Non-CAF Pumping Operations

Tank Water & External Water Supply

Purpose: To establish a procedure to supply an attack line from tank water, transition to an external water supply, increase flow to multiple attack lines, and set pressure control devices.

Background: It is recommended by MFRI Pump Operators course not to run more than one attack line off tank water. One exception to this rule would be in the event of a change on the fireground the effects life safety or the initial attack line becomes disabled. Until water supply is established, the water is needed for the 1st attack line. Additional lines may be deployed from the initial Engine, but should not be charged until an external water supply is achieved. A hoseline supporting the Rapid Intervention Company (RIC) can be charged, but do not flow water unless this line is used in RIC duties to rescue crews inside a fire.

Operations: One attack line transition to external water supply

1. Lay a line from a hydrant to the fire ground.
2. Place pump in gear and open tank-to-pump valve.
3. Pull Attack line, clear the bed, and charge off tank water upon signal from the crew.
4. Set throttle and pressure control device to manage pump pressure.
5. Connect supply line to an intake and announce to 2nd arriving that the unit is read for water.
6. Once the supply line is charged, open intake, close tank-to-pump valve, and monitor pump panel gauges.
7. Place additional lines in service as needed and water supply will support. Adjust throttle and pressure control device as needed.
8. As water consumption allows, refill tank water.
9. Monitor pump panel, pump and engine compartment gauges.

Key Operational Considerations

- Never charge more than one line off tank water to use for fire attack. Crews inside have will have an idea how much sustained water flow they have off the tank water for one line. Life Safety and RIC are the exceptions.
- Fill tank water as soon as possible after transitioning to an external water supply to provide redundancy in the event the external supply fails.

Class B Foam Attack Lines

Purpose: To establish a procedure for pumping foam attack lines used for fuel spill fires. Place in service a foam attack line from an in-line eductor to attack a fuel spill fire. Select appropriate type of foam concentrate and rate of flow for the type of fuel spill.

Operations:

1. Position Engine in a location uphill and upwind from the spill or fire, but within reach of handlines.
2. Identify the type of fuel spill or fire and select the type of foam concentrate required.
3. Connect eductor directly to or near a pump discharge.
4. Connect 200' of 1 ¾" from the eductor to a compatible fog nozzle equipped with an aerator.

5. Select the desired foam concentrate percentage and on selector knob on the foam eductor.
6. Insert the eductor pickup tube in the foam concentrate or attach to the onboard foam cell discharge.
7. Open discharge and increase pump discharge pressure to create 200psi at the eductor.
8. After use, remove pick up tube from foam concentrate in place in fresh water for one minute. Reduce pressure to 100psi and flush the hose and appliances with plain water to remove foam residue.

Key Operational Considerations:

- ❑ Hydrocarbon fuel spill fires on the ground require AFFF foam typically flowing a 3 % foam solution at .10/gpm/square foot.
- ❑ Polar solvents fuel spill fires on the ground require alcohol resistant foam typically flowing a 6 % foam solution at .20gpm/square foot.
- ❑ Place apparatus to protect crew and apparatus from running fuel fires.
- ❑ Clean all foam equipment and hose after foam usage. Class B Foam concentrate is slightly corrosive.
- ❑ Refer to Manufacturer's recommendations for each type foam eductor.
  - Note the necessary pressures and flow from each. The nozzle must be compatible with the eductor to generate good quality foam.
  - Note the maximum allowable back pressure allowed. Back pressure is the sum of the nozzle pressure and the friction loss in the hose between the eductor and the nozzle.

Elevated Master Streams

Purpose: To establish a procedure to supply water to an elevated master stream device on an Aerial Ladder or Aerial Tower.

Background: There are three types of elevated master stream devices in MCFRS: Aerial Tower Platforms, Aerial Ladders with pre-piped water ways, and Aerial Ladders without a pre-piped water way. Each apparatus is unique and the manufacturer's recommendations should always be followed for proper pressures and maximum flow rates for each aerial master stream device.

Operations:

1. Establish a water supply from a sufficient source.
2. Position the Engine within 200' of the aerial apparatus to be supplied.
3. Connect supply lines from large diameter discharges to the gated siamese provided by the aerial apparatus operator. Ensure the gates are closed.
4. Determine what tip is used on the master stream appliance and the elevation. Determine from the aerial apparatus operator if there is a pressure recommended for any pre-piped waterway.
5. Open discharges one at a time and fill hoselines with water up to the gated siamese. Do NOT open gates on the siamese without coordination with the Aerial Apparatus Operator or crew.
6. Adjust throttle to desired pump discharge pressure based upon calculated friction loss or pre-determined pressure for the waterway.
7. Monitor intake pressure for adequate water supply and prepare to expand upon water supply if necessary.

Key Operational Considerations

- Due to the high flows involved when supplying elevated master stream devices, apparatus should be parked as close as possible to the aerial apparatus they are supplying. This also facilitates direct communication between the pump operator and the aerial operator.
- MFRI Pump Operators Course recommends counting the ladder pipe and the siamese both as devices. +10psi for each for a total of 20psi for devices.
- Aerial devices have load ratings based upon pre-determined flows and waterway pressures. Follow recommendations of the manufacturer for maximum flow and required pressure. Aerial Apparatus Operators should be consulted for their specific apparatus.

Portable Master Streams

Purpose: To establish a procedure to supply water to a portable master stream device

Background: Master streams are defined by IFSTA as large volume fire streams flowing more than 350gpm. There are several portable master stream devices used in Montgomery County. Manufacturer's recommendations should always be followed for proper pressures and maximum flow rates. Most manufacturers label the device with the pertinent information, however if the information is absent or illegible personnel should consult owner's manuals or websites.

Operations:

1. Establish a water supply from a sufficient source.
2. Position portable master stream device and secure per manufacturer's recommendations.
3. Attach supply lines from the discharges at the pump panel to the intake(s) on the portable master stream device.
    a. Note the length and size of hose lines used.
    b. If dual lines are used they should be of the same diameter for ease of pump calculations.
    c. It is a good practice to place loops in the hose directly behind the appliance to aid with stability of the appliance.
4. Determine the tip size/flow. Note that some portable master stream devices have limitations on acceptable flows to maintain safe nozzle reaction levels.
5. Determine if the appliance is equipped with a shutoff.
    a. For appliances without a shutoff, the lines must not be charged without coordination with the crew and officer staffing the appliance.
    b. For appliances with a shutoff, ensure the gates are closed and begin filling the supply lines one at a time and fill hoselines with water up to the appliance. The crew can then control the gates at the appliance.
6. Adjust the pump discharge pressure to the desired level to support flow.
7. Monitor intake pressure throughout and prepare to expand upon water supply if necessary.

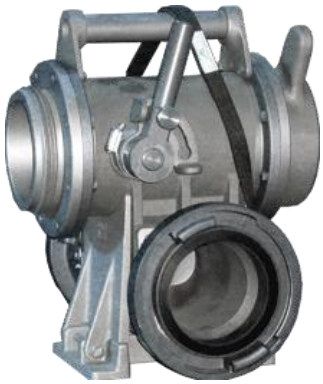
Key Operational Considerations

- Operators must be prepared to shut down in the event the master stream appliance becomes unstable. Some appliances have built-in shutoffs if they over-turn.

- When equipped with a detachable base, ensure parts are securely assembled prior to charging. Specifically, locking pins must be fully engaged and tips tightened.
- Deck guns that are convertible to portable master streams are usually equipped with safety stops that restrict lowering the tip below a certain angle. This is done to direct reaction forces downward rather than backward. When the appliance is mounted to the fire apparatus the elevation angle is generally not restricted and the safety stop can be bypassed to lower the tip further.

Supply Engine - Humat Valve

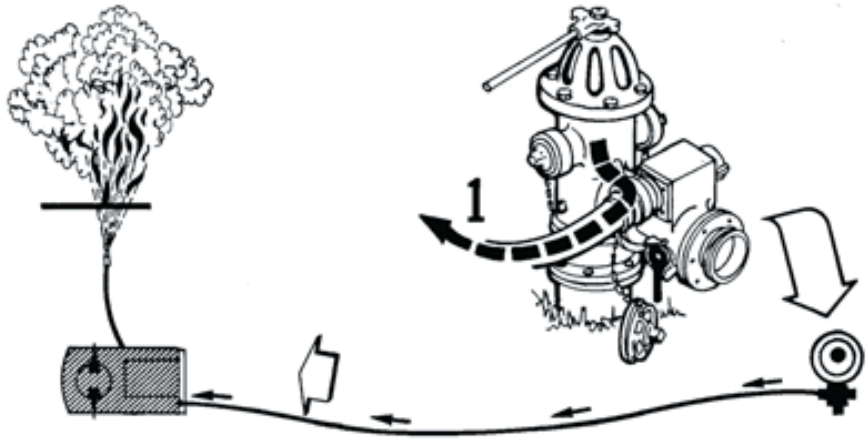
Purpose: To establish a procedure to provide a rapid, expandable, efficient, and uninterrupted supply of water from a municipal hydrant to an Attack Engine.



Background: The inclusion of a four-way hydrant valve allows an initial water supply directly from a hydrant to an Attack Engine prior to the arrival of a Supply Engine. The four-way hydrant valve used by MCFRS is the Humat Valve. The Humat Valve is connected to the steamer outlet on the hydrant immediately and charged after the Attack Engine lays a supply line from the hydrant to the fire scene. The Humat Valve permits the Supply Engine to boost supply pressure to the Attack Engine without interrupting the water supply.

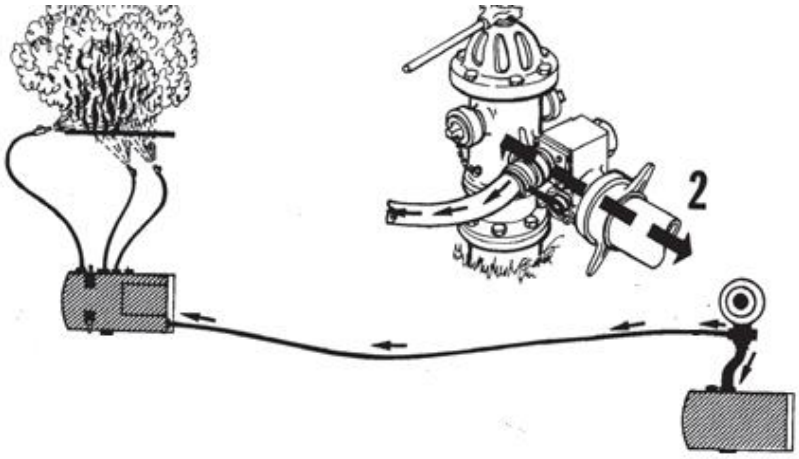
Operations:

1. If not completed prior to arrival, “dress” the hydrant.
    a. attach Humat Valve to the steamer outlet
    b. attach gate valve(s) to the 2½” outlet(s) on the hydrant
    c. Ensure the bypass valve on the Humat Valve is closed. This directs water to the supply line and not out of the face of the Humat Valve.

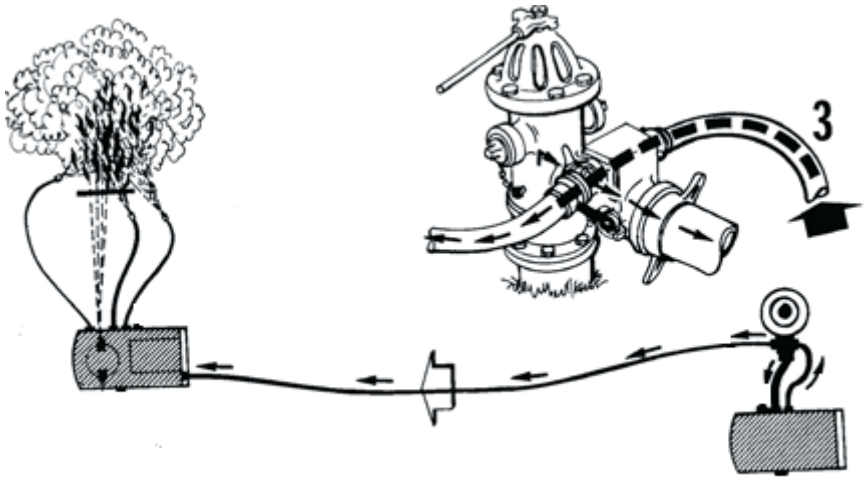


2. After ensuring the Attack Engine is ready for water, charge the hydrant to get an initial water supply to the Attack Engine.

3. Connect the soft sleeve or supply line from the Supply Engine to the 4½" male connection on the front of the Humat Valve.



4. Connect a supply line from a discharge on the Supply Engine to the intake side of the Humat Valve.
5. Open the butterfly valve on the Humat Valve and fill the soft sleeve.
6. Open the appropriate intake on the Supply Engine to receive water from the Humat Valve.
7. Charge the supply line attached to the intake side of the Humat Valve.



8. Once pressure from incoming supply line exceeds the hydrant pressure an internal clapper valve in the Humat Valve will close.
    a. All of the hydrant water is directed to the Supply Engine
    b. Attack Engine is now receiving water from the Supply Engine and not the hydrant
9. Adjust pump discharge pressure based upon the amount of supply line, diameter of supply line, and fireground flow in order to maintain 20 to 50psi of intake pressure at the Attack Engine.

Key Operational Considerations

- Best practice is to charge the Humat Valve before connecting any of the hoselines from the Supply Engine. This identifies that the hydrant will provide water and provides the Attack Engine an initial supply.
- In the event the initial hydrant is OOS, the Humat Valve can be left connected to the hydrant with the Attack Engine's supply line attached to the discharge port. The Supply Engine can then split lay to another hydrant leaving their supply line connected to the intake port of the Humat Valve. Once the Supply Engine locates a new hydrant and charges their supply line, the water will flow through the Humat Valve into the supply line of the Attack Engine essentially bypassing the original hydrant.
- Clear communication between the operators of the Attack and Supply Engines is critical to ensure the supply line is not prematurely charged. The Attack Engine must be ready to receive the water or the operation and personnel can be endangered. Note that Directive 04-01 prohibits the use of hose clamps on LDH, so supply lines must never be blindly charged without coordination.
- Fully "dressing" a hydrant with gate valves on the 2½"outlet provides several advantages:
  - Provides immediate options in the event the soft sleeve MIV fails.
  - Allows a rapid expansion of the water supply without interrupting the initial water supply.
  - Permits a "heavy water hookup" without delaying the initial water supply.
  - Maximizes the flow available from the hydrant by using all available outlets.

- There are advantages and disadvantages to an Attack Engine securing their own water supply at a hydrant near the scene.
  - Taking the hydrant allows the Attack Engine to be self-reliant and truly maximize the water available from a hydrant. There is no water "wasted" in a long supply line or limited by the number of supply lines laid.
  - Taking the hydrant requires the Attack Engine operator to complete more tasks to secure a water supply and may distract them from the pump panel or water tank levels.
  - When the Attack Engine identifies that they will take their own water prior to arrival they can avoid laying LDH that can inhibit the approach of other apparatus.

- When taking their own water, the Attack Engine reduces their flexibility in positioning on the scene and must still consider other apparatus. They are essentially “tethered” to the hydrant they have chosen.
- A Supply Engine at a hydrant serves as a backup to the Attack Engine in the event of a mechanical failure. They can increase discharge pressure and pump through an Attack Engine to allow an orderly withdrawal or support existing attack lines.
- When Attack Engines have their own water supply, Supply Engines should ensure and expand upon the water supply of the Attack Engine by reverse laying from the Attack Engine to another hydrant. The Supply Engine operator should assist the Attack Engine operator as necessary to ensure water supply is established in a timely manner.

Relay Operations

Purpose: To provide a procedure to for Engines to create and maintain water supply at a rate of 500gpm in a constant Engine relay.

Background: MCFRS Policy 24-01 Appendix F identifies relays as a secondary water supply option when the supply is within 3,000 feet of the clappered Siamese positioned at the fireground. A rule of thumb is to position relay Engines at 1,000-foot intervals within the relay. A maximum length relay would require three Relay Engines, one Supply Engine at water source, and one Attack Engine. The minimum desired flow in a relay is 500gpm. For distances over 3,000 feet, a tanker shuttle operation should be considered.

Operations:

1. Once a relay operation is identified as an option to support the initial Rural Water Supply effort, engines assigned to the relay will lay up to 1,000 feet of supply line(s) each to maintain an interval of 1,000 feet or less between pumps. The supply line may be forward laid from the source toward the fireground or reverse laid from the fireground toward the source depending on apparatus approaches and access to the scene.
2. Dual 4” supply lines should be considered within the relay when:
    a. a flow above 1,000gpm is being supported; and/or
    b. the total relay distance exceeds 2,000 feet.
3. Operators connect all supply lines to large diameter intakes and discharges to maximize flow.
4. Supply line is filled with water at low pressure starting at the source, progressing through each Relay Engine, and reaching the fireground.
5. Once water has reached the fireground, pump discharge pressures should be established to maintain an intake pressure of 50psi for each engine within the relay operation.
6. Operator should expect some fluctuation of intake pressures caused by attack lines opening and closing.
7. Operators must also adjust the pressure relief devices as needed.
8. When ordered to shut down, the relay should be shut down sequentially from engine to engine starting at the fireground working back to the source.

Pumping Considerations

- Engines can only discharge rated capacity when the ***net pump pressure*** does not exceed 150psi. Higher discharge pressures will reduce the capacity of the pump per the UL certification. It is best to utilize the largest (highest rated) pumps to complete a relay.

- The ***maximum working pressure of the fire hose*** used in a relay may also limit the amount of water that can be moved. The MCFRS recommends that pump pressures be limited to 250psi in 3-inch supply line, and 200psi for 4-inch supply line. The service test pressures for supply hose are typically 300 to 400psi.
- To initiate a relay with three or more pumpers, the following information is needed:
  - Needed fire flow (500-gpm unless otherwise directed)
  - Distance to the fire from the water source
  - Difference in ground elevation
  - Pump capacity of the responding Engines
  - Diameter of the supply hose line(s)

Key Operational Considerations

- Relay operations are usually coordinated by a Water Supply Group Supervisor.
- Relay operations are only as good as the lowest rated pump. If a smaller capacity pump must be used in a relay, then the distance between pumps must be smaller to maximize the available capacity.
- Visualize the water within the relay as one solid column that runs through the entire relay. Any change in any participating Engine's discharge pressure will cause changes throughout the relay. Do not make throttle changes for residual intake pressures between pressures of 10psi and 100psi.
- Moving large quantities of water over great distances through several pumps is a complicated evolution that must be understood and practiced.
- When the relay is operating, keep pressure adjustments to a minimum.
- Always monitor intake pressure. Make sure intake pressures do not drop low enough to cause the line to shake and or collapse.
- Pressure management devices must be set to avoid extreme spikes in discharge pressures.
- Water takes approximately one minute to move through 1,000 feet of fire hose and 1,000 feet of 4" hose contains approximately 650 gallons of water.