



DORSET & WILTSHIRE FIRE AND RESCUE SERVICE

AS 1 – Firefighting Media – Foam

To be used in conjunction with the [Asset Management Policy Statement](#)

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1 Purpose & Definition

- 1.1 DWFRS currently have seven different foam concentrates in use across the new combined service carried on various vehicles using differing pieces of equipment. The historical foam strategies differed in their approach and also in the manner that it was delivered and applied at operational incidents.
- 1.2 This document is strategically focused and identifies a common solution between both services to simplify our current foam provision and reduce the current expenditure. It recommends the reduction from seven concentrates to three, that match current and planned future vehicle requirements, and includes both Synthetic and Fluroprotein based concentrates. Additionally, there is a recommendation to replace all foam concentrate every 20 years, this has a resultant financial and environmental impact requiring specialist disposal.
- 1.3 This strategy does not include any 'new technology' for firefighting, any organisational changes will be included as required following formal agreement and approval.
- 1.4 The justification to reduce the number of foam products used by the Service is reflected by the manufacturer's ability to produce concentrates that are more effective in dealing with firefighting operations, their commitment to minimise pollution to the environment and the ability to introduce new products which has resulted in the decline in the production of the concentrates we currently use.

2 Recommended foam concentrates

- 2.1 Forexpan: Synthetic based *class A* concentrate currently used across both areas of the service in CAF appliances and Off Road Light Vehicle (OLV's) This concentrate has replaced Ecopol.
- 2.1.1 Niagara: Alcohol Resistant Film-Forming FluroProtein (AR-FFFP) *class B* foam concentrate. The versatility of Niagara enables its used through both a CAF system and through an FB5X using can stock. This concentrate will replace our current concentrates, FP70, FP600 and Alcosel.

2.1.2 Expandol: High expansion foam concentrate used to extinguish and secure flammable hydrocarbon liquid fires.

2.2 Class A Foam compound

2.2.1 **Forexpan** is a synthetic firefighting foam concentrate specially formulated for Class A applications such as wildland fires and structural fires. It is induced at a concentration ratio of 0.5% through the CAF system. [See manufactures data sheets.](#)

2.2.2 Class A CAF capability is provided on seven Dorset based 4 x 4 MAN heavy off road appliances, and one Unimog. In Wiltshire there are five 'B Type' appliances that have CAFS capability and these are generally utilised as '2nd away's.

2.2.3 The capability is provided on the heavy off road appliances as they may be the only appliance that is able to attend certain incidents (off road incidents and/or at times of flooding/snow/ice). They may therefore have to work unsupported for longer than would be expected and may also be working in areas with poor water supplies. The UNIMOG is provided with a cab mounted monitor for use at heath fires, but it can also be used at other incidents where a monitor attack would be effective.

2.2.4 Class A concentrate is also provided on OLVs to make the high pressure fogging system more effective.

2.2.5 A similar system can be utilised by the Ford Rangers located at Westbury and Ludgershall with Class A foam capable of being induced into the water spray.

2.2.6 Class A CAF is primarily provided for the reasons mentioned above, however it is an effective firefighting medium offering many advantages, and as such it should be used whenever these benefits would enable incidents to be resolved effectively (such as; thatch property fires, Heathland firefighting, cooling exposures from radiant heat, Property fires, marine firefighting, high rise and so on.

2.2.7 DWFRS will provide a Class A Foam capability in the following manner:

- Each 4 x 4 Heavy off road appliance is provided with a Godiva Hale CAF system with a 50 litre Class A foam compound tank.
- 1 x Unimog provided with a Godiva Hale CAF system with a 225 litre Class A foam compound tank and 5000 litre water tank.
- A small quantity of 'B Type' appliances are provided with a Godiva Hale CAF system with a 100 litre Class A foam compound tank
- Each OLV in the Dorset area is provided with a 9 litre Class A foam tank to enable Class A foam to be used with the high pressure firefighting pumping systems.
- Historic Wilts CAFS appliances via on-board foam supply

2.3 Class B Foam compound

2.3.1 Niagara is an Alcohol Resistant Film-Forming Fluoroprotein (AR-FFFP) firefighting foam concentrate used for extinguishing and securing both flammable hydrocarbon and polar solvent liquid fires. It is induced at a concentration ratio of 3% with the FB5X and 1% through the CAF system.

- 2.3.2 Within Wiltshire this will be induced into the round the pump proportioner via the foam pick up tube located in the appliance pump bay and delivered via the FB5X. [See manufactures data sheets.](#)
- 2.4 **Class B Foam**
- 2.4.1 DWFRS has adopted a tiered approach to the provision of Class B foam capability.
- 2.4.2 **Level 1** – The capability to extinguish, or secure, small Class B fires such as those encountered at vehicles fires, RTCs and ruptured domestic fuel tanks. Level 1 also includes the capability to apply foam via a BS 336 foam inlet, either using a FB5X or the CAFs nozzle.
- 2.4.2.1 DWFRS will provide a Level 1 capability in the following manner:
- 'B Type' pumping appliances without a CAF system are provided with 2 x 20 litre containers of Class B foam compound and a FB5X foam making branch.
 - All 4x4 Heavy off road pumping appliances are provided with a CAF system capable of applying Class B foam. (With exception of the Heavy off road pumping appliance at Christchurch which is provided with the same equipment as a 'B Type' pumping appliance.)
- 2.4.3 **Level 2** – The capability to extinguish medium Class B fires such as those involving overturned tankers, scrap yards and so on. DWFRS will provide a Level 2 capability in the following manner.
- 2.4.3.1 All 4x4 Heavy off road pumping appliances are provided with a CAF system capable of applying Class B foam (with exception of the MAN at Christchurch which is provided with the same equipment as a 'B Type' pumping appliances.)
- 2.4.3.2 The strategic disposition of 4x4 appliances, and their off road capability, ensures an effective Level 2 Class B capability which assures an attendance currently within the Dorset county boundary in a reasonable timescale. The fact that the Level 2 capability is on 4 x 4 heavy off road appliances means the provision of foam will still be available at times when road conditions are poor. These vehicles have the capability to be used off road for aircraft incidents and the like.
- 2.4.3.3 If required, the foam attack can be augmented by making up for additional 4 x 4 heavy off road appliances and/or making up for the ISU from Poole Fire Station which has additional supplies of Class B foam concentrate.
- 2.4.3.4 Within the Wiltshire area there are no 4x4 appliances but all 'B Types' carry 2 x 20 liter drums of foam and an FB5X, this can be supplemented by bulk foam carried on the OSU's located at Swindon and Salisbury.
- 2.4.4 **Level 3** – The capability to extinguish large Class B fires such as those involving large storage tanks such as those found at storage facilities.
- 2.4.4.1 DWFRS has no dedicated Level 3 provision and will rely on site operators to provide the equipment required for these sites. We will attend and endeavour to offer advice and support.
- 2.4.4.2 For all further technical information please follow the links in the document or see the following Fire Service Manuals:

- [FSM Vol 1 Firefighting Foam – Technical](#)
- [FSM Vol 2 Firefighting Foam](#)
- [NOG Fires and Firefighting](#).

2.5 High expansion foam compound

- 2.5.1 Expandol is a high expansion firefighting foam concentrate used for extinguishing and securing flammable hydrocarbon liquid fires. It is induced at concentration ratios between 1 - 6% with the high expansion foam generator. [See manufactures data sheets](#).

2.6 High expansion foam

- 2.6.1 High expansion foam capability is provided on the ISU at Poole Fire and on the OSU at Swindon in order to provide a safe and effective means to extinguish compartment fires, such as those involving ships holds, industrial warehouses and building basements.
- 2.6.2 DWFRS will provide a High Expansion Foam capability in the following manner.
- 2.6.3 The ISU at Poole is provided with a high expansion foam generator and 500 litres of foam compound
- 2.6.4 The OSU at Swindon is provided with a high expansion foam Generator and 150 litres of foam compound.

3 Responsibilities

3.1 Operational Members of Staff

- 3.1.1 Various items of foam producing equipment are available across DWFRS. Members of staff should be familiar and competent with the systems they are required to operate.
- 3.1.2 Foam can be used at any operational incident where its use is necessary to resolve the incident safely and effectively. However, Fire control must always be informed when foam is in use, giving details of which foam is in use and how much foam concentrate has entered any water course.
- 3.1.3 Foam run off must be contained wherever possible using suitable equipment such as that provided in the EA grab packs. Should this not be adequate, further EA equipment is available from either an OSU, ESU or ISU.
- 3.1.4 The land owner is responsible for safe disposal of any foam residue after an incident. In the case of foam on the highway, the responsibility sits with the local authority.

3.2 Incident Commander (IC)

- 3.2.1 Incident commanders should be aware of the foam capabilities that DWFRS has provided, as outlined in [2.1](#), [2.1.1](#) and [2.1.2](#), and chose the most appropriate option in the circumstances.

- 3.2.2 Incident commanders must ensure that all environmental issues are considered and that any necessary actions required to protect the environment are put in place.
- 3.2.3 Further information can be obtained by following the links in this document or from the relevant manuals listed in [2.1, 2.1.1 and 2.1.2](#).
- 3.3 **Service Control Centre**
- 3.3.1 Inform the Environment Agency when foam has been used passing on the following information:
- which foam compound is in use
 - how much has been used
 - if any has entered any watercourses.
- 3.3.2 Inform the Water/Foam officer when a CAF or foam line is in use.
- 3.3.3 The accuracy of the information will depend on the information received from the incident commander.
- 3.4 **Water and Foam Officer**
- Ensure sufficient foam stocks are maintained and supplied to appliances when required.
 - Represent DWFRS on the National and Regional CFOA CAF/Foam user groups
 - Provide a point of contact for all operational staff for the provision of advice and support in the use of foam
 - Ensure good relations are maintained with Wessex Water and that DWFRS has access to their treatment Sites for foam training
 - Provide support in the use of foam at operational incidents when required.
 - Provide support to the training department utilising knowledge as a foam instructor as and when required.
- 3.5 **Training**
- 3.5.1 **Training venues**
- 3.5.1.1 Foam can be used at any operational incident where its use is necessary to resolve the incident safely and effectively. However, for training purposes foam can only be used at approved sites following approved practices.
- 3.5.1.2 The full list of approved sites and the associated practices can be found in the [Memorandum of Understanding \(MOU\)](#).
- 3.6 **Acquisition of competence**
- 3.6.1 **Class A Foam**
- 3.6.1.1 Class A CAF on 4x 4 Heavy off road and 'B Type appliance.

3.6.1.2 All staff must attend an initial DWFRS External CAF course at the appropriate training centre before using Class A CAF externally.

3.6.1.3 All staff must attend a DWFRS Internal CAF course at the appropriate training centre before using Class A CAF internally.

3.6.2 Class A Foam on OLVs

3.6.2.1 All staff must be familiarised in the use of Class A concentrate on the OLV before using it. Familiarisation training will be delivered when an OLV is issued to a station and then cascaded by station staff to any new staff joining after that point in time.

3.6.2.2 This will be the same for the appliances at Westbury and Ludgershall where a similar system is operated.

3.6.3 Class B Foam

- Class B Level 1 - All staff will be trained in the use of Level 1 (FB5X) during basic training.
- Class B Level 2 - All staff must attend a DWFRS External CAF course at the appropriate training centre before using Class B CAF externally. All staff must attend the DWFRS Internal CAF course at the appropriate training centre before using Class B CAF internally.
- Class B Level 3 - DWFRS has no dedicated Level 3 capability and as such there will no specific training. DWFRS will maintain close links with sites that might require a Level 3 capability through local liaison.

4 Additional Information

4.1 Class A

4.1.1 Class A CAF capability is predicated on the following information.

4.1.2 The class A compressed air system is able to deliver **1,700** litres of compressed air foam per minute consuming **200** litres of water and **1** litre of foam compound (**201** litres of foam solution). The water tank (**1,750** usable litres) will last **8.75** minutes producing **15,312** litres of compressed air foam. Once a water supply has been established the **50** litres of foam in the on board tank can produce **84,000** litres of compressed air foam.

4.2 Class B Foam

4.2.1 Level 1

4.2.1.1 Level 1 capability is predicated on the following information.

4.2.1.2 The selected application rate is **5** litres of foam solution per minute per square metre for **15** minutes¹ and the planning assumption is that the spill may extend to an area of circa **50** square metres so this requires **250** litres per minute of foam solution for **15** minutes.

¹ HMSO, 2000, Fire Service Manual. Volume 1. Fire Service Technology, Equipment and Media pp77

- 4.2.1.3 The FB5X working at 5.5 bar branch pressure will produce 2,270 litres per minute of finished foam, consuming 230 litres of water and 7 litres of foam compound, (237 litres of foam solution per minute). 2 x 20 litre drums of 3% foam compound will last circa 6 minutes producing a total of 13,620 litres of finished foam. The water tank (1750 usable litres) will last circa 7.6 minutes.
- 4.2.1.4 The use of foam for critical purposes, such as lifesaving, is most likely at road traffic collisions. Incident data for road traffic collisions attracting an attendance of two pumping appliances or more from 2010, 2011 and 2012 reveals that the initial attendance pumping appliance was supported by a second pumping appliance within 10 minutes at 96% of incidents, and within 5 minutes at 84% of incidents. Given this the supporting pumping appliance will be in attendance before the foam compound is exhausted on 84% of occasions and more than likely on 96% of occasions.
- 4.2.1.5 Therefore 1 appliance can maintain an attack for 6 minutes and a second can keep the attack going for a further 6 minutes giving 12 minutes overall which is sufficiently close to the planning assumption to be effective for any envisaged Level 1 incident
- 4.2.2 **Level 2**
- 4.2.2.1 Level 2 capabilities are predicated on the following information.
- 4.3 **Class B CAF**
- 4.3.1 Capability is predicated on the following information
- 4.3.1.1 The Class B compressed air foam system is able to deliver 1,700 litres of compressed air foam per minute, consuming 200 litres of water and 2 litres of foam compound (202 litres of foam solution). The water tank (1,750 usable litres) will last 8.75 minutes producing 15,312 litres of compressed air foam. Once a water supply has been established the 50 litres of foam in the on board tank can produce 42,000 litres of compressed air foam and would last circa 25 minutes.
- 4.3.1.2 There are 4 x 4 Heavy off road appliances with CAF at Stn's 03, 07, 10, 12, 16, 18 and 19. This totals 7 appliances capable of delivering Class B compressed air foam strategically, providing an effective class B attack within the Dorset County Border.
- 4.3.1.3 Each 4 x 4 Heavy off road appliance can produce 42,000 litres of compressed air foam giving a total capability of 336,000 litres.
- 4.3.1.4 If further foam concentrate is required, it can be either:
- Taken from any DWFRS B Type appliance and used to top up the foam tank, or
 - Make up for further 4 x 4 heavy off road appliances.
- 4.3.1.5 A further 400 litres of foam compound will be provided on the ISU giving an additional capability of 336,000 litres making a total of 672,000 litres. Further compound will be kept in stock at Poole Fire Station to act as a general reserve for replacing foam as and when it is used. A minimum stock level of 400 litres will be maintained ensuring this can be mobilised to larger incidents if required. This will

provide a further capability of 336,000 litres making an overall total of 1,008,000 litres.

- 4.3.1.6 It must however be noted that if large volumes of B class foam concentrate are required at a large incident, then the capability to deliver finished foam at a consistent application rate from 20 litre container stock will fail. In this instance it is advisable that the foam concentrate should be delivered from an IBC type container.
- 4.3.1.7 The ISU at Poole carries 3,000 litres of Class B 3% fluoroprotein foam and is capable of producing circa 1,000,000 litres of finished foam. Therefore, the Level 2 CAF strategy is able to produce the same finished foam capability as the ISU with circa one third of the quantity of foam compound. The strategy is able to mobilise a foam capability more effectively due to the strategic disposition of Heavy Off road MANs as opposed to a single ISU at Poole.
- 4.3.1.8 The OSU's at Swindon and Salisbury also carry a similar quantity of Class B 3% fluoroprotein foam.

4.4 High Expansion Foam

- 4.4.1 As the High Expansion Foam is carried on the ISU and OSU's, only staff based on those Stations will be trained in its use. This training will be delivered by the Station management team.
- 4.4.2 High expansion capability is predicated on the following information.
- 4.4.3 Poole Harbour Master (Dorset) has confirmed that the largest vessel DWFRS is likely to have to fill is the car decks of a roll on roll off ferry, at a length of 195 metres and a width of 26 metres. The space would need to fill to a height of 3 metres to ensure any fire was extinguished. This would require 15,210 cubic metres of high expansion foam. Using 1 high expansion foam generator it would take 81 minutes and require 368 litres of foam compound. To make allowances for burn back and wastage it seems that a stock of 500 litres of high expansion foam compound is appropriate (20 x 25 litre cans or 25 x 20 liter cans).

4.5 Maintenance of competence

- 4.5.1 Operational staff must maintain their competencies in the use of foam and foam making equipment.
- 4.5.2 The competencies and their associated frequencies have been entered into the Competency management systems and are listed within the following Section 4.6.

4.6 Competencies (frequency)

4.6.1 CAF (Class A and B)

- 4.6.1.1 (6 monthly for stations with CAF) Demonstrate the ability to:
 - Operate the pump to supply class A CAF (including correct flushing technique)
 - Operate the pump to supply class B CAF (including correct flushing technique)
 - Explain the safety requirements to observe when operating the pump to supply CAF
 - Operate the branch to supply class A CAF

- Operate the branch to supply class B CAF
- Explain the safety/environmental requirements to observe when using CAF branches
- Explain the benefits of class A CAF and when it should be used
- Explain the benefits of class B CAF and when it should be used

4.6.2 **FB5X (Class B)**

4.6.2.1 (6 monthly for all) Demonstrate the ability to:

- Operate the pump to supply class B fluoroprotein foam
- Explain the safety requirements to observe when operating the pump to supply class B fluoroprotein foam
- Operate the FB5X to supply class B fluoroprotein foam
- Explain the safety/environmental requirements to observe when using class B fluoroprotein foam
- Explain the benefits of class B fluoroprotein foam and when it should be used

4.6.3 **High expansion (High expansion)**

4.6.3.1 (6 monthly for Poole) Demonstrate the ability to:

- Operate the pump to supply high expansion foam
- Explain the safety requirements to observe when operating the pump to supply high expansion foam
- Operate the high expansion foam generator to supply high expansion foam
- Explain the safety/environmental requirements to observe when using high expansion foam
- Explain the benefits of using high expansion foam and when it should be used

5 **Environmental Considerations**

5.1 Please see the information detailed within [NOG Environmental Protection](#)

6 **Monitoring & Assurance**

6.1 **Procedure Management**

6.1.1 To make sure effective monitoring of this policy any deficiencies identified must be via the operational effectiveness database.

6.1.2 This will enable the organisation to learn from experience and to make improvements where necessary.

7 **Document Reference**

7.1 **Forms to complete**

Relevant Competency Management System

7.2 **Document References**

[FSM Vol 1 Firefighting Foam – Technical](#)

[FSM Vol 2 Firefighting Foam](#)

[FSM Vol 1 Physics and Chemistry for Firefighters](#)

[FSM Vol 2 Petrochemical Incidents](#)

[NOG Fires and Firefighting](#)

[Operational Guidance – NFSP OA 42 – Foam Officer](#)

7.3 Supporting Information

[Memorandum of Understanding \(MOU\) between Dorset and Wiltshire Fire and Rescue Service and Wessex Water](#)

[Expandol Safety Data Sheet](#)

[Forexpan Safety Data Sheet](#)

[Niagara C6 Safety Data Sheet](#)

8 Document Management

Policy Statement Reference: [Asset Management](#)

Owner	Review Date	Author	Status
██████████	01/12/2020	██████████	Published

8.1 Version Control:

Version	Page & Par Ref	Date	Changes Made	Authorised By
V3.0	Entire Document	01/04/2020	Updated links within Relevant Document section to point from BrigadeHQ3 to http://pandp.dwfire.org.uk . No other changes made.	██████████
V2.0	Page 1 & 11	26/06/2018	Updated Policy reference in accordance to new framework.	██████████
V1.0	Page 1 & 11 / Section 7.2	05/12/2017	Updated numbering from original AS 5 to AS 1 as well as updated links to FSM	██████████ ██████████ ██████████
V0.3	Page 5, Section 2.4.4.2 and Section 6.2	29/11/2017	Added document links to section 6.2 and links to a NOG within the body of the procedure, section 2	██████████ ██████████
V0.2	Various Sections of the document	02/08/2017	Clarification on links and link development	██████████ ██████████
V0.1	Entire Document	26/07/2017	Document Creation	██████████

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