

ANNEX 37I

OPERATION OF FIXED FIREFIGHTING SYSTEMS

Ships are to adapt the procedures on the following pages to reflect the operation of fixed systems:

CO₂/BCF Single and Two Shot System Procedure

ACTIVITY	ACTION
1. Person discovering the fire conducts first aid attack and raises a LOUD VOCAL ALARM (including location). Maintain a continuous, aggressive attack (Attack/Attack BA).	-
2. Crash stop ventilation. Isolate 5" fans and remake breakers (if required). Stop HP air compressors. Start closing down ventilation flaps and compartment accesses. Check HPSW pressure. Start additional HPSW pumps.	DTECH/I/C FCP MEOOW
3. Has the correct pipe been made and repeated? a. Location of fire. b. Muster points for: HFEP/SSEP.	QM/MEOOW
4. Is the door/hatch open or closed?	I/C FCP
5. Have FRS and adjacent ships been informed and assistance requested?	QM
6. Start additional generators and reconfigure the power distribution system as necessary.	DTECH/MEOOW
7. Commence system isolations in accordance with the compartment Kill Cards. In vessels fitted with a 2 shot system, system isolations are not to delay operation of the first shot of CO ₂ /BCF (see Note 1 and Note 2).	DTECH/OOD/PM
8. Establish containment priorities: a. Adjacent compartments. b. Remote (any compartments to which the fire could spread by heat transfer through trunking or systems). c. Magazines - sprays activated? Confirm weapons and ammunition 'cook off times'. d. Establish smoke boundaries and pipe locations. e. Are all keys available for adjacent compartments? f. Conduct full boundary search.	OOD/IBC OOD/IBC OOD/IBC OOD/DTECH/ WEO I/C FCP/OOD/IBC Logs I/C FCP

CO₂/BCF Single and Two Shot System Procedure (Cont'd)

ACTIVITY	ACTION
9. Debrief the person finding the fire: a. What is burning and the precise location? b. Who is still in the compartment? c. Are there any casualties?	I/C FCP/OOD/ IBC
10. If fire is not extinguished by first aid action: a. Emergency Clear Lower Deck/Emergency Stations. b. Account for all personnel - service and civilian. c. Control use of spare hands.	OOD/IBC
11. Pipe SITREP to the Ship's Company.	OOD/IBC
12. Continue to close down ventilation flaps - for CO ₂ systems, one nominated ventilation flap is closed but left unclipped to relieve excess pressure during system operation.	DTECH/IBC
13. Attack BA maintains aggressive attack on fire.	I/C FCP
14. If fire is Significant and Attack BA are beaten back withdraw firefighters, seal compartment and confirm all ventilation flaps are shut.	I/C FCP/ OOD/IBC
15. Authorise operation of gas drench to named compartment (see Note 2). Confirm gas cylinders have discharged their contents. BA to be worn.	OOD/IBC
16. Have the FRS and assistance from adjacent ships arrived? Assess outstanding tasks: a. Are all personnel accounted for, is there a need for search and rescue? b. Has the Re-Entry Team been formed for ships operating a Minimum HFEP system? c. Coordinate FRS and adjacent ships assistance. d. Are there sufficient BA, are charging points available? e. Is the fire fully contained, smoke boundaries effective and TMS established? f. Stability - remove water especially if high in the ship.	OOD/IBC OOD/IBC I/C FCP/ DTECH/IBC DTECH/IBC
For operation of single shot gas systems continue to sub para (25)	

CO₂/BCF Single and Two Shot System Procedure (Cont'd)

ACTIVITY	ACTION
17. Monitor the compartment temperature in accordance with sub para (26) .	OOD/IBC
18. Is the fire considered EXTINGUISHED? - NO - go to sub para (23) .	OOD/IBC
19. Is the fire considered EXTINGUISHED? - YES . Clip remaining flap (CO ₂ system only), consider operation of water/AFFF sprays and monitor temperature (sub para (26) to sub para (28) refers). Crash stop ventilation carry out re-entry procedure using 3 hose/fixed hatch waterwall technique.	IBC
20. Is the fire confirmed EXTINGUISHED by the re-entry team – YES? Re-entry Team to cool down the scene of the fire and place sentry. Carry out smoke clearance.	I/C FCP OOD/IBC
21. Is the fire confirmed EXTINGUISHED by the re-entry team – NO? Re-entry Team attack the fire.	-
22. If Re-entry Team are beaten back or if the fire is not considered extinguished (sub para (18)) re-seal the compartment (for CO ₂ system unclip nominated ventilation flap).	I/C FCP OOD/IBC
23. When compartment confirmed closed down, verified against compartment Kill Cards - authorise second operation of gas drench to named compartment (see Note 1).	OOD/IBC
24. Allow 5 mins to elapse for BCF chemicals/CO ₂ to extinguish the fire. Re-clip nominated ventilation flap (CO ₂ systems only).	OOD/IBC
25. After 5 mins order “ Operate high level water/AFFF sprays ”. Spray compartment for 5 mins to effect cooling (see Note 3 and Note 4).	OOD/IBC
26. Monitor bulkhead temperatures using magnetic/digital thermometers. Prior to making a re-entry confirm that compartment temperature is below 60°C (see Note 4 , Note 5 and Note 6).	OOD/IBC/ I/C Containment
27. Consideration should be given to using the high level water/AFFF sprays for a further 5 mins to cool the compartment before attempting to make a re-entry.	OOD/IBC
28. Crash stop ventilation and authorise a re-entry using 3 hose/fixed hatch waterwall technique.	OOD/IBC
29. Extinguish any remaining fire and secure the compartment.	I/C FCP
30. FIRE EXTINGUISHED. Post sentry, carry out smoke clearance and remove water.	I/C FCP OOD/IBC
31. Quarantine the narrative, take photographs of incident boards and damaged areas as required. Restrict access to affected compartment and commence assessment of machinery damage. Report incident via the Navy Lessons and Incident Management System (NLIMS) (2013 DIN06-023 refers).	OOD/IBC

Notes:

1. Isolations for each space are to be identified on the Kill Card as Primary or Secondary. Primary Isolations are to include all fuel, air, lub oil, 440V and HV systems in the compartment. In most cases it should be possible to make Primary isolations within 10 mins but Secondary isolations may take up to 30 mins to complete. The making of isolations, giving priority to the Primary isolations, must commence as soon as the alarm is raised, however their completion should not delay use of the first shot of the gas drench system. In vessels fitted with a 2 shot system all Primary isolations must, whenever possible, be completed before authorisation of the second shot. In 1 and 2 shot systems all Primary and Secondary isolations must, whenever possible, be completed before authorising a re-entry to the compartment concerned. If for any reason isolations cannot be achieved the OIC must make a risk management decision when to authorise operation of the gas drench system or make a re-entry.

2. Confirm all personnel have been evacuated from the compartment. Before the order **"Operate CO₂/BCF Gas Drench"** is given the OIC is to have given consideration to man below boards and last known location of any missing service or civilian personnel. This process must not unduly delay operation of the gas drench system and the OIC must be prepared to make a risk management decision when authorising operation of a toxic gaseous system. Once the order **"Operate CO₂/BCF Gas Drench"** is given cabinet doors are to be opened as a coordinated action in the process of operating the gas drench. No more than 60 secs is to elapse from opening doors to operating the gas drench system.

3. In ships fitted with common pipework for gas drench and water/AFFF sprays there is a risk that the cooling effect of the expanding gas will cause water trapped in the pipework to freeze. If a sequence of Gas/Water (AFFF)/ Gas is used, a second operation of the gas system may freeze any remaining water and prevent a successful second gas drench. The risk is greatly reduced if a Gas/Gas/Water (AFFF) sequence is used.

4. High level spraying quickly reduces compartment temperatures and minimises heat damage. Most high level spray systems are fitted with non-aspirating nozzles - foam is **NOT** produced when AFFF and water is used. Water spray with AFFF greatly improves the cooling effect by reducing the surface tension of the water thereby increasing the wetted area. 'Water only spraying' does not adversely affect bilge foam introduced through the foam tubes. Excessive spraying of any description will increase equipment damage.

5. Positioning of spray heads varies; therefore spraying will not necessarily cool the machinery space deckhead. Deckhead temperatures may therefore remain high due to latent/trapped heat.

6. During State 3 peacetime incidents, personnel safety is a higher priority and there is no Operational or Safety related requirement to regain the effected compartment as quick as possible, consideration should be given to delaying the re-entry until the compartment temperature has dropped to: ambient temperature **OR** below the open flash point temperature for POL substances within the compartment. In MMS this temperature can be taken as approximately 60°C for F76.



BTM - Single Shot System Procedure

ACTIVITY	ACTION
1. Person discovering the fire conducts first aid attack and raises a LOUD VOCAL ALARM (including location). Maintain a continuous, aggressive attack (Attack/Attack BA are to be deployed if circumstances permit).	-
2. Crash stop ventilation. Isolate 5" fans and remake breakers (if required). Stop HP air compressors. Start closing down ventilation flaps and compartment accesses. Check HPSW pressure. Start additional HPSW pumps.	DTECH/I/C FCP MEOOW
3. Has the correct pipe been made and repeated? a. Location of fire. b. Muster points for: HFEP/SSEP.	QM
4. Is the door/hatch open or closed?	I/C FCP
5. Have FRS and adjacent ships been informed and assistance requested?	QM
6. Start additional generators and reconfigure the power distribution system as necessary.	DTECH/ MEOOW
7. Commence system isolations in accordance with the compartment Kill Cards (see Note 1).	DTECH/ MEOOW/IBC
8. Establish containment priorities: a. Adjacent compartments. b. Remote (any compartment to which the fire could spread by heat transfer through trunking or systems). c. Magazines - sprays activated? Confirm weapon and ammunition 'cook off times'. d. Establish smoke boundaries and pipe locations. e. Are all keys available for adjacent compartments? f. Conduct full boundary search.	OOD/IBC OOD/IBC OOD/IBC DTECH/WEO I/C FCP/ OOD/IBC Logs I/C FCP
9. Debrief the person finding the fire: a. What is burning and the precise location? b. Who is still in the compartment? c. Are there any casualties?	I/C FCP/ OOD/IBC

BTM - Single Shot System Procedure (Cont'd)

ACTIVITY	ACTION
10. If fire is not extinguished by first aid action: a. Emergency Clear Lower Deck/Emergency Stations. b. Account for all personnel - service and civilian. c. Control use of spare hands.	OOD/IBC
11. Pipe SITREP to the Ship's Company.	OOD/IBC
12. Continue to close down ventilation flaps	DTECH/IBC
13. Attack BA maintains aggressive attack on fire.	I/C FCP
14. If fire is significant and Attack BA are beaten back withdraw firefighters, seal compartment and confirm all ventilation flaps are shut.	I/C FCP/OOD/IBC
15. Authorise operation of gas drench to named compartment. Confirm gas cylinders have discharged their contents. BA to be worn (see Note 2).	OOD/IBC
16. Have the FRS and assistance from adjacent ships arrived? Assess outstanding tasks: a. Are all personnel accounted for, is there a need for search and rescue? b. Has the Re-Entry Team been formed for ships operating a Minimum HFEP system? c. Coordinate FRS and adjacent ships assistance. d. Is there sufficient BA, are charging points available? e. Is the fire fully contained; smoke boundaries effective and TMS established? f. Stability - remove water especially if high in the ship.	OOD/IBC OOD/IBC I/C FCP DTECH/IBC
17. Allow at least 5 mins for BTM to chemically extinguish the fire.	OOD/IBC
18. After 5 mins consider ordering " Operate high level water/AFFF sprays ". Spray compartment for 5 mins to effect cooling (see Note 3).	OOD/IBC
19. Monitor bulkhead temperatures using magnetic/digital thermometers. Prior to making a re-entry confirm that compartment temperature is below 60°C (see Note 3 , Note 4 and Note 5).	I/C Containment/ OOD/IBC
20. Consideration must be given to using the high level water/AFFF sprays for a further 5 mins to cool the compartment before attempting to make a re-entry.	OOD/IBC

BTM - Single Shot System Procedure (Cont'd)

ACTIVITY	ACTION
21. Crash stop ventilation and authorise a re-entry using the 3 hose/ fixed hatch waterwall technique.	OOD/IBC
22. Extinguish any remaining fire and secure the compartment.	I/C FCP
23. FIRE EXTINGUISHED. Post sentry, carry out smoke clearance and remove water.	I/C FCP OOD/IBC
24. Quarantine the narrative, take photographs of incident boards and damaged areas as required. Restrict access to affected compartment and commence assessment of machinery damage. Report incident via the Navy Lessons and Incident Management System (NLIMS) (2013 DIN06-023 refers).	OOD/IBC

Notes:

1. Isolations for each space are to be identified on the Kill Card as Primary or Secondary. Primary isolations are to include all fuel, air, lub oil, 440V and HV systems in the compartment. In most cases it should be possible to make Primary isolations within 10 mins but Secondary isolation may take up to 30 mins to complete. The making of isolations, giving priority to the Primary Isolations, must commence as soon as the alarm is raised; however their completion should not delay use of the gas drench system. All Primary and Secondary isolations must, whenever possible, be completed before authorising a re-entry to the compartment concerned. If for any reason isolations cannot be achieved the OIC must make a risk management decision when to authorise a re-entry.

2. Confirm all personnel have been evacuated from the compartment. On the order **“Operate CO₂/BCF/BTM Gas Drench”**, cabinet doors are to be opened as a coordinated action in the process of operating the gas drench. No more than 60 secs is to elapse from opening doors to operating the gas drench system.

3. High level spraying quickly reduces compartment temperatures and minimises heat damage. Most high spray systems are fitted with non-aspirating nozzles - foam is **NOT** produced when AFFF and water is used. Water spray with AFFF greatly improves the cooling effect by reducing the surface tension of the water, thereby increasing the wetted area. ‘Water only spraying’ does not adversely affect bilge foam introduced through the foam tubes. Excessive spraying of any description will increase equipment damage.

4. Positioning of spray heads varies; therefore spraying will not necessarily cool the machinery space deckhead. Deckhead temperatures may therefore remain high due to latent/trapped heat.



5. During State 3 peacetime incidents, personnel safety is a higher priority and there is no Operational or Safety related requirement to regain the effected compartment as quick as possible, consideration should be given to delaying the re-entry until the compartment temperature has dropped to ambient temperature **OR** below the open flash point temperature for POL substances within the compartment. In MMS this temperature can be taken as approximately 60°C for F76.

BTM - Two Shot Systems Procedure

ACTIVITY	ACTION
1. Person discovering the fire conducts first aid attack and raises a LOUD VOCAL ALARM (including location). Maintain a continuous, aggressive attack (Attack/Attack BA are to be deployed if circumstances permit).	-
2. Crash stop ventilation. Isolate 5" fans and remake breakers (if required). Stop HP air compressors. Start closing down ventilation flaps and compartment accesses. Check HPSW pressure. Start additional HPSW pumps.	DTECH/ MEOOW/IBC
3. Has the correct pipe been made and repeated? a. Location of fire. b. Muster points for: HFEP/SSEP.	QM/MEOOW/ HQ1
4. Is the door/hatch open or closed?	I/C FCP
5. If the fire is not extinguished by first aid action authorise operation of gas drench to named compartment. Personnel not wearing BA are to withdraw from the space at the first opportunity, using EEBD if required. The first operation of BTM must not be delayed because personnel are not wearing respirator protection in the affected space (see Note 1). Confirm gas cylinders have discharged their contents. BA to be available.	OOD/IBC/ MEOOW
6. Pipe SITREP over the main broadcast, including location of FCP.	OOD/IBC
7. If fire is not extinguished by first aid action: a. Emergency Clear Lower Deck/Emergency Stations. b. Account for all personnel - service and civilian. c. Control use of spare hands.	OOD/IBC
8. Have FRS and adjacent ships been informed and assistance requested?	QM
9. Start additional generators and re-configure the power distribution system as necessary.	DTECH/MEOOW

BTM - Two Shot Systems Procedure (Cont'd)

ACTIVITY	ACTION
10. Commence system isolations in accordance with the compartment Kill Cards. Closing down is not to delay operation of the first shot of BTM (see Note 2).	DTECH/OOD IBC
11. Establish containment priorities: a. Adjacent compartments. b. Remote (any compartment to which the fire could spread by heat transfer through trunking or systems). c. Magazines - sprays activated? Confirm weapon and ammunition 'cook off times'. d. Establish smoke boundaries and pipe locations. e. Are all keys available for adjacent compartments? f. Conduct full boundary search.	OOD/IBC OOD/IBC OOD/IBC DTECH/OOD/ WEO I/C FCP/ OOD/IBC Logs I/C FCP
12. Debrief the person finding the fire: a. What is burning and the precise location? b. Who is still in the compartment? c. Are there any casualties?	I/C FCP OOD/IBC
13. Continue to close down doors and hatches with the exception of one hatch to allow escape/rescue of firefighters. A hatch waterwall at the nominated hatch is advisable if manpower permits to prevent the escape of smoke/heat/BTM. The rigging of this waterwall must not delay the early use of the first operation of the BTM system.	I/C FCP/ OOD/IBC
14. Personnel fighting the fire will confirm if the fire has been extinguished.	I/C FCP
15. Pipe SITREP over main broadcast.	OOD/IBC
16. Account for all non-BA wearers.	OOD/IBC

BTM - Two Shot Systems Procedure (Cont'd)

ACTIVITY	ACTION
17. Have the FRS and assistance from adjacent ships arrived? Assess outstanding tasks:	OOD/IBC
a. Are all personnel accounted for, is there a need for search and rescue?	OOD/MEO/IBC
b. Has the Re-Entry Team been formed for ships operating a Minimum HFEP system?	
c. Coordinate FRS and adjacent ships assistance.	OOD/IBC
d. Are firefighters in need of reliefs (see Para 2521 and Table 25-2).	
e. Is the fire fully contained; smoke boundaries effective and TMS established?	OOD/IBC
f. Stability - remove water especially if high in the ship.	DTECH/IBC
18. Is the fire considered EXTINGUISHED - YES? Attack BA cool down scene of the fire and place sentry. Carry out smoke clearance.	I/C FCP
19. Is the fire considered EXTINGUISHED? - NO? Attack Party continues to attack the fire.	I/C FCP
20. Prepare for second operation of gas drench system:	OOD/IBC
a. Are all ventilation flaps confirmed shut and Primary isolations completed where practicable? (see Note 2).	DTECH/OOD/IBC
b. Have the Attack Party been beaten back?	I/C FCP
c. Withdraw firefighters, ensuring that the compartment is closed down.	I/C FCP
d. Authorise second operation of gas drench to named compartment.	OOD/IBC
21. Allow at least 5 mins for BTM to chemically extinguish the fire.	OOD/IBC
22. After 5 mins consider order “ Operate high level water/AFFF Sprays ”. Spray compartment to effect cooling (see Note 3 and Note 4).	OOD/IBC
23. Monitor bulkhead temperatures using magnetic/digital thermometers. Prior to making a re-entry confirm that compartment temperature is below 60°C (see Note 4 and Note 5).	OOD/IBC
24. Consideration must be given to using the high level water/AFFF sprays for a further 5 mins to cool the compartment before making a re-entry.	OOD/IBC

BTM - Two Shot Systems Procedure (Cont'd)

ACTIVITY	ACTION
25. Crash stop ventilation and authorise a re-entry using the 3 hose/ fixed hatch waterwall technique.	OOD/IBC
26. Extinguish any remaining fire and secure the compartment.	I/C FCP
27. FIRE EXTINGUISHED. Post sentry, carry out smoke clearance and remove water.	OOD/IBC I/C FCP
28. Quarantine the narrative, take photographs of incident boards and damaged areas as required. Restrict access to affected compartment and commence assessment of machinery damage. Report incident via the Navy Lessons and Incident Management System (NLIMS) (2013 DIN06-023 refers).	OOD/IBC

Notes:

1. *The Attack Party fighting the fire without BA are at risk from the toxic effects of smoke. The BTM introduced into the space is between 5-7% concentration and is not in itself toxic. However, when BTM is in contact with extremely hot surfaces this will add to the toxicity of the smoke. Firefighters without BA are therefore to evacuate the space as soon as the BTM drench alarm sounds. BTM drench cabinet doors are to be opened as a coordinated action in the process of operating the gas drench. No more than 60 secs is to elapse from opening doors to operating the gas drench system.*

2. *Isolations for each space are to be identified on the Kill Card as Primary or Secondary. Primary isolations are to include all fuel, air, lub oil, 440V and HV systems in the compartment. In most cases it should be possible to make Primary isolations within 10 mins but Secondary isolations may take up to 30 mins to complete. The making of isolations, giving priority to the Primary isolations, must commence as soon as the alarm is raised, however their completion must not delay use of the first shot of the gas drench system. All Primary isolations should, whenever possible, be completed before authorisation of the second shot. All Primary and Secondary isolations should, whenever possible, be completed before authorising a re-entry to the compartment concerned. If for any reason isolations cannot be achieved the OIC must make a risk management decision when to authorise operation of the gas drench system or make a re-entry.*

3. *High level spraying quickly reduces compartment temperatures and minimises heat damage. Most high level spray systems are fitted with non-aspirating nozzles - foam is **NOT** produced when AFFF and water is used water spray with AFFF greatly improves the cooling effect by reducing the surface tension of the water, thereby increasing the wetted area. **'Water only spraying'** does not adversely affect bilge foam introduced through the foam tubes. Excessive spraying of any description will increase equipment damage.*





4. *Positioning of spray heads varies; therefore spraying will not necessarily cool the machinery space deckhead. Deckhead temperatures may therefore remain high due to latent/trapped heat.*

5. *During State 3 peacetime incidents, personnel safety is a higher priority and there is no Operational or Safety related requirement to regain the effected compartment as quick as possible, consideration should be given to delaying the re-entry until the compartment temperature has dropped to ambient temperature **OR** below the open flash point temperature for POL substances within the compartment. In MMS this temperature can be taken as approximately 60°C for F76.*