Division 06 Fire and Rescue Operations

Chapter 16– Fire Fighting Foam

March 2009

POLICY

To establish standard operational guidelines in the use of Class B fire fighting foam agents at emergency incidents and establish standard operational guidelines and ensure the availability of fire fighting foam agents when required at emergency incidents. This General Order does not discuss the use or application of Class A fire fighting foams.

DEFINITIONS

AFFF - Aqueous Film Forming Foam – fire fighting agent used to provide vapor suppression, smothering and cooling for flammable or combustible liquid fires where the liquid is a non-polar liquid (i.e., will not mix with water).

AR-AFFF – Alcohol Resistant Aqueous Film Forming Foam – fire fighting agent used to provide vapor suppression, smothering and cooling for flammable or combustible liquid fires where the liquid is a polar liquid (i.e., able to mix with water).

Foam Unit - a specialized unit designed to assist in the abatement of hazardous material incidents involving flammable liquids on fire or which pose a serious potential for a major fire. These units possess the unique capability to deliver large quantities of foam solution (water and proportioned foam properly mixed with air) from installed or mounted foam systems.

Station stockpile - a minimum inventory of 200 gallons of foam agent in five-gallon containers. Station stockpiles are maintained to ensure availability of AFFF concentrate for response to emergency incidents.

Stores stockpile - a minimum inventory of 250 gallons of foam agent in five-gallon containers. Stores stockpile is maintained to ensure availability of AFFF concentrate for resupply of stations and station stockpiles.

PROCEDURES

1. Foam Units

At least one foam unit shall be dispatched on ALL of the following types of incidents within Prince George's County:

- Tanker vehicle fires.
- Aircraft emergency incidents.
- Large flammable or combustible liquid spills, i.e., involving more than 100 gallons.
- Facility fires involving bulk storage containers of flammable or combustible liquids, i.e., involving more than 100 gallons.

At least one foam unit shall be dispatched to hazardous material incidents and other emergency situations, not identified above, when requested by the Incident Commander or when it is closest by mileage.

Additional foam units or fire fighting vehicles with foam capability (see Addendum #1) shall be dispatched to the flammable or combustible liquid incident when requested by the Incident Commander.

2. Water and Foam Supply during Significant Incidents

To ensure there is an adequate supply of water to maintain an effective foam operation (a minimum of 1,000 gpm), Incident Commanders shall ensure that water supply operations are initiated.

The two closest water tankers shall be automatically dispatched to all flammable/combustible liquid incidents in non-hydrant areas to support the foam unit(s) dispatched.

The closest station with large diameter hose (LDH) shall be dispatched to any flammable/combustible liquid incidents to support water supply operations for the foam unit(s) dispatched.

The closest station with a station stockpile shall be notified of the incident. That station will prepare their foam stockpile to be available for immediate response by loading the foam agent onto the transport vehicle.

Should additional AFFF concentrate be needed during normal business hours for an emergency incident the Stores Stockpile shall be made available by Logistics and Supply. It is the responsibility of the Incident Commander to ensure that a vehicle is also requested to transport the Stores Stockpile to the incident.

3. Dispatch of the Hazardous Materials Coordinator and the Fire/EMS Department's Hazardous Materials Response Team

The Hazardous Materials Coordinator, or designated representative, shall be dispatched on all significant incidents where fire fighting foam agent is going to be applied or has been applied. The Fire/EMS Department's Hazardous Materials Response Team shall be dispatched according to General Order 6-10.

4. Atmospheric Monitoring

Any flammable or combustible liquid spill where fire fighting foam agent has been applied shall be monitored with a direct reading instrument (i.e. combustible gas indicator). This is necessary to ensure that the vapor suppression action of the fire fighting foam agent is adequate.

5. Response Procedures

As part of the incident size up, first arriving Company Officers should evaluate the risks and benefits of applying fire fighting foam to flammable and combustible liquid spills or fires. This should include, but is not limited to:

- Availability of the proper foam concentrate
- Adequate quantities of foam concentrate
- Adequate water supply to maintain foam flow

At incidents where no life safety hazard or threat to a critical infrastructure is present, the decision to apply fire fighting foam or "let it burn" should be coordinated with the Hazardous Materials Coordinator, or designated representative to address environmental concerns.

A Foam Group Officer shall be established when more than two foam handlines and/or foam appliances are in operation. The Foam Group Officer shall position themselves at a perpendicular angle to the foam lines/appliances, when safely possible, to direct the application point of the foam lines/appliances (see Diagram #1).

The Foam Group Officer and Incident Commander/Operations Officer shall coordinate fireground operations prior to commencement of foam operations.

All foam units and foam delivery devices shall be operated within their specific operational guidelines.

The Incident Commander shall ensure there is an adequate supply of foam on hand prior to commencing foam operations.

Safe operation of the foam unit shall be determined by the Foam Unit Officer. (Note: This is due to the extensive training required for this specialized unit operation). The driver in charge of the foam unit is in charge of the vehicle during actual flow of foam agents. This is due to their overall visibility and control of its operation.

Minimum Staffing:

- Two firefighters per foam handline.
- One company officer for each two handlines.
- One driver/operator per foam unit.
- Enough staffing to maintain foam resupply (dumping foam from five-gallon containers into open top containers used for foam eductor points).
- One turret (foam monitor) operator if applicable.

Maximum staffing:

- Based on vehicle design.

6. Application Rates for Class B Spill Fires

Personnel must understand proper application rates to be able to determine the amount of foam required for an incident involving flammable or combustible liquids.

The application rates discussed address spill fires of shallow depth. Increasing the foam application rate over the minimum recommended flow rates will generally reduce the time required for extinguishment. However, if the application rate is less than the minimum recommended, the time required to extinguish will be prolonged or, if too low, the fire may NOT be controlled.

For flammable liquids that float on top of water and will not mix with water (e.g., gasoline, gasohol, diesel, JP-8, jet fuel, #2 fuel oil, etc.), the recommended application rate is 0.1 gpm of foam solution per square foot of fire with a minimum run time of 15 minutes. If the AR-AFFF is a 3%/6% type, the foam must be educted at a 3% concentration.

For polar liquids (i.e., water miscible – will mix with water) (e.g., ketones, alcohol, E-85 fuel), the recommended application rate is 0.2 gpm of foam solution per square foot of fire with a minimum run time of 15 minutes. If the AR-AFFF is a 3%/6% type, the foam must be educted at a 6% concentration. A foam nozzle must be used to ensure the foam solution is properly aerated.

7. Responsibilities

In each station with a foam unit or station stockpile, the career Battalion Chief, Volunteer Chief, and Career Officer shall establish one officer to be responsible for carrying out all station-level duties identified in this General Order.

8. Fire Fighting Foam Agent Stockpiles

Station stockpiles of AFFF concentrate are housed at Stations 831, 843, and 836. Each

station stockpile consists of a minimum of 200 gallons of AFFF concentrate. Station stockpiles are maintained to ensure availability of AFFF concentrate for response to emergency incidents.

Logistics and Supply (Logistics) will maintain the stores stockpile. The stores stockpile is maintained to ensure availability of AFFF concentrate for resupply of stations and station stockpiles.

Stations shall ensure that AFFF concentrates in stockpiles are stored in areas that are not subject to temperature extremes. (It should be stored at temperatures above 35º F and below 120º F.).

When any station stockpile inventory falls below the 200 gallon minimum, that station shall contact Logistics on the next weekday (Monday through Friday) to replenish the stockpile.

Each fire station that maintains a stockpile of AFFF concentrate shall maintain or have immediate access to an emergency vehicle to deliver the foam to a designated location when requested by Public Safety Communications (PSC) during emergency incidents.

9. All Fire Stations

All fire stations shall be supplied with one 1-1/2", 95-gpm, bypass foam eductor. The eductor shall be kept on the assigned first due engine.

Each fire station shall ensure that a 95-gpm nozzle is used with the bypass foam eductor to ensure it functions properly. Where fire fighting foam is being applied to flammable or combustible liquids that are polar liquids it is recommended that a foam nozzle be utilized to ensure adequate aeration of the applied fire fighting foam.

Each fire station shall maintain a minimum of 15 gallons (three five-gallon containers) of fire fighting foam with the bypass foam eductor on the first due engine.

Each driver of fire apparatus delivering fire fighting foam at an incident shall maintain an accountability of the amount of fire fighting foam used and the number of foam application devices used (by nozzle type, size, gpm, nozzle pressure, and duration of use). This information shall be forwarded to the Hazardous Materials Coordinator, or designated representative, for inclusion in the after-action report.

10. Foam Replenishment

Stations requiring replacement AFFF concentrates for apparatus, foam units, or station stockpiles shall contact Logistics and Supply for replacement during business hours. Stations shall provide a Stores Request containing the date, location, and incident number of the incident where the AFFF was applied and indicate the quantity of AFFF concentrate needed. Logistics and Supply shall provide this information to the Hazardous Materials Coordinator or designated representative to address environmental concerns or notifications to regulatory agencies.

11. Fire Stations with Approved Foam Units

The approved foam units within Prince George's County Fire/EMS Department are listed in Addendum #1.

Andrews Air Force Base Fire Department shall be considered as an additional resource

for flammable/combustible liquid fire fighting incidents involving non-polar liquid fires.

Addendum #1 also lists all fire fighting apparatus within the Department that have built-in foam systems and their capabilities, or carry additional foam capabilities.

The Hazardous Materials Coordinator shall update and submit the addendum to the Fire Chief for approval as needed.

When one of the fire stations listed in Addendum #1 has a change in its foam delivery system capability, i.e., placed out-of-service, placed in-service, removed, etc., the senior fire station officer on duty (career or volunteer) will notify PSC.

12. Post Response Procedures

The driver/operator shall ensure that all vehicle pumps, foam lines, eductors, and nozzles are properly flushed after each use, when required. All foam used shall be restocked immediately, if possible.

The Foam Unit Officer shall ensure that the foam unit is restored to full operational status after use.

Logistics shall assist in ensuring that all AFFF concentrate from station stockpiles utilized at the emergency incident are replaced. Logistics shall ensure that inventory of the Stores Stockpile is replenished as soon as possible to ensure availability of AFFF concentrate.

13. Environmental Considerations During Foam Applications

AFFF utilized to mitigate flammable or combustible liquid incidents should be considered an environmental hazard. Response operations shall be initiated to confine both the spilled flammable or combustible liquid and the applied fire fighting foam agent, once life safety requirements have been accomplished.

Confinement efforts should prevent spilled flammable or combustible liquid and/or applied fire fighting foam agents from entering any stormwater drainage system, waterway, body of water, or water well.

Additionally confinement efforts should prevent spilled flammable or combustible liquid and/or applied fire fighting foam agents entering the sanitary sewer system.

It shall be the responsibility of the Hazardous Materials Coordinator or designated representative to make notifications to applicable regulatory agencies when necessary. These include, but are not limited to the Maryland Department of the Environment, the Washington Suburban Sanitary Commission, and Prince George's County Health Department.

For flammable or combustible liquid spills that do not present a life safety hazard, a decision whether to foam or "let it burn" shall be made, based on the environmental consequences.

REFERENCES

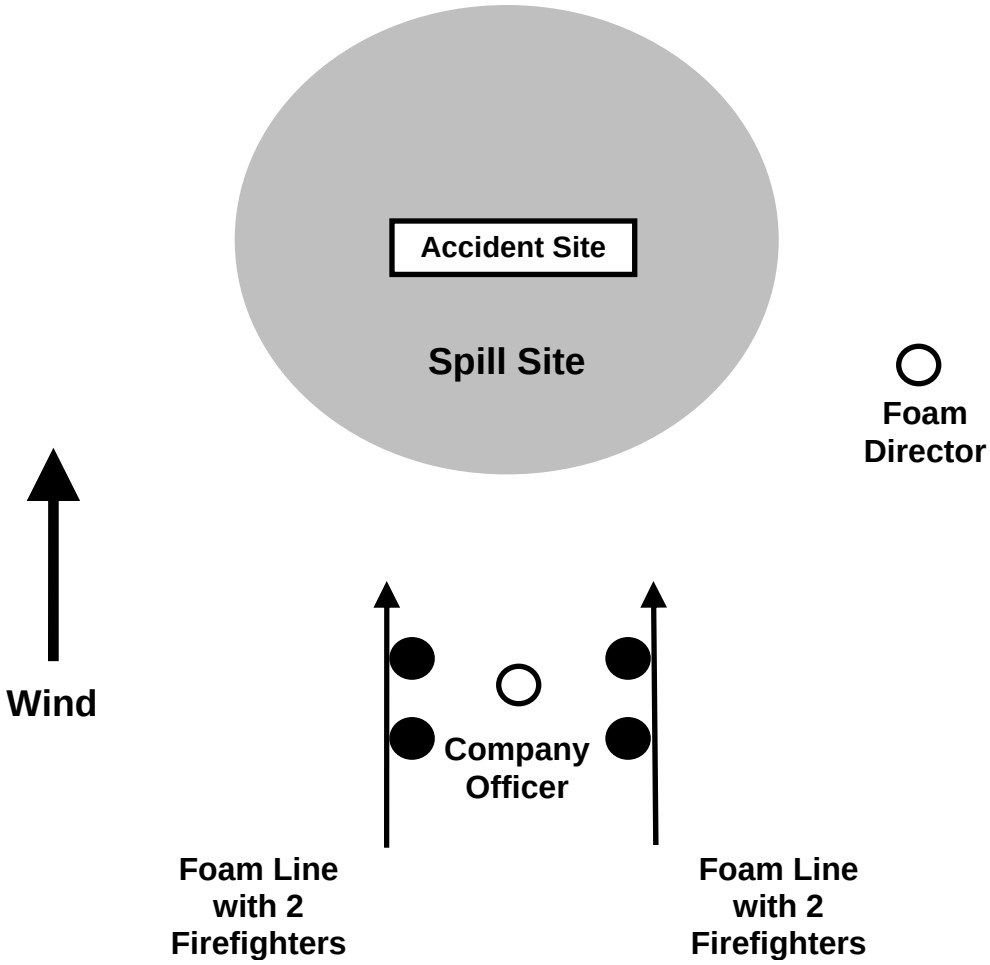
N/A

FORMS/ATTACHMENTS

Diagram #1, Response Procedures Personnel positioning

Addendum #1, Fire Fighting Apparatus with Foam Capability

Diagram #1 – Response Procedures
Personnel positioning



Addendum #1 Fire Fighting Apparatus with Foam Capability				
Apparatus	**Foam Capacity**	**Water Tank Capacity**	**Proportioner or Eductors**	**Foam Appliances**
Foam 12	400 gallons of 3%x6% foam; 80 five gallon pails	300 gallon tank, 1,250 gpm pump	1 - 6% fixed, 300 gpm 2 - 3% fixed, 300 gpm 1 - 0-9%, 300 gpm 1 - 0-6%, 95 gpm bypass	3 2½" foam nozzles, 300 gpm each
Foam 25	400 gallons in foam tank	400 gallon tank	built-in variable foam	1 2½" foam nozzle, 270 gpm 4 1½" foam nozzles, 120 gpm 1 1½" medium expansion foam nozzle 1 500 gpm foam monitor
Foam 48	1,000 gallons of protein foam in foam tank	no water tank	built-in balanced pressure foam system	1 1½" foam nozzle 1 2½" foam nozzle 1 1½" medium expansion foam nozzle 1 2½" medium expansion foam nozzle 1 500 gpm foam monitor
Engine 312	40 gallon foam tank		built-in bypass eductor	
Engine 283	60 gallon tank	500 gallon tank, 1,250 gpm pump	built-in bypass eductor	
Engine 361	100 gallons 300 lbs of PPK		built-in bypass eductor	
Engine 481	60 gallon tank	500 gallon tank, 1,250 gpm pump	built-in bypass eductor	1 1½" foam nozzle
Engine 741	50 gallon tank	750 gallon tank, 1,250 gpm pump	built-in bypass eductor	
Engine 742	50 gallon tank	750 gallon tank, 1,250 gpm pump	built-in bypass eductor	
Foam 74 (P-19) for limited locations	130 gallon tank	1,000 gallon tank, 1,000 gpm pump and roll	Built in around-the-pump foam proportioner	750 gpm roof turret 250 gpm bumper turret
Foam 74 (P-23) 4 identical units	500 gallon tank	3,300 gallon tank, 2,000 gpm pump and roll	Built in around-the-pump foam proportioner	750/1500 gpm roof turret 250 gpm bumper turret 100 gpm handline
Foam Trailer 74	1,000 gallon tank			

*Fire fighting foam agent stockpiles have been established at Stations 22, 25, 31, 43, 47, **and 53.**