GreenFire Multi Class Wetting Agent (MCWA)

San José Fire Department

The San José Fire Department's core mission is to serve the community by protecting life, property and the environment through prevention and response.

Wednesday, April 1, 2026

MCWA Operations With Class A and Class B Fuels

San José Fire Department
Bureau of Training and EMS

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Training Objectives

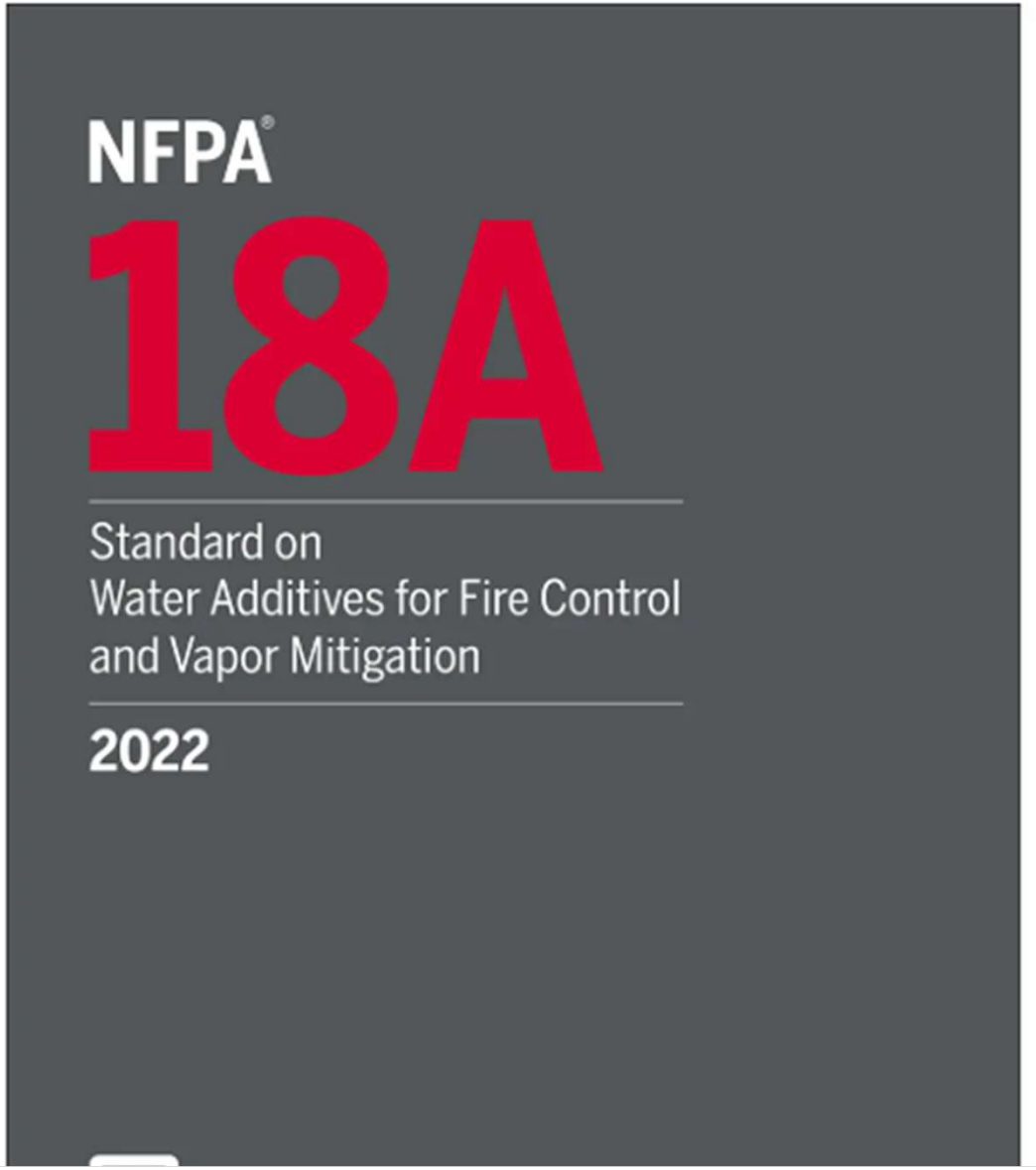
- Why SJFD is switching
- What GreenFire is
- How it works
- Application techniques
- Pump considerations
- Mix ratios & application rates

Why SJFD Is Changing

- PFAS health and environmental concerns
- Groundwater contamination
- Regulatory pressure
- Clean-up costs
- **Goal**: *maintain performance, reduce impact*

What GreenFire Is

- Eco-friendly ***wetting agent***
- Tested under NFPA 18 Wetting Agent guidelines and UL 711
- Surfactant reduces surface tension
- Improves penetration & cooling
- Spreads across fuel surface
- Suppresses vapors *(to a limited extent)*



What It Is NOT

- Not AFFF – no aqueous film seal
- No alcohol-resistant blanket
- Short-lived blanket
- Relies on cooling

Operational Takeaway:
Proper technique and continued application are critical.

MCWA's have reduced vapor suppression compared to traditional AFFF foam

Product Characteristics

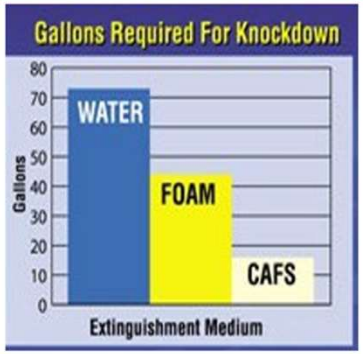
- PFAS-free
- Non-corrosive
- Biodegradable
- Compatible with standard equipment

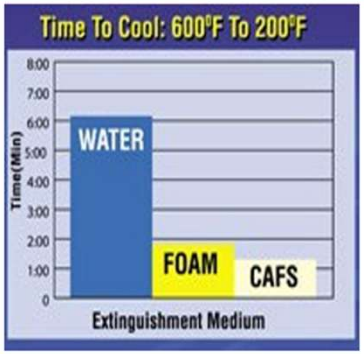
Multi Class Use: Class A & B Fuels

- Structure fires
- Wildland fires
- Debris/refuse fires
- Vehicle fires
- Fuel spills
- Liquid fuel fires
- Overhaul

Class A Fuels

- **Initial attack**
  - 1%
- **Overhaul**
  - 0.5% or less





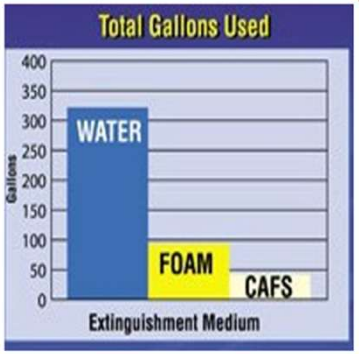


Diagram courtesy of Hypro LLC

KNOCKDOWN

Class A Foam provided faster knockdown than water alone

Water - 50 seconds; 73 gal.
Foam - 25 seconds; 44 gal.
CAFS - 11 seconds; 16 gal.

COOLING

Class A Foam cooled the area 3.5 times faster than water

Water - 6:03 min
Foam - 1:45 min
CAFS - 1:28 min

EXTINGUISHMENT

Class A Foam was 3.4 times more efficient than water at extinguishing the fire

*Water - 320 Gallons
Foam - 95 Gallons
CAFS - 45 Gallons

* After 225 gallons, IC ordered foam

• UL testing conditions differ from SJFD field capabilities, **remember** *this product is not traditional Class B foam.*

• Although the manufacturer recommends lower percentages for hydrocarbons, due to these differences—including SJFD's use of standard fog nozzles and not low/medium expansion foam nozzles—and the presence of ethanol in common fuel blends, SJFD will utilize a more conservative approach of 0.3 gpm/ft² at 6% for incidents involving a life hazard.

Class B Fuels

- **Hydrocarbon spills/fires**
- Vehicle fuel fires
- Fuel spills on Rescue Response
  - Spills classified as 1” or less in depth
- Deep pooled spills (tanks, diked spills) greater than 1”

NOTE: gasoline burns at a rate of about 1/8” per minute. A 1” deep spill will burn away in about 8 minutes.

Class B Fuels

POLAR SOLVENTS:

MCWA is *NOT* alcohol resistant.

The polar solvent will actively pull water content out of the blanket, rendering it ineffective at a much faster rate.

MCWA may provide initial knockdown, but blanket will be short lived and vapor suppression will be limited.

Class B Fuels

POLAR SOLVENTS:

Water will dilute the polar solvent fuel, and depending on the fuel, at about a 5:1 ratio, flame will no longer be supported.

Be aware, if the fuel is not contained, you may not be able to effectively dilute the fuel and could push burning fuel towards other exposures.

Class B Fuels

Application Technique:

- Narrow fog pattern (≤10°)
- Bank-on & Roll-on most effective
  - Allow solution to spread across fuel
  - Use surfaces (ground, walls, cars or other objects) to agitate and expand the finished solution
  - Avoid plunging streams directly into the fuel

Class B Application Rate (Fire)

SJFD Proportioning: 3-6%

****Spill fires are fought by the square foot****

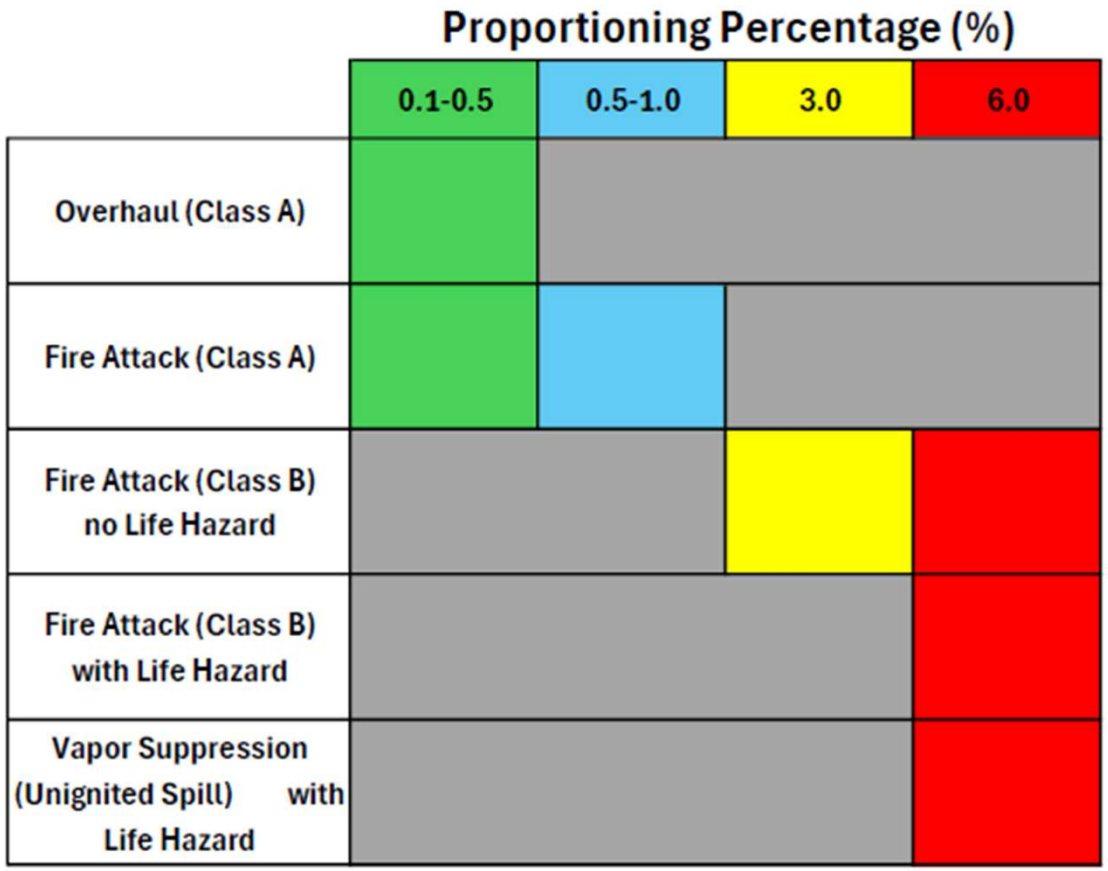
Finished solution must be applied to the fire faster than the fire can consume it.

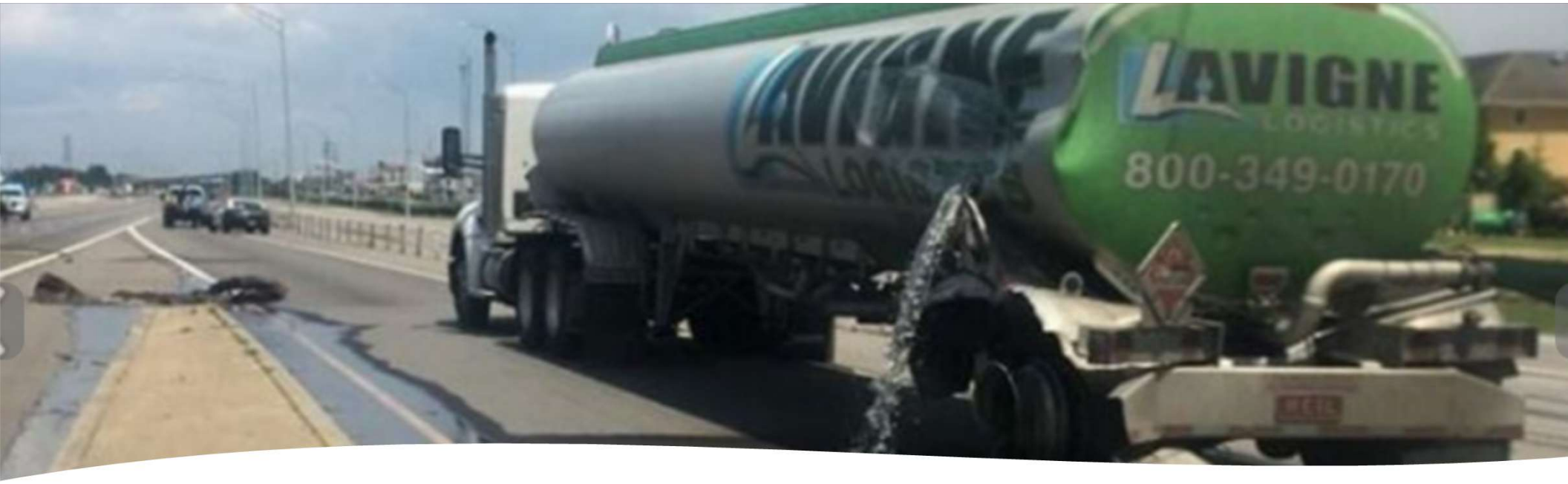
- Application Rate:
  - 0.3 gpm x ft²
- Ensures coverage, cooling, suppression

Class B Application Rate

SJFD Proportioning: 3-6%

- Fuel fire with **life hazard** = **6%**
- Vapor suppression on unignited spill with **life hazard** = **6%**
- Fuel fire, **no life hazard 3-6%**
- Structure fire/wildland **0.5-1.0%**
- Overhaul **0.1-0.5%**





Unignited Spills

- **Unignited spills have NO application rate!**
- Aim for a 3-4” thick blanket to suppress vapors
- Without the use of low-expansion fog nozzles this may be difficult – make as thick of a blanket as you can achieve
- Use surfaces to create agitation and increase the expansion of the finished solution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Unignited Spills

- Reapply as necessary

(using a gas monitor to test for flammable vapors, or at 1-2 minute intervals*)

*based upon the ‘quarter-life’/’residence time’ (the time it takes the finished MCWA solution to lose 25% of its water content

Scene security – maintaining the blanket - will use copious amounts of MCWA concentrate, especially during extended extrication operations

Unignited Spills

- 100 mL of water/MCWA concentrate mixed in a 1 L bottle to create a 3% and 6% solution
- Solution was agitated to expand the finished MCWA ‘foam’
- Quarter Life (time to drain 25% of the water content from the finished solution)
  - 50 seconds @ 3%
  - 1 minute 30 seconds @ 6%

Takeaway:

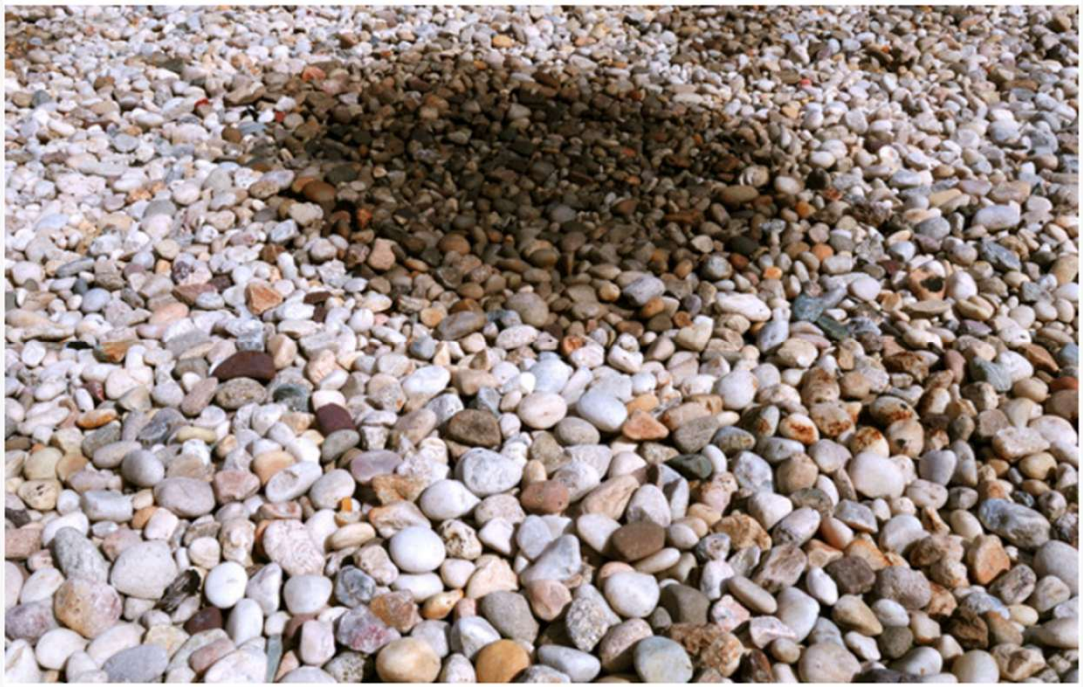
Vapor suppression capability of MCWA relies on water content in the blanket. As water drains, effectiveness is reduced. For incidents requiring true vapor suppression for life safety, utilize at 6% with continuous application, requesting Foam 29 for extended ops.

Spills & Fires on Porous Surfaces
(earth, soil, rock, sand etc)

Surface behavior differences:

- Fuel is absorbed into surface (soil, dirt, sand, gravel)
- Irregular surface prevents uniform surface coverage
- No defined “pool” — fuel exists both on and below surface
- Continued vapor release from subsurface fuel

Spills & Fires on Porous Surfaces
(earth, soil, rock, sand etc)



Impact on MCWA effectiveness:

- Reduced surface sealing compared to hard surfaces
- Wetting agent may penetrate fuel but cannot fully isolate it
- Vapor suppression may be incomplete or short-lived
- Increased likelihood of re-ignition

Spills & Fires on Porous Surfaces
(earth, soil, rock, sand etc)

Operational considerations:

- Expect greater application volume and duration
- Focus on cooling and saturation of affected area
- Continued application often required
- Surface disturbance may release additional vapors

Limitations:

- Will not create a reliable vapor-sealing layer in porous media
- Effectiveness is significantly less than on concrete/asphalt
- May require additional tactics (foam reapplication, overhaul, or excavation)

Direct Injection System Limitations

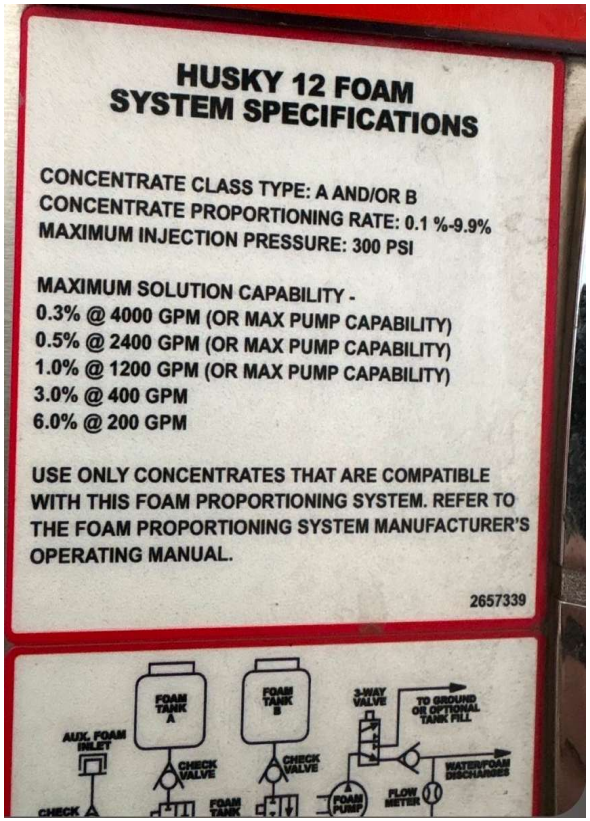
Foam Pro System:

- 166 gpm @ 3%
- 83 gpm @ 6% - *for flows above 60 gpm, consider using an eductor*

Husky 12 System: (Pierce Engines)

- 400 gpm @ 3%
- 200 gpm @ 6%

*Higher nozzle flows can exceed foam pump capacity, delivering full water flow but a lower-than-set MCWA percentage



Eductor Use

SJFD uses 95 gpm eductors:

- With 1 ¾” hose, nozzle no more than 200’ from eductor
- For extended hose lays, utilize 2 ½” or 3” hose to supply the eductor away from the pump panel
  - Have a plan/personnel for changing 5 gal buckets!

Eductor Use

- Make all connections and place pick-up tube in bucket
  - Charge hoseline at idle
  - (this reduces transit time and fills hose immediately with MCWA solution)
- Charge to 200 psi at the eductor

PDP = 200 psi (+ FL +/- EP)* if away from the engine

- @ 95 gpm, 1 ¾" hose has FL = 10 psi/100'
- With 200' of 1 ¾" hose from eductor and 100 psi nozzle pressure, you are @ 120 psi of back pressure in the system.
- A 95 gpm eductor can have no more than 130 psi of backpressure to properly work,
- No kinks in hose, and limited to an elevation gain of 20' from the eductor to the nozzle *(if elevation is unavoidable, consider removing lengths of 1 ¾")*

Eductor Use

Rule of Thumb:

A 95 gpm eductor with MCWA will handle ~ 400 sq/ft fire

- Nozzle bale must be FULLY open

MCWA concentrate use per minute will equal the % setting

- 95 gpm @ 1% = 1 gallon of MCWA per minute
- 95 gpm @ 3% = 3 gallons of MCWA per minute
- 95 gpm @ 6% = 6 gallons of MCWA per minute

Pump Chart Changes

Class A fuels MCWA: Fire Attack @ 0.5-1.0%, Overhaul @ 0.1-0.5%
Class B fuels MCWA: All fuel Types @ 3-6% (0.3gpm/sf application rate)
FLOW RATE AND AMOUNT OF FINISHED MCWA SOLUTION NEEDED:
Spill Sq Ft x application rate = Finish MCWA rate x time* = Needed Finish MCWA Gals
(ex: Spill 100sf x 0.3gpm/sf = 30gpm x 15min = 450 gals finish MCWA needed)
***Initial application time = 15 minutes for Class B liquid fuels**
fyi: 13.5-27 gallons MCWA concentrate for 450 gallons of finished MCWA
Foam Eductor Hose System (PDP = 200 psi + Supply FL if away from pump)
200 psi into Eductor with 1-3/4" x 200' to fog nozzle
(FL and EP from Eductor to Nozzle not to exceed 30 psi)
Nozzle must flow 95 GPM (No hose kinks, bale fully open)
Set nozzle pattern to ≤ 10° Fog, Bank-Down or Roll-On to 4" thick blanket

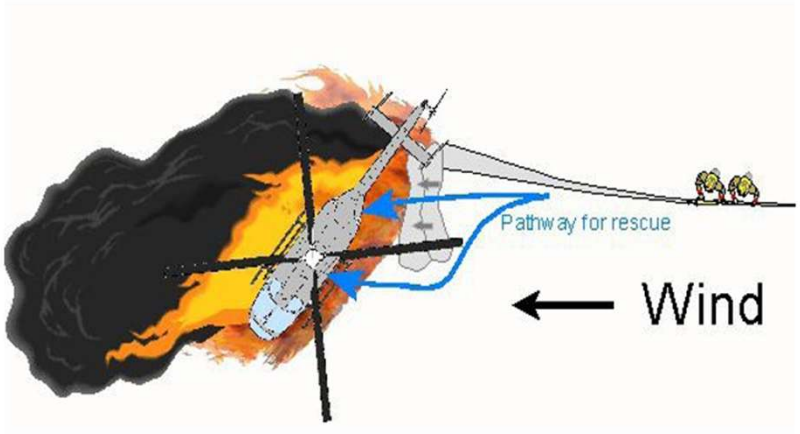
- Take note of new percentages for Class A and Class B fuels
- Application rate 0.3 gpm/ft² remains unchanged
- Initial application time is 15 minutes for hydrocarbon and polar solvent

Operational Considerations

When approaching a fuel spill or fire:

- Consider wind direction
- Prioritize approach from the uphill side, and then from the upwind side
- Consider dry-chem extinguisher for quick knockdown
- MCWA finished solution does not always need to cover the entire spill area immediately
- In some situations, MCWA finished solution may be applied to create a safe pathway for rescue or access, rather than immediately attempting full extinguishment.
- Initial application should generally begin at the edge of the fire or spill closest to the hose team, advancing forward as the fire is controlled.

Operational Considerations



Although some containment efforts may be employed well ahead of the flow, a sudden and massive release of fuel from the container may occur. Anything downhill is in danger!

Consider the wind direction when approaching the hazard. Foam application does not always have to cover the entire fire area. Coverage may only be needed to create a pathway for rescue.

Operational Considerations (continued)

When MCWA concentrate supply is limited or uncertain:

- Prioritize life safety
- Protect personnel and evacuation routes
- Delay attack on the main body of fire until adequate supply is confirmed

•Once adequate MCWA concentrate is available:

- Initiate MCWA application on the main body of the fire

•Exposure protection:

- Position water streams to avoid disrupting or diluting the blanket
- Shut down exposure lines once MCWA application begins, unless needed for:
  - Firefighter safety
  - Critical exposure protection

Flow Calculations – Step 1

- **Estimate spill area**
- Rectangle: L x W
- Circle: 3.14 x r^2

Flow Calculations – Step 2

Determine flow (gpm)

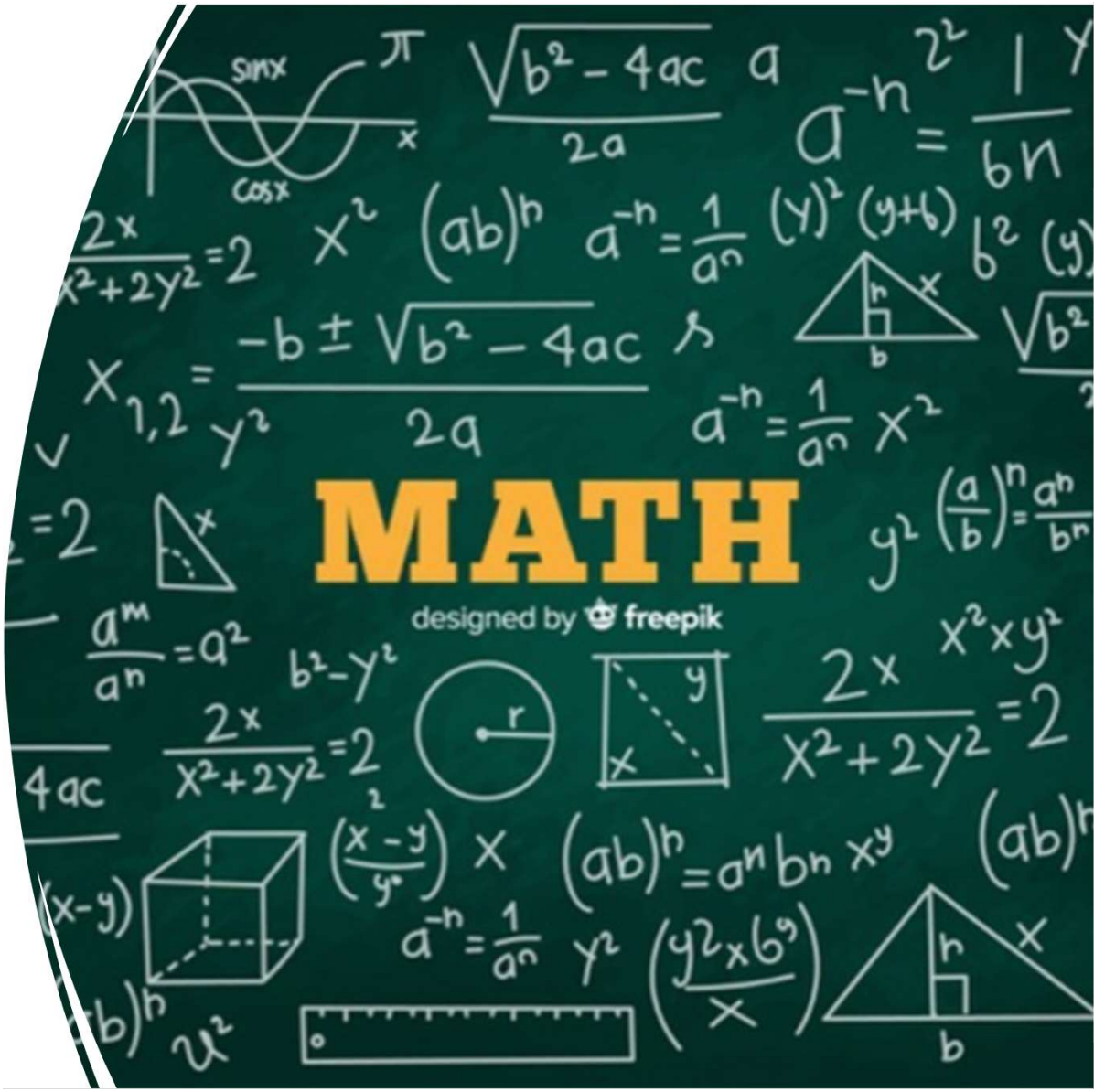
- **Flow (gpm)** = Area x 0.3 gpm/ft²

Total Finished MCWA Solution

- **Finished solution** = Flow (gpm) x time (min)
- Per NFPA allow for 15 minutes of flow

Rule of Thumb (0.3 gpm/ft²)

- 100 ft² → 30 gpm
- 200 ft² → 60 gpm
- 300 ft² → 90 gpm
- 500 ft² → 150 gpm
- 1000 ft² → 300 gpm



Example 1 – Small Spill

- 10 x 10 = 100 ft²
- Flow: 30 gpm
- 15 min = 450 gal finished MCWA solution
- 3% = 13.5 gal concentrate
- 6% = 27 gal concentrate

*Finished MCWA solution minus concentrate = water used

Example 2 – Medium Spill

- 20 x 25 = 500 ft²
- Flow: 150 gpm
- 15 min = 2,250 gal finished MCWA solution
- 3% = 67.5 gal concentrate
- 6% = 135 gal concentrate

Fire Area = Approximately 50' x 10'

A fuel tanker which has burned to mid-level - actual area is 450Ft² (53' x 8.5')... plus whatever spilled area is involved.

HYDROCARBON TANKER FIRE

Estimate the square footage ≈ **500 ft²**

- **500 x 0.3 = 150 gpm**
- **150 gpm x 10 minutes = 1,500 gal finished foam solution**
- **1,500 gal x 0.06 (6%) = 90 gal foam concentrate needed**

Example 3 – Large Spill

- 25 x 40 = 1000 ft²
- Flow: 300 gpm
- 15 min = 4,500 gal finished MCWA solution
- 3% = 135 gal concentrate
- 6% = 270 gal concentrate

Operational Consideration

- Large spills require sustained water supply and large volume of concentrate
- Hydrants, additional engines, or tenders
- Foam 29 – 750 gallons of Class B SFFF (synthetic fluorine free foam)

Spill Type	Approximate Size	Approx. Area (sq ft)	Required Flow (GPM)	Finished MCWA Flow Total (15 min)**	MCWA Concentrate Use 3% (15 min)	MCWA Concentrate Use 6% (15 min)
Passenger Vehicle	10'x10' or 14'x14'	100–200	30-60 gpm	450-900 gal.	13.5-27 gal.	27-54 gal.
Pickup Truck	14'x14' or 18'x18'	200–300	60-95 gpm	900-1,425 gal.	27-42.75 gal.	54-85.5 gal.
Semi Truck	30'x30' or 40'x40'	900-1,600	270-480 gpm	4,050-7,200 gal.	121.5-216 gal.	243-432 gal.
Fuel Tanker Truck	40'x40' or 225'x225'	1,600-50,000	480-15,000 gpm	7,200-225,000 gal.	216-6,750 gal.	432-13,500 gal.

This chart and associated flow rate and MCWA usage estimations apply to Class B liquid fires (ignited fuels).

Unignited fuel spills do not utilize an application rate. These incidents should be managed by applying a 3–4 inch blanket at a 6% concentration to achieve vapor suppression.

** **Finished MCWA Flow = TOTAL water + MCWA concentrate**

For incidents larger than a passenger vehicle, water supply (hydrants, additional engines, Water Tenders) and additional resources should be addressed early in the incident. Consider Foam 29 for large spills and lengthy scene control with vapor suppression needs.

Conclusion

- MCWA use relies on cooling effects for knockdown.
- Vapor suppression will be limited. For extended scene security of unignited spills, or lengthy events, consider requesting Foam 29 to respond.
- For large spill fires, consider the pros and cons of attempting extinguishment vs. letting the product burn.
- FoamPro systems will be limited flow rates (gpm) at higher %. Consider using an eductor for 95 gpm @ 6%

Conclusion

Thank you!

Questions?

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