

# NORTH WHATCOM FIRE AND RESCUE

## FIRE DISTRICT POLICY

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<b>Number:</b>	<b>0900.0308.00</b>	<b>Date:</b>	<b>10/21/10</b>
<b>Area:</b>	<b>Emergency Readiness and Response/Operations</b>	<b>Page:</b>	<b>1 of 8</b>
<b>Subject:</b>	<b>Compressed Air Foam System Operation</b>	<b>Approved:</b>	

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### 1.0 General

Compressed Air Foam Systems (CAFS) is a new technology that facilitates more efficient use of water during fire suppression efforts. CAFS when used and applied properly enables the firefighter to extinguish a fire quickly and has the properties that enable the firefighter to apply an insulating barrier for protection of exposures. CAFS should be considered another “tool” for a firefighter’s tool box and should be used based on fire conditions and the experience of fire personnel.

### 2.0 Purpose

It is the purpose of this policy to identify when and where to use Compressed Air Foam, and to outline the proper procedure for CAFS application. It further is the purpose of this policy to identify the proper care and maintenance of CAFS.

### 3.0 Scope:

This policy applies to all Operational and Maintenance personnel.

### 4.0 Policy:

#### 4.1 Definitions:

- 4.1.1 *Compressed Air Foam System (CAFS)* – a system consisting of a balanced volume of compressed air injected into the foam solution while it is still in the piping of the apparatus with the foam solution and air proceeding through the hose lines which provides the mechanical agitation forming air bubbles which when produced enhance a firefighter’s capabilities of water by increasing the surface area of water, thereby increasing the steam conversion to allow for greater heat absorption.
- 4.1.2 *Class A Foam Concentrate* – a synthetic detergent that affects the physical properties of water thereby enhancing water’s ability to extinguish a fire. Foam concentrate when mixed with water reduces the surface tension of water enabling it to penetrate Class A materials more effectively.
- 4.1.3 *Foam Solution* – A solution created when 0.1% or greater foam concentrate is added to water.

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- 4.1.4 *Compressed Air Foam* – a proportioned mixture of foam concentrate, compressed air and water that under the correct proportions forms a foam substance of which the consistency can range from a “thin milk white solution” to a thick “shaving cream” solution.
- 4.1.5 *Wet Foam* – a foam created by increasing the amount of water introduced into the foam solution yielding a wet, “milk like” solution with a rapid drain time. Wet foam is high in water content and will provide greater protection against thermal insult.
- 4.1.6 *Dry Foam* – a foam created by decreasing the amount of water introduced into the foam solution where the foam created has the appearance of “shaving cream”. Dry foam has a much slower drain time and is most desirable for pre-treating and/or protecting exposures. Dry foam will cling to vertical surfaces and remain in place longer and act as an insulation blanket against thermal exposure.

*Note: Compressed Air Foam when used in the form of “dry foam” will not provide adequate thermal protection to crews who are attempting to fight structure fires from offensive, interior positions.*

### 4.2 **Policy Statement – Use of Compressed Air Foam on Class A Fires**

- 4.2.1 CAFS shall be considered the primary extinguishing agent when combating all Class A type fires (brush, debris, vehicles, agricultural products and recycled) materials, unless there are indicators that the use of CAFS may cause harm to personnel, and/or cause harm to the environment.
- 4.2.2 Unless otherwise specified, the first arriving suppression apparatus company officer shall make the decision to use CAFS based on his/her initial “size-up”, training, and experience.
- 4.2.3 Consideration when using CAFS should be given at the beginning of the attack to initiate a brief, well placed exterior attack on the structure fire prior to making entry. Doing so enables:
- Personnel to assemble the proper staffing as required.

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- A quick and effective rapid knockdown from a safe distance with one or two firefighters minimizing damage using limited water, thus favorably impacting interior conditions.

4.2.4 Class A foams shall not be used when the fire is located within one hundred-fifty feet of any live stream or other live body of water and/or when the solution could come into contact with such steams or other bodies of water.

4.2.5 Only Class A foam concentrate shall be from the apparatus foam cell. Class B foam concentrate shall not be placed in the apparatus foam cell as severe damage to the foam system can occur.

4.2.6 The use of CAFS on large commercial structures where significant thermal columns are present should be restricted to exposure protection tactics and not applied directly to the main body of the fire. Attempts should be made to direct CAFS streams to the perimeter section of the fire and slowly work towards the main body of the fire.

4.3 **Policy statement – Application of Compressed Air Foam for an Offensive Interior Structural Attack:**

4.3.1 Only wet foam shall be used when conducting offensive interior structural firefighting.

4.3.2 Application method shall be determined and identified by the company officer after assessing conditions upon arrival.

4.3.3 When conducting a structural interior offensive fire attack the company officer prior to entering the structure, shall assess the fire environment and conditions before making a decision as to the use of CAFS. When making the assessment for the use of CAFS, the company officer shall consider:

- Amount of fire involvement and the need for firefighter thermal protection.
- The location of the fire and the materials burning
- The potential for collateral damage from water should CAFS not be used.

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- The type of water supply (tender vs. hydrant) and amount of water available.
- Available staffing

4.3.4 When implementing an offensive interior attack (offensive mode) the following operating procedures shall be followed:

- Minimum recommended flows for 1 3/4" hand lines are 100 gpm and 125 psi of compressed air with Class A concentrate proportioned at 0.3%
- CAFS foam nozzles shall be either a smooth bore, quarter turn ball valve with a 1 3/8" water way and no smaller than a 15/16 detachable tip, or other approved nozzle.
- Minimum flows for 2 1/2" lines shall be 150 gpm and 125 psi. Flows will be at 0.3% concentrate and 100 psi through CAFS capable nozzle.

4.3.5 For pre-flashover conditions an application of foam should begin prior to crews being forced to the floor by heat.

4.3.6 For post flashover conditions the application should include painting all surfaces including the floor and contents utilizing a box pattern for extinguishment and cooling.

#### 4.4 **Policy Statement – Use of Compressed Air Foam for RIT Operations:**

4.4.1 RIT operations will be conducted in accordance with RIT operations as defined by fire district policy.

4.4.2 Hand lines being used by RIT personnel for firefighter rescue shall be water only hand lines and shall not be compressed air foam charged.

#### 4.5 **Policy Statement - Application of Compressed Air Foam for an Defensive Exterior Structural Attack:**

4.5.1 Exterior structural applications (defensive mode) of CAFS can be made effectively without pushing the fire due to the use of solid streams and the effectiveness of the foal.

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4.5.2 Crews shall begin the application of foam from a safe distance outside the collapse zone.

4.5.3 The most effective attack using CAFS on a structural fire is “Transitional Attack” moving from the exterior to an offensive interior attack as conditions allow.

- Use wet, to very wet foam to penetrate through the thermal column.
- Flow rates shall match the building and fire conditions (Big Fire = Big Foam)

4.6 **Policy Statement – Application of Compressed Air Foam for Standpipe Operations:**

4.6.1 CAFS can be used effectively in dry standpipes.

4.6.2 Operating pressures and flow rates for dry standpipes shall be the same as used for ground level attack lines.

4.6.3 CAFS shall not be used for wet standpipes due to the fact that the standing column of water will dilute the initial foam, and because compressible agents will not easily lift the column of water.

4.7 **Policy Statement – Application of Compressed Air Foam for Vehicle Fires:**

4.7.1 CAFS application for a vehicle fire shall be a two-step process.

4.7.2 Initial attack on a vehicle fire shall consist of 1 ¾” CAFS hand line from a safe distance to initiate rapid knockdown.

4.7.3 Minimum operations shall be 1 ¾” hand lines at 100 gpm flow and 125 psi of compressed air with Class A concentrate proportioned at 0.3%.

4.7.4 Once knockdown has occurred, firefighters should approach the vehicle and extinguish the using various selected nozzle settings as desired. Minimum operating pressures and flow rates should remain the same as for initial attack.

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4.8 **Policy Statement – Application of Compressed Air Foam for Wild land and/or natural Vegetation Fires:**

4.8.1 Direct attack wild land application will use compressed air foam streams for better reach and penetration.

- The primary goal of initial attack shall be to stop the progression of the fire by suppressing the perimeter lines of the fire first.
- CAFS streams shall be used to knock down intense fire behavior on the perimeter of the fire first, followed by ensuring containment of the perimeter.
- Secondary to securing the perimeter, CAFS should be used in various nozzle configurations to blanket smoldering area, wet burned area, and reduce smoke generation.

4.8.2 Indirect Attack wild land application will use modified compressed air foam streams for better wetting and increasing insulating properties:

- Use “wet foam” for pretreatment of fuels in the path of an oncoming wild fire. This will saturate dry fuels allowing for increased evaporation rates.
- If time permits, go back over pretreated fuels with a second application of “drier foam” to insulate fuels and to create fire breaks, and/or fire control lines.
- The decision to apply wet and/or drier foam shall be determined on fuel type and fuel load, the weather conditions, staffing, and fire behavior.

4.8.3 Using CAFS for interface operations creates the advantage over the use of straight water, extending capability of water and personnel, creating foam lines and barriers, raising fuels moisture of wild land and structural fuels, and coating existing structures with an insulating, protective layer of foam.

4.8.4 Wild land fire suppression in the urban interface requires protection structures from oncoming wild land fire. Urban interface protection will be accomplished using a two-step process.

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- First application of CAFS to an exposed structure shall be done with a wet foam application using a 0.3% foam concentrate proportion.
- Second application on the same structure shall be accomplished by creating a second layer of dry foam using a 0.3 to 0.8% proportioned foam concentrate.

### 4.9 Policy Statement – Foam Purchase and Storage

- 4.9.1 Class A foam concentrate shall be purchased in drum quantities to reduce the chance of Class B concentrate being inadvertently introduced into a Class A foam cell.
- Class A concentrate should be purchased in containers larger than five (5) gallon containers.
  - Class B concentrate shall be purchased in containers with capacity no larger than five (5) gallons.
- 4.9.2 Class A concentrate shall be stored at each fire station where CAFS equipped fire apparatus are housed, in an area clearly identified for Class A concentrate.
- The Class A concentrate storage area shall be identified with a placard minimum of six (6) letters that states “CLASS A FOAM CONCENTRATE”.
  - Only Class A concentrate will be stored in this area.
- 4.9.3 All containers, carboys, drums, etc. shall be clearly marked indicating that Class A or Class B concentrate is contained in that container.
- 4.9.4 Class A foam concentrate does have a Material Safety Data Sheet (MSDS), and all firefighters shall familiarize themselves with the information on the MSDS.
- 4.9.5 In addition, the MSDS sheet appropriate for foams being carried on, and/or used shall be carried on each apparatus carrying such foam concentrate.
- 4.9.6 Firefighters shall exercise caution to ensure all safeguards recommended by the foam concentrate manufacture are followed.

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4.9.7 The level of Class A foam concentrate in the foam cell shall be checked as part of the daily apparatus check. Foam concentrate shall be added to the cell whenever the quantity level indicates three quarters ( $\frac{3}{4}$ ) of a tank or less.

4.9.8 Class A concentrate is fairly corrosive and care must be used when filling foam cells to ensure cells are not overfilled. If spills occur, the concentrate shall be diluted and removed from the spill area in accordance with manufacturer's recommendations.

4.9.9 Firefighters shall ensure that filling and flushing the full system and any associated spill, is accomplished in an area where dilution can occur safely and without harming the environment.

4.10 **Policy Statement – Maintenance of CAFS Systems and Associated Apparatus:**

4.10.1 Firefighters shall, on a weekly basis, place a nozzle on a foam discharge port and flush CAFS through that line for sixty (60) seconds using a 0.1% proportioned concentrate.

4.10.2 Firefighters shall, on a monthly basis, visually check the level of compressor oil by looking through glass sight level gauge.

- If sight level gauge indicates the oil quantity is below one-half, maintenance personnel shall be notified.

4.9.3 Firefighters shall, on a monthly basis, operate the CAFS air compressor for a minimum to twenty minutes to bring the compressor operating temperature into normal operating range.

Approved: \_\_\_\_\_

Board Chair, Board of Fire Commissioners  
North Whatcom Fire and Rescue

Date: \_\_\_\_\_

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