentered, a backdraft explosion or an intensifying fire might occur as oxygen is reintroduced to the space. Firefighters use caution to position themselves to the side of the access when opening the door or scuttle.

E.3. Fight the Fire

If the water mist or AFFF system is ineffective or does not operate, conduct an indirect attack from the 1-52-1 WTH before entry through QAWTD 2-32-1 using installed 36-gallon AFFF hose reel #2 (1-58-1).

Once inside the space, follow standard firefighting procedures. Visibility is likely to be extremely limited.

E.4. Report

Report when the fire is extinguished, when the reflash watch is set, and when the fire is overhauled.

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Chapter 8: Post-Fire Actions

Introduction This chapter discusses post-fire compartment actions.

In This Chapter This chapter contains the following sections:

Section	Title	Page
A	Desmoking	8-2
B	Compartment Overhaul	8-4

Section A: Desmoking

A.1. General After the fire is out, desmoke the space, and post a watch with AFFF hose to extinguish any reigniting fires. The OSL reports to the bridge when the reflash watch is set and again when overhaul is complete.

A.2. Desmoke When a Class B fire is extinguished, combustible gases are still present. Operating electric controllers to start fans might reignite these gases. Leave circuit breakers and other protective devices that tripped automatically during the fire in the tripped position until system damage is assessed.

Examine the electrical distribution system and, if possible, 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 takes longer, but might still be accomplished by using installed ventilation fans for positive pressure from adjacent spaces. Desmoking with the installed ventilation system is less risky when:

- The space has cooled.
- The source of oil or fuel is secured and all oil or fuel has been washed into the bilges.
- No damage has been sustained to the electrical distribution system.

NOTE:

Conduct air change out four times before atmospheric testing.

A.3. Atmospheric Testing Desmoke before testing the atmosphere because combustible gas and oxygen analyzers do not operate reliably when sensors are exposed to excessive moisture, heat, or particulates in the atmosphere. When the space is clear of smoke, test for oxygen, combustible gases, and toxic gases per reference (d), Gas Free Engineering, Naval Ships' Technical Manual, Chapter 074, V3. Contact HSWL SC for assistance with air monitoring and surface wipe sampling before certifying the space as safe for personnel to enter without SCBAs.

A.4. Gas Free Engineers As defined by reference (d), E-5 and above shipboard personnel are authorized to conduct post-fire atmospheric tests for the purpose of certifying a space safe.

**A.5. Thresholds
for Toxic Gases**

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. Threshold limit values (TLVs) are as follows:

- carbon dioxide (CO₂), 5000 ppm TLV or 5% by volume
- carbon monoxide (CO), 50 ppm TLV
- hydrogen chloride, 5 ppm TLV
- hydrogen cyanide, 10 ppm TLV
- chlorine, 0.5 ppm TLV

Conduct tests near the center of the fire and all four corners on each level, high and low, with a minimum of ten test points taken. Use portable exhaust fans and ventilation trunks to remove trapped gases in low portions of compartments.

NOTE:

After you have completed a round of satisfactory test results, consider a compartment “safe.” An “unsatisfactory” test result at any test point requires further ventilation, and retesting at all points.

Section B: Compartment Overhaul

- B.1. Dewater** The OSL determines when water will be removed from the space, with the CO's permission and per standard operating procedures.
- Use P-100 pumps, with the portable or installed eductor (engine room), to remove water contaminated with flammable liquids.
 - Retest for toxic gases after removal of water. Water might trap toxic gases that are released during water removal.
 - Use the fixed bilge system or the P-100 for removing uncontaminated water (i.e., water free of flammable liquids) in spaces other than the engine room.
-
- B.2. Reman** Reman once the space is certified as safe for personnel to reenter without SCBAs.
-
- B.3. Investigate Damage** The EO directs the damage investigation and determines which, if any, equipment and machinery should be restarted.
-
- B.4. Reenergizing Unaffected Systems and Equipment** The EO directs the lineup, starting, and energizing of mechanical and electrical equipment after a detailed damage assessment indicates operations will not endanger personnel or the cutter. Assessment includes retesting the affected space for explosive gases to prevent equipment that could produce a spark or hot surface from causing a fire or explosion. The damage investigation determines which, if any, equipment and machinery to restart.
-

Appendix A: Glossary and Acronyms

1MC	1 Main Circuit or General Announcing System.
Affected space	A space in a major oil spill or fire.
AFFF	Aqueous film forming foam.
BAC	Breathing air compressor.
Backdraft explosion	An explosion that results from combining fresh air with hot flammable fire gases that have reached their auto-ignition temperatures.
Class A fire, ordinary combustibles	Ordinary combustibles such as wood, paper, fabric, and most kinds of trash. Class A fires leave ash.
Class B Fire	Fires whose fuel is flammable or combustible liquid or gas. Class K fires (Cooking oils and fats) are technically a subclass of the flammable liquid/gas class, the special characteristics of these types of fires, namely the higher flash point, are considered important enough to recognize separately.
Class C fire	Fires involving potentially energized electrical equipment. These fires are a hazard to firefighters using conductive agents, as electricity might be conducted from the fire, to the firefighter's body, and then to ground. Once electricity is shut off to the equipment involved, it becomes an ordinary combustible (Class A) fire.
Class D fire	Class D fires consist of combustible metals such as magnesium, potassium, titanium, and zirconium.
CO	Carbon monoxide.
CO₂	Carbon dioxide.
Contained	The oil/fuel leak/spill is controlled and not allowed to spread.

COV	Cut-off valve.
DC	Damage control.
DCC	Damage control central.
DCTT/RRT	Damage control training team and rapid response team.
Desmoking	Ventilation.
Electrical isolation	Used to describe the de-energizing of all electrical equipment in and to the affected space.
EO	Engineering officer.
EOW	Engineer of the Watch.
FFE	Firefighter's ensemble.
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 usually at fire zone bulkheads or watertight subdivisions. Set boundaries over the fire as quickly as possible, since fire tends to spread faster vertically than horizontally. Remove combustibles in contact with fire-exposed decks, bulkheads, and overheads to avoid fire spread. Set smoke boundaries using structure that is at least fume tight. On-scene leader decides when and where to set boundarymen with charged hoses. As much as practicable, minimize the amount of water used to keep a fire boundary cool.
GFE	Gas free engineer.
GPU	Gas-operated pump unit.
HSWL SC	Health, Safety and Work-Life Service Center.
Machinery space	A main machinery or auxiliary machinery space that contains any of the following: installed firefighting systems, oil fired boilers, internal combustion engines, gas turbines, or fuel transfer equipment.

Main space	A machinery space with internal combustion engines, gas turbines, or boilers used for propulsion.
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 cannot be controlled with a rag by a watchstander in a normal round.
Mechanical isolation	Used to describe the securing of all machinery and piping systems in and to the affected space.
OOD	Officer of the deck.
OPCON	Operational control.
OSL	On-scene leader.
Out of control fire	A fire that creates conditions due to heat and smoke that force personnel to abandon the space. Flammable liquid spray fires are automatically considered a Class B fire out of control.
Overhaul	Determine the extent of the fire while extinguishing residual, embedded fires, followed by clean up operations.
PCBs	polychlorinated biphenyls.
QAWTD	Quick-acting watertight door.
Recovery/ triage area	A space designated by DCC for the treatment and recovery of personnel.
Reentry	Used to describe when a fire team reenters an affected space after it has been evacuated.
SCBA	Self-contained breathing apparatus.
Smoke control zone	An enclosed area immediately adjacent an access to the affected space, i.e., between the primary and secondary smoke boundaries.
SSDG	Ship's service diesel generator.

Surfactant	A large group of surface acting compounds that includes detergents, wetting agents, and liquid soaps.
TLV	Threshold limit value.
TTP	Tactics, techniques, and procedures.
Unaffected space	Any space other than the space involved in a major oil leak/spill or fire.
Vapor secure	Establishing a film or foam blanket over flammable liquids to prevent vaporization thereby isolating the fuel source from oxygen and heat.
WQSB	Watch, quarter, and station bill.

Appendix B: Machinery Space Firefighting Communications Plan

Machinery Space Firefighting Communications Plan

ECR (EOW) and Bridge: _____

ECR and Machinery: _____

DCC, Bridge, BDS, and Repair Lockers: _____

DCC and Repair Lockers: _____

OSL and Repair Locker Leader: _____

ECR and watchstander: _____

RPE and Repair Locker Leader: _____

INV and Repair Locker Leader: _____

The P-100 pump team fantail and fo'c'sle: _____

Notes:

- In the event that portable radios cannot be used, the OSL communicates directly with the repair locker via message blanks.
- In the event that message traffic cannot be maintained, use any available means to maintain communications between the repair party and the repair locker.

Machinery Space Firefighting Communications Plan

ECR (EOW) and Bridge: _____

ECR and Machinery: _____

DCC, Bridge, BDS, and Repair Lockers: _____

DCC and Repair Lockers: _____

OSL and Repair Locker Leader: _____

ECR and watchstander: _____

RPE and Repair Locker Leader: _____

INV and Repair Locker Leader: _____

The P-100 pump team fantail and fo'c'sle: _____

Notes:

- In the event that portable radios cannot be used, the OSL communicates directly with the repair locker via message blanks.
- In the event that message traffic cannot be maintained, use any available means to maintain communications between the repair party and the repair locker.

Appendix C: Mechanical and Electrical Isolation

A. Engine Room. Secure the following items when the engine room is evacuated for a fire:

- Secure main diesel engines from any location.
 - ECC switchboard.
 - Engine room stops.
 - Emergency pull stops in passageway, 1-52-1-L.
- Secure ship service diesel generators at emergency shutdowns.
 - ECC switchboard.
 - Engine room stops.
 - Emergency pull stops in passageway, 1-52-1-L.
- Secure bubbler at emergency shutdowns
 - ECC switchboard.
 - Engine room stops.
 - Emergency pull stops in passageway, 1-52-1-L.
- Remote fuel oil cutoff valve (2-FOS-1) to 3-51-4 at frame 48 on the main deck (port side on weather deck).
- Remote fuel oil cutoff valve (1-FOS-1) to 3-51-5 at frame 48 on the main deck (stbd side on weather deck).

B. Auxiliary Machinery Space #2. Secure the following items for a fire in Aux 2.

1. Electrical

Breaker	Location	Supplies
CB L	Eng rm 110 dist panel (2-57-1)	Aux 2 lighting
CB M	Eng rm 110 dist panel (2-57-1)	Aux 2 receptacles
CB M	Aux 1 dist panel (2-31-1)	oily water separator
CB A	Aux 1 dist panel (2-31-1)	#1 fuel oil transfer pump **
CB C	Aux 1 dist panel (2-31-1)	#2 fuel oil transfer pump **
CB G	Aux 1 dist panel (2-31-1)	potable water service pump **
CB J	Aux 1 dist panel (2-31-1)	potable water standby pump **

Note: Alternative method of securing those items marked with ** is to secure breaker 1S-P419 located on the ECC SWBD, which secures the Aux 1 dist panel (2-31-1)

2. Mechanical. No mechanical isolation is required from outside the space.

C. Aft Steering. Secure the following items for a fire in after steering

1. Electrical

Breaker	Location	Supplies
CB F	ECC switchboard	steering gear pump #1
CB H	ECC switchboard	steering gear pump #2
P421-16	ECC 440V panel	steering sump heater #1 & #2
CB N	Eng rm 110V panel (2-57-1)	steering gear room receptacle
CB P	Eng rm 110V panel (2-57-1)	steering gear room lighting
CB S	Eng rm 110V panel (2-57-1)	steering room steam heater
CB R	Eng rm 110V panel (2-57-1)	steering gear room receptacle

2. Mechanical. No mechanical isolation is required from outside the space.

D. 120' ATON Barge (hulls 102 & 103)

- Machinery space. Secure the following items for a fire.
 - Secure the BPU, HPU, and generators from any of these locations.
 - Machinery room stops.
 - Remote pull cables, outside machinery space QAWTD (cargo hold)
 - Fuel oil cutout valves. buoy deck port FWD
 - Electrical isolation shore tie
- Paint locker. Secure the following items for a fire.
 - a. Electrical isolation power panel P-2-39-2, breaker "C"

Appendix D: Damage Control Boundaries, Smoke Control Zones, and Curtains

[Section A: Engine Room Fire \(3-32-0-E\)](#)

[Section B: Auxiliary Space #2 Fire \(3-19-0-E\)](#)

[Section C: Motor Room Fire \(4-61-0-E\)](#)

[Section D: After Steering Fire \(2-80-0-E\)](#)

[Section E: ATON Barge Fire](#)

Section A: Engine Room Fire (3-32-0-E)

A.1. Primary Fire and Smoke Boundaries

- Bulkhead NR 32, forward (Aux 1, laundry flat, engineering shop).
- Bulkhead NR 61, aft (motor room upper and lower).
- Main deck from frame 32 to frame 61 (galley, CPO berthing and head, dry stores, mess deck, repair locker, passageways 1-52-1-L and 1-58-1-L, 1-29-0-L, and stack space, armory, and ward room).
- Hull from frame 32 to frame 61.

NOTE:

FWD of lower level frame 32 are fuel oil tanks.

Other peripheral tanks:

- 2-41-1-F Lube Oil Tank**
- 2-41-2-F Lube Oil Tank**
- 2-45-1-F Day Tank**
- 2-45-2-F Day Tank**
- 4-32-0-F Dirty Oil tank**
- 4-38-0-F**
- 4-40-1 F**
- 4-40-2-F**
- 4-48-0-F Oily Water Tank**

A.2. Secondary Fire and Smoke Boundaries

- Bulkhead NR 19.
- Bulkhead NR 76.
- 01 deck frame 19 to frame 67.
- Hull from frame 19 to frame 32 and from frame 61 to frame 80.

A.3. Smoke Control Zone

- Auxiliary space 1.
- Vestibule (1-52-3-L).

A.4. Smoke Curtain

- Frame 34, 01 deck.
 - Frame 32 main deck passageway.
 - Frame 32 to bridge.
 - Frame 48 aft mess deck
 - Frame 52 passageway
-

Section B: Auxiliary Space #2 Fire (3-19-0-E)

B.1. Primary Fire and Smoke Boundaries

- Bulkhead NR 19.
 - Bulkhead NR 32.
 - 2nd deck from frame 19 to frame 32.
 - Hull from frame 19 to frame 32.
-

B.2. Secondary Fire and Smoke Boundaries

- Bulkhead NR 8.
 - Bulkhead NR 61.
 - Main deck frame 8 to frame 61.
 - Hull from frame 8 to frame 19 and from frame 32 to frame 61.
-

B.3. Smoke Control Zone

- Auxiliary space 1.
 - Anchor handling room.
-

B.4. Smoke Curtain

- Frame 32 main deck passageway.
 - Anchor handling room.
-

Section C: Motor Room Fire (4-61-0-E)

**C.1. Primary
Fire and Smoke
Boundaries**

- Bulkhead NR 61.
 - Bulkhead NR 76.
 - Hull below and beside.
 - Main deck fantail and ECC deck.
-

**C.2. Secondary
Fire and Smoke
Boundaries**

- Bulkhead NR 32.
 - Hull.
-

**C.3. Smoke
Control Zone**

- Passageway (1-58-1-L).
 - After steering, frame 80.
-

**C.4. Smoke
Curtain**

- After steering, frame 80.
-

Section D: After Steering Fire (2-80-0-E)

**D.1. Primary
Fire and Smoke
Boundaries**

- Bulkhead NR 76.
-

**D.2. Secondary
Fire and Smoke
Boundaries**

- Bulkhead NR 61.
-

**D.3. Smoke
Control Zone**

- Passageway 1-58-1-L.
-

**D.4. Smoke
Curtain**

- Passageway 1-58-1-L.
-

Section E: ATON Barge Fire

E.1. Machinery Space

E.1.a. Primary Fire and Smoke Boundaries

- Primary FWD: FWD voids.
 - Secondary FWD: skin of the barge (bow).
 - Primary AFT: forward bulkhead of the cargo hold.
 - Secondary AFT: aft bulkhead of the barge mess deck.
 - STBD: skin of the barge.
 - PORT: skin of the barge.
 - Overhead: port deckhouse, MK workshop, paint locker, DC shop, stbd deckhouse.
-

E.1.b. Smoke Control Zone

- Cargo hold.
 - Barge mess deck.
 - Store keepers' office.
 - MK work shop.
-

E.1.c. Smoke Curtain

- MK shop QAWTD.
 - Barge mess deck QAWTD.
-

E.2. Paint Locker

E.2.a. Primary Fire and Smoke Boundaries

- Primary FWD: skin of the barge (bow).
 - Primary AFT: forward bulkhead of the buoy deck.
 - STBD: DC shop.
 - PORT: port deckhouse.
 - Overhead: barge fo'c'sle.
-

Appendix E: Spaces Requiring Subsections

Due to the unique configuration and responses to fire or major oil leaks in these spaces, each is addressed separately.

- Engine Room (3-32-0-E).
 - Lead acid batteries are 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. Battery acid is extremely corrosive. If the battery leaks acid from a melt down or explosion, the acid could be harmful to the ship and 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. Don SCBAs when firefighting and overhauling fires in the battery space until the entire space has been tested for combustible and toxic gases. During overhaul efforts, cool batteries and dilute spilled acid with water.

- After Steering Compartment (2-80-0-E).
 - The after steering compartment has two accesses:
 - WTH (1-84-1) on the main deck, aft.
 - The WTD (2-76-1) in the motor room via WTH (1-62-1) in the vestibule (entrance to motor room).
 - The steering system has an operating pressure of 1420 psi and storage reservoir of 150 gallons. It has two pumps for operation which can be secured from the Bridge, ECC or the local controller.
 - Fight fire in this space the same as fire in the engine room. An indirect attack through WTH 1-84-1 on the main deck by applying AFFF using installed 36-gallon AFFF hose reel #2 (1-58-1) for foam application. Discharge AFFF into the space to provide an adequate foam blanket to cover the hazard. Once the indirect attack is complete, the firefighting team directly attacks through QAWTD 2-76-1.

- Auxiliary Machinery No. 2 (3-19-0-E).
 - Action for a fuel oil leak is to secure the equipment and immediately report the casualty to the bridge. Secure the equipment. Secure pump and isolate COV of system. Break out PKP extinguisher and stand by for assistance. Obtain EEBD in case space needs to be evacuated.
 - In case of a major spill, secure the space and apply AFFF to the bilge for a minimum of 2 minutes from the fixed AFFF system in passageway (1-52-1-L).
 - If a bravo fire breaks out in this space:
 - Immediately secure equipment, preferable by using electrical or mechanical isolation.
 - Report Class B fire in Aux 2.
 - Secure the compartment.
 - Man AFFF station in passageway 1-52-1-L. With fire pump on line open COVs 1-52-1 (FM supply to AFFF system), 1-53-7 (FM supply to Aux 2 eductor), COV 1-55-7 (AFFF supply to eductor), 1-56-1 (AFFF mixture), and 2-29-1 (in Aux 1) supply to AUX 2 for 2 minutes.
 - The hose team re-enters under direction of the OSL, with permission from the commanding officer. The OSL accesses via QAWTS 2-23-2. Indirect access is through the scuttle, direct access is by opening the hatch. The primary fire station is installed 36-gallon AFFF hose reel #1 (2-31-0), under the ladder in Aux 1. The OSL determines whether to secure electrical power.
 - Place ventilation controller 2-31-1 from supply 01-27-1 in the off position. Place ventilation controller 01-30-2 exhaust from 01-32-2 in the off position.
 - Set a primary smoke boundary at QAWTS 2-22-2 located in Aux 1. Close 2-19-1 vent supply fitting and 2-19-2 vent exhaust fitting. Set secondary boundaries at QAWTD 2-19-1 to bos'n hold, QAWTD 2-32-1 to engine room, and smoke blanket by QAWTS 1-31-1 to passageway 1-29-0-L.
 - Set the primary forward fire boundary at bulkhead 19 in misc stores 4-9-0-A and deck in Aux 1 to be used for top side boundary. The aft boundary is bulkhead 28. Fire station # in Aux 1 is to be used for top side boundary. Fire station #1, 1-22-1 and fire station #2, 1-22-2 on the main deck for bulkhead 19.
 - Immediately aft of BLKD 28 are fuel oil tanks.

- 120' ATON Barges (Hulls 102 & 103):

- Lead acid batteries are 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. Battery acid is extremely corrosive. If the battery leaks acid from a melt down or explosion, the acid could be harmful to the ship and 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. Don SCBAs when firefighting and overhauling fires in the battery space until the entire space has been tested for combustible and toxic gases. During overhaul efforts, cool batteries and dilute spilled acid with water.
 - STBD side outboard the HPU diesel engine.
 - Port side FED of the Generator sets.
 - Mid-ship just forward of the BPU diesel engine.

Lead acid batteries are also in the STBD deckhouse just off the buoy deck. These batteries are for buoy operations. Although most batteries in the space are not ready for service, several batteries might be in the space in preparation for working aids.

- Paint Locker. The paint locker is located FWD on the main deck just off the buoy deck. This space is also protected by a fixed CO₂ system. All safety precautions and procedures mentioned in the Machinery Space Fire Doctrine (MSFD) shall be followed for the activation of the CO₂ flooding system. A fire in this compartment is handled as a Class B fire. In the event that the CO₂ system does not extinguish the fire, AFFF shall be used to extinguish the flammable liquid. All reentry procedures and precautions shall be followed as stated in the MSFD.

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Appendix F: Engine Room 3-32-0-E Underway Checklists

[Section A: Watchstander Duties for Leak/Fire in Engine Room](#)

[Section B: Engineering Control Room \(EOW\) Checklist](#)

[Section C: OOD Checklist](#)

[Section D: EO Checklist](#)

[Section E: RRL/OSL Checklist](#)

Section A: Watchstander Duties for Leak/Fire in Engine Room

A. Major Oil Leak/Fire

- _____ Notify EOW of casualty
- _____ Secure effected equipment: Secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.
- _____ Shoulder EEBDs.
- _____ Break out portable AFFF and PKP extinguishers. Wash oil to bilge using AFFF extinguisher. Fight small, contained fires with PKP/AFFF extinguishers. If there is no immediate danger of a fire, wash large oil leaks to the bilge using the installed 36-gallon AFFF hose reel #2 (1-58-1).
- _____ Maintain AFFF blanket.

B. Class B Fire Out of Control

- _____ Complete checklist for leak/fire.
- _____ Fight the fire using AFFF or portable extinguishers until:
 - _____ The fire is out
 - _____ Relieved by fire party
 - _____ The fire is out of control
- _____ Notify EOW that the fire is out of control.
- _____ Don and activate EEBDs (as needed).
- _____ Evacuate through nearest exit.
- _____ Activate water mist system for engine room.
- _____ Notify EOW of personnel, machinery, firefighting equipment status, and water mist activation time.
- _____ Maintain AFFF blanket on flammable liquid using AFFF bilge sprinkling system.

Section B: Engineering Control Room (EOW) Checklist

A. Major Oil Leak/Fire in Engine Room

_____ Secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.

_____ Notify OOD

- Casualty location
- Equipment affected
- Action taken and max speed available
- Recommend setting general emergency per the machinery space fire doctrine

“Conn – EOW: There is a [class A/B/C fire] or a [major fuel/lube oil leak] in the engine room, compartment 3-32-0-E, [port side/stbd side/centerline] at Frame [#]. I have secured the following equipment [list]. Max speed available is [#] SRPM’s. Recommend setting general emergency per the machinery space fire doctrine.”

_____ Shoulder EEBDs.

_____ Energize fire pumps as required.

_____ Check firemain pressure.

_____ If initial actions are insufficient to vapor secure bilge, energize AFFF bilge sprinkling for initial 2-minute dump.

_____ In the event of a fire in engine room.

- Direct watchstander(s) to take initial action to combat fire.

– or –

- Activate water mist system for engine room.

_____ Mechanically isolate space further by securing other equipment near the casualty.

_____ Electrically isolate space further by securing other equipment near the casualty.

B. Class B Fire Out of Control in Engine Room

- _____ Complete checklist for leak/fire.
- _____ Notify OOD fire is out of control and engine room and is being evacuated.
- _____ If not done previously, activate engine room AFFF bilge sprinkling for an initial 2-minute dump.
start time: _____ end time: _____
- _____ If not done previously, activate water mist system for engine room
start time: _____ end time: _____
- _____ Mechanically isolate space.
- _____ Electrically isolate space.
- _____ Evacuate and make report to EO regarding machinery plant, personnel, and casualty status. Report AFFF bilge sprinkling and water mist system activation times.
- _____ Verify engine room fuel oil remote COVs are closed.
- _____ Lay to WQSB, after passing on complete status of casualty and being properly relieved by the general emergency watch section.

Section C: OOD Checklist

A. Major Oil Leak/Fire in Engine Room

_____ Receive report from EOW.

- Casualty – location of leak/fire
- Equipment – affected
- Action – and max speed available
- Set general emergency as per the machinery space fire doctrine

_____ Sound general alarm.

Pipe: “[Fire, fire, fire] or [major oil leak] in the engine room, compartment 3 -32-0-E, [port side/stbd side/centerline], at frame [#]. All hands set general emergency per the machinery space fire doctrine. Set zebra. Do not set zebra on the firemain.”

_____ Establish communications with DCC. Report manned and ready to DCC.

_____ Notify OPCON.

_____ Slow ship to 5 knots or less (if propulsion is still available).

_____ Maneuver ship to maintain as smooth a ride as possible during response.

_____ Ensure EO reports all stations manned & ready and zebra set,

Pipe: “All stations Manned and Ready, Zebra Set.”

_____ When EOW reports AFFF applied to engine room bilges,

Pipe: “AFFF bilge flooding was activated in engine room at time: _____.”

_____ If EOW reports water mist system activated in engine room,

Pipe: “Water mist system activated in engine room time: _____.”

_____ Record and track SCBA activation time.

B. Class B Fire Out of Control in Engine Room

_____ Ensure checklist for leak/fire is complete.

_____ When EOW reports fire is out of control and engine room is being evacuated,

Pipe (if directed by EO): “The fire in the engine room is out of control. The engine room is being evacuated.”

_____ Ensure EO reports engine room is mechanically and electrically isolated.

Pipe (if directed by EO): “The engine room is mechanically and electrically isolated.”

_____ If not activated previously, ensure EO reports water mist system activation time.

Pipe (if directed by EO): “Water mist system has been activated in the engine room at time: _____.”

_____ Ensure EO reports fire team ordered to reenter engine room.

Pipe (if directed by EO): “The fire team has reentered the engine room at time: _____.”

_____ Ensure EO reports Class B fire is out.

Pipe (if directed by EO): “Class B fire is out in the engine room, reflash watch is set.”

Section D: EO Checklist

A. Major Oil Leak/Fire in Engine Room

_____ Establish communications.

_____ Conn

_____ Pump team

_____ OSL

_____ Investigators

_____ Manned and ready.

_____ Conn

_____ Pump team

_____ OSL

_____ Investigators

_____ Report all stations manned & ready to OOD.

Pipe: "All stations manned and ready."

_____ Verify firemain pressure.

_____ Start plot.

_____ Report initial 2-minute AFFF bilge flooding times to OOD.

start time: _____ end time: _____

Pipe: "AFFF bilge flooding was activated in engine room at time: _____."

_____ If EOW reports, water mist system activated in engine room

start time: _____ end time: _____

Pipe: "Water mist system has been activated in the engine room at time: _____."

_____ Receive and plot reports from OSL.

_____ Zebra set

_____ Fire boundaries set

_____ Smoke boundaries/smoke control zone set

_____ Ventilation secured

_____ Two P-100 pumps rigged in tandem

_____ Report zebra set to OOD.

Pipe: "Zebra is set."

B. Class B Fire Out of Control in Engine Room

_____ Complete checklist for leak/fire.

_____ Receive report from EOW engine room evacuated.

Pipe: "Engine room is evacuated . Make all reports to DCC."

_____ Order AFFF station operator to conduct 2-minute AFFF bilge flooding (if not accomplished by EOW).

start time: _____ end time: _____

_____ If not previously reported, EOW to report, water mist system has been activated in engine room.

Pipe: "Water mist system has been activated in the engine room at time: _____."

_____ Receive reports from EOW.

_____ Secure remote engine room supply fan shutdown and boiler

_____ Close engine room fuel oil remote COVs

_____ Closed engine room fire station COVs

_____ Account for all personnel in watch section

_____ AFFF bilge flooding times

_____ Location of firefighting equipment in engine room

_____ Receive reports of electrical isolation complete.

_____ Receive reports of mechanical isolation complete.

_____ Report engine room is mechanically and electrically isolated.

Pipe: "The engine room is mechanically and electrically isolated."

_____ Verify fire team ready for reentry.

_____ Ensure P-100 rigged for standby on fo'c'sle before re-entry.

_____ SCBA change out station established.

- _____ Request permission from CO to enter.
- _____ Order fire team to reenter engine room.
- _____ Receive reentry time from OSL.
- _____ Report fire team has entered engine room at (time)_____ to OOD.
Pipe: “The fire team has reentered the engine room at time: _____.”
- _____ Receive ‘fire is out’ report.
- _____ Report fire is out to OOD.
Pipe: “Class B fire is out in the engine room, reflash watch is set.”
- _____ Order fire overhaul.
- _____ Order repair locker electrician to investigate for electrical damage.
- _____ Order desmoking.
- _____ Conduct gas free tests.
- _____ Order dewatering.

Section E: RRL/OSL Checklist

A. Major Oil Leak/Fire in Engine Room

- _____ Establish communications with DC central.
- _____ Make reports to DC central.
 - _____ Manned and ready
 - _____ Set zebra
 - _____ Set fire boundaries
 - _____ Set smoke boundaries/smoke control zone
 - _____ Set ventilation
 - _____ Rig two P-100 pumps and connect to firemain
- _____ Check firemain pressure.
- _____ Ensure following positions are filled.
 - _____ OSL
 - _____ ATL
 - _____ #1 Nozzleman
 - _____ #1 Hoseman
 - _____ Plugman
 - _____ Back-up hose nozzleman (as directed)
 - _____ Back-up hose hoseman (as directed)
- _____ Dispatch investigators/report existing conditions to DC central.
- _____ Ensure investigators verify water mist/AFFF stations manned/status of smoke/fire boundaries.
- _____ Wash oil into bilges and cover with a blanket of AFFF to vapor seal.

B. Class B Fire Out of Control in Engine Room

- _____ Complete checklist for leak/fire.
- _____ Verify from EO mechanical and electrical isolation is complete.
- _____ Report fire team manned and ready for reentry.
- _____ Establish SCBA change-out station on fo'c'sle.
- _____ Order fire team to reenter engine room when ordered by EO/DC central.
- _____ Report reentry time to DC central.
- _____ Pass word to DCC when the fire is out and reflash watch is set.
- _____ Initiate post fire actions when ordered by EO/DC central.
- _____ Ensure post fire personnel don and activate SCBA before reentry.
- _____ Overhaul fire
- _____ Repair locker electrician investigate for electrical damage
- _____ Desmoking
- _____ Dewatering
- _____ Atmospheric testing

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Appendix G: Engine Room 3-32-0-E Inport Checklist

[Section A: Inport/Cold Iron Class B Fires](#)

Section A: Inport/Cold Iron Class B Fires

Watchstanders take the following actions in the event a major oil leak or fuel fire occurs in the engine room while inport:

Note: While inport, life comes before property. Take no unnecessary risks inport to combat a fire. Property is replaceable, human life is not.

- _____ (Watchstander) Notify OOD.
 - _____ (Watchstander) Notify/call 911 or other as per memorandum of agreement.
 - _____ (Watchstander) Shoulder EEBD.
 - _____ (OOD) Sound the alarm and muster all personnel on the pier.
 - _____ (Watchstander) Secure equipment/isolate source of the leak.
 - _____ (Watchstander/OOD) Start fire pump.
 - _____ (Watchstander) Wash oil to the bilge with 36-gallon AFFF hose reel #2 (1-58-1).
 - _____ (OOD) Notify fire department as per MOA.
 - _____ (OOD) Notify Sector/Base, commanding officer, XO, EO as per standing orders.
 - _____ (Watchstander) Maintain AFFF blanket on flammable liquid.
 - _____ (Watchstander) If a fire starts, fight with portable extinguishers and AFFF.
 - _____ (Watchstander) If fire becomes out of control, don and activate EEBD.
 - _____ Evacuate through nearest exit.
 - _____ Set zebra to greatest extent possible.
 - _____ Activate water mist.
 - _____ (OOD) Brief rescue and assistance (R&A) teams and the fire department when they arrive, reporting on fire and plant status.
- The commanding officer or direct representative (XO or OOD) makes the decision to use the fire department. Such decisions are difficult to make under the stress of a major fire, so create standing agreements with the local fire department addressing span of control and decision-making procedures.
- _____ Inport watchstanders and onboard personnel not in the duty section standby to assist R&A teams and fire department personnel as directed by the OOD.
 - _____ (Watchstander) Maintain re-flash watch until all flammable liquids are removed from the space and the space declared safe by the EO.

Appendix H: After Steering 2-80-0-E Underway Checklist

[Section A: Person Discovering Leak Duties](#)

[Section B: Command and Control \(OOD\) Checklist](#)

[Section C: OSL/RLL Checklist](#)

Section A: Person Discovering Leak Duties

A. Major Oil Leak in After Steering:

- _____ Notify EOW of casualty.
- _____ Secure affected equipment. Secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.
- _____ Shoulder EEBDs.
- _____ Break out portable AFFF and PKP extinguishers. Wash oil to bilge using AFFF extinguisher. Fight small, contained fires with PKP/AFFF extinguishers. If needed, use installed 36-gallon AFFF hose reel #2 to wash oil into the bilge.
- _____ Maintain AFFF blanket on flammable liquid.

B. Class B Fire in After Steering

- _____ Complete checklist for leak/fire.
- _____ Notify EOW that the fire is out of control.
- _____ Don and activate EEBDs.
- _____ Fight the fire using AFFF or portable extinguishers until
 - _____ The fire is out
 - _____ Relieved by fire party
 - _____ The fire is out of control
- _____ Maintain AFFF blanket on flammable liquid.

Section B: Command and Control (OOD) Checklist

A. Major Oil Leak/Fire in After Steering:

_____ Receive report from EOW or person discovering the leak/fire.

_____ Casualty – location of leak

_____ Equipment – affected

_____ Action – status of machinery

_____ Set the machinery space fire doctrine

_____ Sound general alarm.

Pipe: “[Fire, fire, fire] or [major oil leak] in the after steering compartment 2-80-0-E, [port side/stbd side/centerline], at frame [#]. All hands set general emergency per the machinery space fire doctrine. Set zebra. Do not set zebra on the firemain.”

_____ Establish communications with DCC. Report manned and ready to DCC.

_____ Notify OPCON.

_____ Ensure OSL reports all stations manned & ready/zebra set.

Pipe: “All stations manned and ready, zebra is set.”

_____ Slow ship as much as possible and still maintain steerage.

B. Class B Fire Out of Control:

_____ Complete steps for major lube oil leak/fire above.

_____ When person discovering leak or OSL reports fire is out of control and after steering is being evacuated:

Pipe: “The fire in after steering is out of control. After steering is being evacuated.”

_____ Receive muster reports for all personnel.

_____ Ensure OSL reports after steering gear is mechanically and electrically isolated.

Pipe: “After steering is mechanically and electrically isolated.”

_____ Ensure OSL reports fire team ordered to reenter after steering.

Pipe: “The fire team has reentered after steering at _____ time”

_____ Ensure OSL reports; Class B fire is out.

Pipe: “Class B fire is out in after steering, Reflash watch is set.”

Section C: OSL/RLI Checklist

A. Major Oil Leak/Fire in After Steering:

- _____ Establish communications with DC Central.

- _____ Make reports to DC central.
 - _____ Manned and ready
 - _____ Set zebra
 - _____ Set fire boundaries
 - _____ Set smoke boundaries/smoke control zone
 - _____ Set ventilation

- _____ Check firemain pressure.

- _____ Ensure following positions are filled before re-entry:
 - _____ OSL
 - _____ ATL
 - _____ #1 Nozzleman
 - _____ #1 Hoseman
 - _____ Plugman
 - _____ Back-up hose nozzleman (as directed)
 - _____ Back-up hose hoseman (as directed)

- _____ Dispatch investigators/report existing conditions to DC central.

- _____ Ensure investigators AFFF stations manned/status of smoke/fire boundaries.

- _____ Wash oil into bilges and cover with an AFFF blanket to vapor seal.

B. Class B Fire Out of Control in AFT Steering

- _____ Complete checklist for leak/fire.
- _____ Verify from EO mechanical and electrical isolation is complete.
- _____ Report fire team manned and ready for reentry.
- _____ Establish SCBA change-out station on fo'c'sle.
- _____ Order fire team to reenter when ordered by EO.
- _____ Report reentry time to DC Central.
- _____ Pass word to DCC when the fire is out and reflash watch is set.
- _____ Initiate post fire actions when ordered by EO/DC central.
- _____ Ensure post fire personnel don and activate SCBA before reentry.
 - _____ Overhaul fire
 - _____ Repair locker electrician investigate for electrical damage
 - _____ Desmoking
 - _____ Dewatering
 - _____ Atmospheric testing

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Appendix I: After Steering 2-80-0-E Inport Checklist

[Section A: Inport/Cold Iron Class B Fires:](#)

Section A: Inport/Cold Iron Class B Fires:

Watchstanders take the following actions in the event a major oil leak or fuel fire occurs in the after steering compartment while inport:

Note: While inport, life comes before property. Take no unnecessary risks inport to combat a fire. Property is replaceable, human life is not.

- _____ (Watchstander) Notify OOD.
 - _____ (Watchstander) Notify/call 911 or other as per memorandum of agreement.
 - _____ (Watchstander) Shoulder EEBD.
 - _____ (OOD) Sound the alarm and muster all personnel on the pier.
 - _____ (Watchstander) Secure equipment/isolate source of the leak.
 - _____ (Watchstander/OOD) Start fire pump.
 - _____ (Watchstander) Wash oil to the bilge with 36-gallon AFFF hose reel #2 (1-58-1).
 - _____ (OOD) Notify fire department as per MOA.
 - _____ (OOD) Notify Sector/Base, commanding officer, XO, EO as per standing orders.
 - _____ (Watchstander) Maintain AFFF blanket on flammable liquid.
 - _____ (Watchstander) If a fire starts, fight with portable extinguishers and AFFF.
 - _____ (Watchstander) If fire becomes out of control, don and activate EEBD.
 - _____ Evacuate through nearest exit.
 - _____ Set zebra to greatest extent possible.
 - _____ (OOD) Brief rescue and assistance (R&A) teams and the fire department when they arrive, giving fire and plant status.
- The commanding officer or direct representative (XO or OOD) makes the decision to use the fire department. Such decisions are difficult to make under the stress of a major fire, so create standing agreements with the local fire department addressing span of control and decision-making procedures.
- _____ Inport watchstanders and onboard personnel not in the duty section standby to assist R&A teams and fire department personnel as directed by the OOD.
 - _____ (Watchstander) Maintain re-flash watch until all flammable liquids are removed from the space and the space declared safe by the EO.

Appendix J: Aux Machinery Space 2, 3-19-0-E Underway Checklist

[Section A: Person Discovering Leak Duties](#)

[Section B: Auxiliary Machinery Space Checklist](#)

[Section C: OSL/RLL Checklist](#)

[Section D: EO Checklist](#)

Section A: Person Discovering Leak Duties

A. Major Oil Leak in the Auxiliary Machinery Space:

- _____ Notify EOW of casualty.
- _____ Secure effected equipment: Secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.
- _____ Shoulder EEBDs.
- _____ Break out portable AFFF and PKP extinguishers on scene. Wash oil to bilge using AFFF extinguisher. Fight small, contained fires with PKP/AFFF extinguishers. If needed, fire use installed 36-gallon AFFF hose reel #1 (2-31-0) to wash oil into the bilge.
- _____ Maintain AFFF blanket on flammable liquid.

B. Class B Fire in the Auxiliary Machinery Space:

- _____ Complete checklist for leak/fire.
- _____ Fight the fire using AFFF or portable extinguishers until:
 - _____ The fire is out
 - _____ Relieved by fire party
 - _____ The fire is out of control
- _____ Notify EOW that the fire is out of control.
- _____ Don and activate EEBDs (as needed).
- _____ Evacuate through nearest exit.
- _____ Maintain AFFF blanket on flammable liquid using AFFF bilge sprinkling system.
- _____ Notify EOW of personnel, machinery, and firefighting equipment status.

Section B: Auxiliary Machinery Space Checklist

A. Major Oil Leak/Fire in Auxiliary Machinery Space:

_____ Secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.

_____ Notify OOD.

- Casualty location
- Equipment affected
- Action taken
- Recommend setting general emergency per the machinery space fire doctrine

“Conn – EOW: There is a [class A/B/C fire] or a [major fuel/lube oil leak] in the Auxiliary Machinery Space, compartment 3-19-0-E, [port side/stbd side/centerline] at Frame [#]. I have secured the following equipment [list]. Recommend setting general emergency per the machinery space fire doctrine.”

_____ Shoulder EEBDs.

_____ Energize fire pumps as required.

_____ Check firemain pressure

_____ If initial actions are insufficient to vapor secure bilge, energize AFFF bilge sprinkling for initial 2-minute dump.

_____ In the event of a fire in Auxiliary Machinery Space

- Direct watchstander(s) to take initial action to combat fire

– or –

- Activate AFFF bilge sprinkler system.

_____ Mechanically isolate space further by securing other equipment near the casualty.

_____ Electrically isolate space further by securing other equipment near the casualty.

B. Class B Fire Out of Control:

- _____ Complete checklist for leak/fire.
- _____ Notify OOD fire is out of control and auxiliary machinery space and is being evacuated.
- _____ If not done previously, activate auxiliary machinery space AFFF bilge sprinkling for an initial 2-minute dump.
start time:_____end time:_____
- _____ Mechanically isolate space.
- _____ Electrically isolate space.
- _____ Evacuate and make report to EO regarding machinery plant, personnel, and casualty status. Report AFFF bilge sprinkling and water mist system activation times.
- _____ Lay to WQSB, after passing on complete status of casualty and being properly relieved by the general emergency watch section.

Section C: OSL/RLL Checklist

A. Major Oil Leak/Fire in Auxiliary Machinery Space:

- _____ Establish communications with DC central.
- _____ Make reports to DC central.
 - _____ Manned and ready
 - _____ Set zebra
 - _____ Set fire boundaries
 - _____ Set smoke boundaries/smoke control zone
 - _____ Set ventilation
- _____ Verify/order 2-minute AFFF activation from AFFF station in passageway 1-52-1-L.
- _____ Ensure following positions are filled before re-entry:
 - _____ OSL
 - _____ ATL
 - _____ #1 nozzleman
 - _____ #1 hoseman
 - _____ Plugman
 - _____ Back-up hose nozzleman (as directed)
 - _____ Back-up hose hoseman (as directed)
- _____ Check firemain pressure.
- _____ Verify AFFF on scene.
- _____ Ensure that SCBA persons dressed out properly.
- _____ Wash oil into bilges and cover with an AFFF blanket vapor seal the oil.

B. Class B Fire Out of Control:

- _____ Complete checklist for leak/fire.
- _____ Verify from EO mechanical and electrical isolation is complete.
- _____ Report fire team manned and ready for reentry.
- _____ Establish SCBA change-out station on fo'c'sle.
- _____ Order fire team to reenter when ordered by EO.
- _____ Report reentry time to DC Central.
- _____ Pass word to DCC when the fire is out and reflash watch is set.
- _____ Initiate post fire actions when ordered by EO/DC central.
- _____ Ensure post fire personnel don and activate SCBA before reentry.
 - _____ Overhaul fire
 - _____ Repair locker electrician investigate for electrical damage
 - _____ Desmoking
 - _____ Dewatering
 - _____ Atmospheric testing

Section D: EO Checklist

C. Major Oil Leak/Fire in Auxiliary Machinery Space:

_____ Establish communications.

- _____ Conn
- _____ Pump team
- _____ OSL
- _____ Investigators

_____ Manned and ready.

- _____ Conn
- _____ Pump team
- _____ OSL
- _____ Investigators

_____ Report all stations manned & ready to OOD.

Pipe: "All stations manned and ready."

_____ Verify firemain pressure.

_____ Start plot.

_____ Report initial 2-minute AFFF bilge flooding times to OOD.

start time: _____ end time: _____

Pipe: "AFFF bilge flooding was activated in engine room at time: _____."

_____ Receive and plot reports from OSL.

- _____ Zebra set
- _____ Fire boundaries set
- _____ Smoke boundaries/smoke control zone set
- _____ Ventilation secured
- _____ Two P-100 pumps rigged in tandem

_____ Report zebra set to OOD.

Pipe: "Zebra is set."

D. Class B Fire Out of Control in Auxiliary Machinery Space

- _____ Complete checklist for leak/fire.
- _____ Receive report from EOW auxiliary machinery space evacuated.
- Pipe: "Auxiliary machinery space is evacuated . Make all reports to DCC."***
- _____ Order AFFF station operator to conduct 2-minute AFFF bilge flooding (if not accomplished by EOW)
start time: _____ end time: _____
- _____ Receive reports from EOW.
 - _____ Account for all personnel in watch section
 - _____ AFFF bilge flooding times
 - _____ Location of firefighting equipment in auxiliary machinery space
- _____ Receive reports of electrical isolation complete.
- _____ Receive reports of mechanical isolation complete.
- _____ Report auxiliary machinery space is mechanically and electrically isolated.
- Pipe: "The auxiliary machinery space is mechanically and electrically isolated."***
- _____ Verify fire team ready for reentry.
- _____ Ensure P-100 rigged for standby on fo'c'sle before re-entry.
- _____ Establish SCBA change out station.

_____ Permission from CO to enter.

_____ Order fire team to reenter engine room.

_____ Receive reentry time from OSL.

_____ Report fire team has entered engine room at (time)_____ to OOD.

Pipe: “The fire team has reentered the engine room at time: _____.”

_____ Receive ‘fire is out’ report.

_____ Report fire is out to OOD.

Pipe: “Class B fire is out in the engine room, reflash watch is set.”

_____ Order fire overhaul.

_____ Order repair locker electrician to investigate for electrical damage.

_____ Order desmoking.

_____ Conduct gas free tests.

_____ Order dewatering.

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Appendix K: Aux Machinery Space 2, 3-19-0-E Inport Checklist

[Section A: Inport/Cold Iron Class B Fires](#)

Section A: Inport/Cold Iron Class B Fires

Watchstanders take the following actions in the event a major oil leak or fuel fire occurs in the aux machinery space while inport:

Note: While inport, life comes before property. Take no unnecessary risks inport to combat a fire. Property is replaceable, human life is not.

- _____ (Watchstander) Notify OOD.
 - _____ (Watchstander) Notify/call 911 or other as per memorandum of agreement.
 - _____ (Watchstander) Shoulder EEED.
 - _____ (OOD) Sound the alarm and muster all personnel on the pier.
 - _____ (Watchstander) Secure equipment/isolate source of the leak.
 - _____ (Watchstander/OOD) Start fire pump.
 - _____ (Watchstander) Wash oil to the bilge with 36-gallon AFFF hose reel #1.
 - _____ (OOD) Notify fire department as per MOA.
 - _____ (OOD) Notify Sector/Base, commanding officer, XO, EO as per standing orders.
 - _____ (Watchstander) Maintain AFFF blanket on flammable liquid.
 - _____ (Watchstander) If a fire starts, fight with portable extinguishers and AFFF.
 - _____ (Watchstander) If fire becomes out of control, don and activate EEED.
 - _____ Evacuate through nearest exit.
 - _____ Set zebra to greatest extent possible.
 - _____ (OOD) Brief rescue and assistance (R&A) teams and the fire department when they arrive, giving fire and plant status.
- The commanding officer or direct representative (XO or OOD) makes the decision to use the fire department. Such decisions are difficult to make under the stress of a major fire, so create standing agreements with the local fire department addressing span of control and decision-making procedures.
- _____ Inport watchstanders and onboard personnel not in the duty section standby to assist R&A teams and fire department personnel as directed by the OOD.
 - _____ (Watchstander) Maintain re-flash watch until all flammable liquids are removed from the space and the space declared safe by the EO.

Appendix L: 120' ATON Barge Underway Checklist

[Section A: Person Discovering Leak Duties](#)

[Section B: Command and Control \(OOD\) Checklist](#)

[Section C: OSL/RLL Checklist](#)

Section A: Person Discovering Leak Duties

A. Major Oil Leak on the Barge:

- _____ Notify EOW of casualty.
- _____ Secure affected equipment: secure the source of the leak/fire immediately, consistent with the restricted maneuvering bill. If source cannot be secured, deflect oil to bilge.
- _____ Shoulder EEBDs.
- _____ Break out portable AFFF and PKP extinguishers on scene. Wash oil to bilge using AFFF extinguisher. Fight small, contained fires with PKP/AFFF extinguishers.
- _____ Maintain AFFF blanket on flammable liquid.

B. Class B Fire on the Barge:

- _____ Complete checklist for leak/fire.
- _____ Notify EOW that the fire is out of control.
- _____ Don and activate EEBDs.
- _____ Fight the fire using AFFF or portable extinguishers until:
 - _____ The fire is out
 - _____ Relieved by fire party
 - _____ The fire is out of control
- _____ Maintain AFFF blanket on flammable liquid.

C. Class B Fire out of control on the Barge:

- _____ Notify EOW that a fire is out of control and evacuate space.
- _____ Activate CO₂ when directed.

Section B: Command and Control (OOD) Checklist

A. Major Oil Leak/Fire on the Barge:

_____ Receive report from EOW or person discovering the leak/fire.

_____ Casualty – location of leak

_____ Equipment – affected

_____ Action – status of machinery

_____ Set the machinery space fire doctrine

_____ Sound general alarm.

Pipe: “[Fire, fire, fire] or [major oil leak] on the barge, compartment _____, [port side/stbd side/centerline], at frame [#]. All hands set general emergency per the machinery space fire doctrine. Set zebra. Do not set zebra on the firemain.”

_____ Establish communications with DCC. Report manned and ready to DCC.

_____ Notify OPCON.

_____ Ensure OSL reports all stations manned & ready/zebra set.

Pipe: “All stations manned and ready, zebra is set.”

B. Class B Fire Out of Control:

_____ When person discovering leak or OSL reports fire is out of control and the ATON barge is being evacuated:

Pipe: *“The fire on the barge is out of control. The space is being evacuated.”*

_____ Receive muster reports for all personnel.

_____ Ensure OSL reports ATON barge is mechanically and electrically isolated.

Pipe : *“The _____ space is mechanically and electrically isolated.”*

_____ Activate CO₂ bank (with commanding officer permission) .

Activation/release time _____.

Pipe: *“CO₂ has been released on the barge at _____.(time)”*

_____ Observe color of smoke (black to white/gray) that may be visible from engine room as an indicator of CO₂ effectiveness. Report observation to OSL.

_____ Ensure OSL reports CO₂ is good or CO₂ is bad.

Pipe: *“CO₂ is good.” or “CO₂ is bad.”*

_____ Ensure OSL reports fire team ordered to reenter effected space.

Pipe: *“The fire team has reentered the affected space at _____ time.”*

_____ Ensure OSL reports; Class B fire is out.

Pipe: *“Class B fire on the barge is out, reflash watch is set.”*

Section C: OSL/RLL Checklist

A. Major Oil Leak/Fire on the Barge:

- _____ Establish communications with DC central.
- _____ Make reports to DC central.
 - _____ Manned and ready
 - _____ Set zebra
 - _____ Set fire boundaries
 - _____ Set smoke boundaries/smoke control zone
 - _____ Set ventilation
- _____ Check firemain pressure.
- _____ Ensure following positions are filled before re-entry:
 - _____ OSL
 - _____ ATL
 - _____ #1 Nozzleman
 - _____ #1 Hoseman
 - _____ Plugman
 - _____ Back-up hose nozzleman (as directed)
 - _____ Back-up hose hoseman (as directed)
- _____ Dispatch investigators/report existing conditions to DC central.
- _____ Ensure investigators AFFF stations manned/status of smoke/fire boundaries.
- _____ Wash oil into bilges and cover with an AFFF blanket to vapor seal.

B. Class B Fire Out of Control:

- _____ Complete steps for major lube oil leak/fire above.
- _____ Apply exterior cooling of decks, fire boundaries.
- _____ Verify effectiveness of CO₂ flooding:
 - _____ Color of smoke from black to gray/white
 - _____ Temperature of bulkhead decreasing
 - _____ Inform OOD of CO₂ effectiveness
- _____ Report fire team manned and ready for reentry.
- _____ Conduct a direct attack through the machinery room quick acting watertight door located in the cargo hold using two AFFF hoses. Apply a vapor barrier to the bilges regardless of whether CO₂ was effective. Conduct a secondary attack through the MK shop from the Buoy deck.
- _____ Coordinate SCBA reliefs.
- _____ Report when fire is under control.
- _____ Report when fire is out. _____ (time).
- _____ Initiate post fire actions as per chapter 11.
- _____ Ensure post fire personnel don and activate OBA/SCBA before reentry.
 - _____ Overhaul fire
 - _____ Repair locker electrician investigate for electrical damage
 - _____ Desmoking
 - _____ Dewatering
- _____ Conduct compartment atmospheric testing as per chapter 11.
 - _____ O₂
 - _____ Explosive
 - _____ Toxic

Appendix M: 120' ATON Barge Inport Checklist

[Section A: Inport/Cold Iron Class B Fires](#)
[Section B: Primary and Secondary Fire/Smoke Boundaries,
Smoke Control Zones, and Smoke Curtains](#)

Section A: Inport/Cold Iron Class B Fires

Watchstanders take the following actions in the event a major oil leak or fuel fire occurs on the ATON barge while inport:

Note: While inport, life comes before property. Take no unnecessary risks inport to combat a fire. Property is replaceable, human life is not.

- _____ (Watchstander) Notify OOD.
- _____ (Watchstander) Notify/call 911 or other as per memorandum of agreement.
- _____ (Watchstander) Shoulder EEBD.
- _____ (OOD) Sound the alarm and muster all personnel on the pier.
- _____ (Watchstander) Isolate source of the leak.
- _____ (Watchstander/OOD) Start fire pump.
- _____ (Watchstander) Use AFFF hose to wash oil to the bilge.
- _____ (OOD) Notify Sector/Base, commanding officer, XO, EO.
- _____ (Watchstander) Maintain AFFF blanket on flammable liquid.
- _____ (Watchstander) If a fire breaks out, fight it with AFFF and portable extinguishers..
- _____ Set zebra if possible.
- _____ (OOD) Brief rescue and assistance (R&A) teams and fire department personnel when they arrive, giving fire and plant status.

The commanding officer or direct representative (XO or OOD) makes the decision to use the fire department. Such decisions are difficult to make under the stress of a major fire, so create standing agreements with the local fire department addressing span of control and decision-making procedures.

- _____ Inport watchstanders and onboard personnel not in the duty section standby to assist R&A teams and fire department personnel as directed by the OOD.
- _____ (Watchstander) Maintain re-flash watch until all flammable liquids have been removed from the space and the space declared safe by the EO.

Section B: Primary and Secondary Fire/Smoke Boundaries, Smoke Control Zones, and Smoke Curtains

A. Engine Room Fire (3-32-0-E)

1. Primary fire/smoke boundaries

- Bulkhead NR 32, Forward (Aux 1, Laundry, EM Shop). Note: FWD of lower level frame 32 are F/O tanks
- Bulkhead NR 61, Aft (Motor Room upper and lower)
- Main deck from Frame 32 to Frame 61 (Galley, CPO berthing and head, dry stores, mess deck, repair locker, passageways 1-52-1-L and 1-58-1-L, ECC, storage 1-48-1-A, and stack space)
- Hull from Frame 32 to Frame 61

2. Secondary fire/smoke boundaries

- Bulkhead NR 19
- Bulkhead NR 80
- 01 deck Frame 19 to Frame 67
- Hull from Frame 19 to Frame 32 and from Frame 61 to Frame 80

3. Smoke Control zone

- Auxiliary space I
- Vestibule (1-52-3-L)
- Motor Room

4. Smoke curtains

- Frame 34-01 Deck
- Frame 32-Main Deck passageway
- Mess deck entrances (2)
- Frame 32 to Bridge

B. Auxiliary Space #2 Fire (3-19-0-E)

1. Primary fire/smoke boundaries
 - Bulkhead NR 19
 - Bulkhead NR 32
 - 2 deck from Frame 19 to Frame 32
 - Hull from Frame 19 to Frame 32
2. Secondary fire/smoke boundaries
 - Bulkhead NR 8
 - Bulkhead NR 61
 - Main deck Frame 8 to Frame 61
 - Hull from Frame 8 to Frame 19 and from Frame 32 to Frame 61
3. Smoke Control zone
 - Auxiliary space I
 - Anchor handling room
4. Smoke curtains
 - Frame 32 Main Deck passageway
 - Anchor Handling Room

C. After Steering Fire (2-80-0-E)

1. Primary fire/smoke boundaries
 - Bulkhead NR 76
2. Secondary fire/smoke boundaries
 - Bulkhead NR 61
3. Smoke Control zone
 - Motor Room

D. 120' ATON Barges (Hulls 102 & 103):

1. Machinery Space

- Fire/Smoke Boundaries
 - Secondary FWD: Skin of the barge (bow)
 - Primary FWD:FWD Voids
 - Primary AFT: Forward Bulkhead of the Cargo Hold
 - Secondary AFT: Aft Bulkhead of the Barge Mess Deck
 - STBD: Skin of the Barge
 - PORT: Skin of the Barge
 - Overhead: Port DeckHouse, MK Work Shop, Paint Locker, DC Shop, STBD Deck House
- Smoke Control Zone
 - Cargo Hold
 - Barge Mess Deck
 - Store Keepers Office
 - MK Work Shop
- Smoke Curtains
 - MK Shop QAWTD
 - Barge Mess Deck QAWTD

E. Paint Locker

- Fire/Smoke Boundaries
 - Primary FWD:Skin of the barge (bow)
 - Primary AFT: Forward Bulkhead of the Buoy Deck
 - STBD: DC Shop
 - PORT: Port DeckHouse
 - Overhead: Barge fo'c'sle
- Smoke Control Zone (None)
- Smoke Curtains (None)

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Appendix N: Pressure Measurements

Introduction

A pressure force on any solid surface by liquid or gas does not apply to any single point on that surface. Instead, this force spreads equally along the whole surface. Therefore, pressure force on a surface depends on not only the level of compression of liquid or gas bound by the solid surface, but by the surface area size as well.

The term “pressure” was introduced to measure forces acting on a surface independently of the surface area size. Pressure (p) on any given surface area is a ratio of force (F) acting on a surface area, to the surface area size (S). Pressure is expressed as follows: $p=F\div S$. The metric (SI) unit of pressure is the newton per square meter, called the pascal (Pa). In the United States, we customarily use pound-force per square inch (psi) for most pressure measurements, but use Bar (bar) or millibar for weather

Many techniques and measurement systems exist for measuring pressure (or vacuum). Onboard, we use gauge pressure, which is pressure relative to the local atmospheric pressure (atm). We also use two different measurement systems onboard the WTGB 140'. Some onboard firefighting equipment use psi and others use bar.

- Psi
 - Firepumps/firemains
 - CO₂ bottles
 - ATON barge fixed CO₂ flooding system.
- Bar
 - Marioff HI-FOG water mist system.

Pressure Conversions

0.9869233 atm = 1 bar = 0.1 MPa = 14.50377 psi.

Our onboard gauges are not this exact, so in practice,
1 atm = 1 bar = .1 MPa = 14.5 psi.

If you have a gauge that is reading .5 bar: $.5 \times 14.5 = 7.25$ psi

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Appendix O: Water Mist Oxygen Calculations

Calculation of Safe Oxygen Levels Inside a Compartment After Hi-Fog Watermist Activation											
Component	Length	Width	Height	Compt. Volume (m ³)	N2 Cylinders (pcs)	Oxygen Content (m ³ /21%)	Nitrogen Content (m ³ /78%)	Other Content (m ³ /1%)	Oxygen Content After Discharge (%)	Nitrogen Content (%)	Other Content (%)
BANK 1 BOTTLES START TO DISCHARGE											
Engine Room	13.25	9.85	3.12	407.20	1.00	85.51	317.62	4.07	20.50%	78.50%	1.00%
Engine Room	13.25	9.85	3.12	407.20	2.00	85.51	317.62	4.07	20.02%	78.98%	1.00%
Engine Room	13.25	9.85	3.12	407.20	3.00	85.51	317.62	4.07	19.56%	79.44%	1.00%
Engine Room	13.25	9.85	3.12	407.20	4.00	85.51	317.62	4.07	19.12%	79.88%	1.00%
Engine Room	13.25	9.85	3.12	407.20	5.00	85.51	317.62	4.07	18.70%	80.30%	1.00%
Engine Room	13.25	9.85	3.12	407.20	6.00	85.51	317.62	4.07	18.30%	80.70%	1.00%
Engine Room	13.25	9.85	3.12	407.20	7.00	85.51	317.62	4.07	17.92%	81.08%	1.00%
Engine Room	13.25	9.85	3.12	407.20	8.00	85.51	317.62	4.07	17.55%	81.45%	1.00%
Engine Room	13.25	9.85	3.12	407.20	9.00	85.51	317.62	4.07	17.20%	81.80%	1.00%
Engine Room	13.25	9.85	3.12	407.20	10.00	85.51	317.62	4.07	16.86%	82.14%	1.00%
Engine Room	13.25	9.85	3.12	407.20	11.00	85.51	317.62	4.07	16.53%	82.47%	1.00%
Engine Room	13.25	9.85	3.12	407.20	12.00	85.51	317.62	4.07	16.22%	82.78%	1.00%
Engine Room	13.25	9.85	3.12	407.20	13.00	85.51	317.62	4.07	15.92%	83.08%	1.00%
Engine Room	13.25	9.85	3.12	407.20	14.00	85.51	317.62	4.07	15.63%	83.37%	1.00%
BANK 2 BOTTLES START TO DISCHARGE WHEN NITROGEN IS <70 BAR IN BANK 1											
Engine Room	13.25	9.85	3.12	407.20	15.00	85.51	317.62	4.07	15.35%	83.65%	1.00%
Engine Room	13.25	9.85	3.12	407.20	16.00	85.51	317.62	4.07	15.08%	83.92%	1.00%
Engine Room	13.25	9.85	3.12	407.20	17.00	85.51	317.62	4.07	14.81%	84.19%	1.00%
Engine Room	13.25	9.85	3.12	407.20	18.00	85.51	317.62	4.07	14.56%	84.44%	1.00%
Engine Room	13.25	9.85	3.12	407.20	19.00	85.51	317.62	4.07	14.32%	84.68%	1.00%
Engine Room	13.25	9.85	3.12	407.20	20.00	85.51	317.62	4.07	14.08%	84.92%	1.00%
Engine Room	13.25	9.85	3.12	407.20	21.00	85.51	317.62	4.07	13.85%	85.15%	1.00%
Engine Room	13.25	9.85	3.12	407.20	22.00	85.51	317.62	4.07	13.63%	85.37%	1.00%
Engine Room	13.25	9.85	3.12	407.20	23.00	85.51	317.62	4.07	13.42%	85.58%	1.00%
Engine Room	13.25	9.85	3.12	407.20	24.00	85.51	317.62	4.07	13.21%	85.79%	1.00%
Engine Room	13.25	9.85	3.12	407.20	25.00	85.51	317.62	4.07	13.01%	85.99%	1.00%
Engine Room	13.25	9.85	3.12	407.20	26.00	85.51	317.62	4.07	12.82%	86.18%	1.00%
Engine Room	13.25	9.85	3.12	407.20	27.00	85.51	317.62	4.07	12.63%	86.37%	1.00%
Engine Room	13.25	9.85	3.12	407.20	28.00	85.51	317.62	4.07	12.44%	86.56%	1.00%
N2 Cylinder Volume	50.00	Liters									
N2 Under Pressure	200.00	Bar									
Ref. The State of the Art 1985. Draft Technical Report for Consideration at the ISO/TC 34/SC3, ISO N48 Meeting, October 2 and 3, 1985											
Oxygen content after discharge is calculated: (oxygen content before discharge) / (nitrogen released to enclosure + total volume of the space)											
Nitrogen content after discharge is calculated: (100% - Oxygen content - content of other compounds) / (nitrogen released to enclosure + total volume of the space)											

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