# OG 400.4.2 WATER SUPPLY

ADOPTED: Jan 1, 2016 REVISED: November 3, 2021

PURPOSE:
To establish guidelines for providing continuous water supply in hydrant, non-hydrant areas, and/or supplement insufficient water systems.

DEFINITIONS:

Attack Engine*
The attack engine is located at the scene, receives water from the water relay and supplies the attack lines.

Attack Tender
Tender equipped with hose and pump capacity to attack a fire.

Command Channel
The command channel is the working channel assigned by dispatch. The VTAC channels will be used for radio communications within the water supply group.

Direct Pumping Operations*
In the direct pumping method, a water tender or engine pumps the water from its tank directly to the pump intake of the attack engine. This method is typically set up by having the attack engine lay out a supply line. Tenders used for direct pumping operations should have a pump capacity of 750 GPM or greater. **NOTE:** Pump capacity rating is from draft and may be lower when pumping through the tank-to-pump line because of plumbing restrictions.

Forward Lay
Is laying a supply line from a water source to the scene. Make sure to drop the appropriate hose appliances needed for the type of water supply to be used.

Iowa State University Formula
The Iowa State University Rate-of-Flow Formula was developed to determine the fire flow needed to knock down a fully involved structure or compartment in the structure. The knockdown flow is determined by dividing the cubic size of the compartment or building by 100. GPM = V (length x width x height) ÷ 100

Jet Siphon
A jet siphon is a device connected to the end of a hard suction hose that assist in the transfer of water. Jet siphons are used for drafting operation or transferring water from one portable tank to another.

Non-Hydrant Area
Any area that is greater than 1000 feet from a fire hydrant.

Nurse Tender*
This method generally involves a water tender that is positioned immediately adjacent to the attack engine. The nurse tender supplies water to the attack engine by the tender pump or drafted from the water tender by the attack engine.

Portable Tank
A foldable tank used in rural fire operations commonly referred to as porta-tank.

Relay Engine*
The relay engine, also known as in line engine, is the engine(s) connected within a water relay operation that receives water from the source engine, or another relay engine, boosts the pressure, and then supplies water to the next apparatus in the relay.

Reverse Lay
A reverse lay is laying a supply line from the scene back to a water supply or relay engine. A reverse lay can also be used to lay a line from a water manifold, or appliance, at the scene to a water supply. Engines performing a reverse lay should remove all needed equipment from the engine before making the lay.

Source Engine*
The source engine, also known as supply engine, is the engine connected to the water supply at the beginning of the water relay operation.

Shuttle Tender(s)
Tender used to shuttle water from a fill site to the scene.

Water Supply Area
The water supply area is an area away from the scene where "source" apparatus set up to supply water to the scene. Usually in rural tender operations. The area needs to be located so additional tenders have room to maneuver with easy approach and departure.

Water Supply Officer (WSO)
Is the person responsible for the tender operation and maintaining the require water supply for the scene. The WSO works within the Incident Command System.

*IFSTA Pumping Apparatus Driver/Operator Handbook Second Edition

PROCEDURES:

A. Structure and/or stationary fire in an area with fire hydrants.
    1. First-in engine, with smoke showing, should lay a 5" LDH supply line from the closest fire hydrant to the scene. Based on immediate needs at the scene, and additional apparatus enroute, the IC or Company Officer may elect to go straight to the scene and have the next arriving unit reverse lay to the hydrant.
        a. Structures fires taller than three stories, reverse lay from the fire to the hydrant should be considered.

2. Second-in engine should stop at the next closest hydrant, or the closest hydrant if the first-in engine did not lay a supply line and await orders.
3. Consider putting a source engine at the hydrant if the LDH supply line is greater than 500 feet in length.
4. Incident Command should use the Iowa State University Rate-of-Flow Formula to determine the GPM flow required for the situation. Add one additional supply line set up, including engines, LDH, and hydrant for each 1250 GPM needed at the scene. See Relay Pumping section.
5. Each Aerial apparatus should have its own water supply line set up, including engines, LDH, and hydrant. See Relay Pumping section.
6. Large scale incidents may require hydrant and tender operations.

B. Structure and/or stationary fire in a non-hydrant area.
   1. First-in Engine, with smoke showing, should lay a 5" LDH supply line tail down the driveway. Based on immediate needs at the scene, and additional apparatus enroute, the IC or Company Officer may elect to go straight to the scene and have the next arriving unit drop a tail, or reverse lay to the water supply area. If the second arriving engine drops a tail make sure to move the supply line to the first engine. A temporary nurse tender operation can be considered with the intent of setting up a supply line and water shuttle operation away from the scene.
      a. Using the Iowa State University Rate-of-Flow Formula determine if the estimated flow will be greater than 750 GPM. Estimated flows less than 750 GPM the direct pumping method from a tender with a pump capacity of 750 GPM or greater can be utilized. Estimated flows greater than 750 GPM should utilize a portable tank and source Engine water shuttle. The source engine can be a tender if it is capable of drafting and has a pump capacity of 750 GPM or greater. The 750 GPM is a suggested threshold. If the required GPM to the scene can be maintained with either direct pumping method or a portable tank/source engine the WSO can stay with what is working.
      b. Tender 60 can be used as a direct pumping operation and switch to a source engine and draft from a portable tank.
      c. When establishing a water supply area take into consideration the ability of switching from a direct pumping operation to a source engine and portable tank operation.
      d. Water supply area should be away from the scene, if possible, to provide enough area to set up portable tanks if needed and provide easy access and departure for the tenders. The amount of water needed at the scene may require more than one portable tank. Jet siphons should be used to transfer water from one tank to the other. More than one jet siphon may be needed to transfer water from one portable tank to another. NOTE: Some rural settings may have room to allow the water supply area to be close to the scene minimizing the amount of LDH supply needed. However, the following should be considered when having the water supply area close to the scene.
         i. Will it make the scene too congested?

ii. Can tenders easily access, maneuver, and depart? Minimize the need for tenders to backup down driveways or roads. Most vehicle accidents happen when backing up.
iii. Consider lost water due to hose lay length. For every foot of 5" LDH is one gallon of water.

2. Incident Commander should establish a Water Supply Group consisting of the following positions.
   a. Water Supply Officer (WSO).
      i. Obtain water flow requirement at the scene.
      ii. Establish the plan to deliver required GPM at scene.
      iii. Identify needed resources and communicate with the IC.
      iv. Identify fill sites.
      v. Establish a radio channel/talk group for communications within the Water Supply Group.

   b. Dump Site Manager can be established to help coordinate the rotation of full tenders into the off-load area.
      i. Can be designated by the IC or Water Supply Officer.
      ii. Works under the direction of the Water Supply Officer.
   c. Fill Site Manager can be established to help coordinate operations at the fill site.
      i. The Fill Site Manager can be established by the IC or Water Supply Officer.
      ii. There can be a Fill Site Manager at each fill site location.
      iii. The Fill Site Manager is responsible for coordinating the tenders at the fill site to make sure of a quick tender turnaround time.
3. Additional arriving apparatus should go into level I stagging (hold short) until receiving orders. DO NOT go directly into the scene until told. Setting up rural situations takes some time; it is better to delay the initial set up than it is to make major changes during the incident.

C. Wildland Water Supply - Tenders should use a direct pumping operation to fill apparatus. A portable tank can be used as a water supply at a wildland fire, but you must consider the following.
   1. Only use portable tanks if apparatus are capable of drafting from the portable tank.
   2. Even though a unit has drafting capability it probably will be faster to fill the unit using the tenders pump than setting up a draft.
   3. A portable tank may be the best option depending on tender travel time to and from the scene. If a portable tank is used assign a draft capable unit at the portable tank site to fill apparatus.

D. Relay Pumping Operations – A relay pumping operation always begins with the source engine. As a rule, the largest capacity pump should be at the source. The maximum capacity of the relay is determined by the capacity of the smallest pump and the smallest hose used in the relay.

1. Any LDH supply line should not be greater than 1000 feet. Some low-capacity hydrants may require 500 feet between engines.
2. Source and relay engine(s) governor are to be in RPM mode. Pump discharge pressure should be 20 to 30 PSI greater than the friction loss in the hose flowing the target GPM. (PP = FL + 20)
3. The governor on the attack engine should be in pressure mode.
4. The water source for relay pumping can be from a hydrant system or drafting from a static water source such as portable tanks, pond, or river. DO NOT cross contaminate a relay pumping operation with hydrant water and a draft site going into one engine. If a situation requires both hydrants and a draft site use two complete separate relay pumping operations. Report any potential cross contamination to the water system provider.

E. Communications – Water supply functions should use a secondary radio channel for their operations. This will minimize radio traffic for the command channel.
   1. The VTAC channels will be used for radio communications within the water supply group. VTAC 11 will be the first choice of the VTAC channels. If VTAC 11 is not available, the Water Supply Officer or Command will direct water supply units to use either VTAC 12, VTAC 13, or VTAC 14.
   2. Once a VTAC channel is designated for the water supply group it will be the responsibility of the Water Supply Officer to communicate with Command the primary "Command" channel.
   3. Once the water supply operations are setup, either tender operations and/or hydrant supply, Command shall be notified by radio on the command channel, "water supply operations are established". This communication should be done by the Water Supply Officer or the Engineer of the attack engine if a Water Supply Officer has not been assigned.

TENDER RESOURCES

| Department | Radio # | Tank | Pump | Preconnect | Supply | Port Tank | Dump |
|---|---|---|---|---|---|---|---|
| Albany | WT11 | 3000 | 500 | 200' of 1" | | 3000 | Rear/Side |
| | | | | | | | |
| Aumsville | T65 | 3000 | 1000+ | 2 – 1 ¾ | 1000 – 5" | 3000 | Rear/Side |
| | T67 | 3000 | 1000+ | 2 – 1 ¾ | 1000 – 5" | 3000 | Rear/Side |
| | | | | | | | |
| Jefferson | T60* | 3000 | 1250+ | 2 – 1 ¾ | 1000 – 5" | 3000 | Rear/Side |
| | T64 | 3000 | 250 | | | 2000 | Rear Only |
| | | | | | | | |
| Lebanon | PT31 | 2500 | 1500+ | 2 – 1 ¾<br>1 – 2 ½ | 1000 – 4" | 3000 | Rear |
| | WT32 | 2000 | 500+ | 2 - 1 ¾ | 300 – 3" | 2500 | Rear/Side |
| | WT33 | 2000 | 500+ | 2 - 1 ¾ | 300 – 3" | 2500 | Rear/Side |
| | | | | | | | |
| Lyons | T55 | 3000 | 750+ | 2 – 1 ¾ | | 3500 | Rear/Side |
| | T56 | 3000 | 200 | | | 3000 | Rear |
| | | | | | | | |
| MCFD #1 | T319 | 3000 | 750+ | 2 – 1 ¾ | | 3000 | Rear/Side |
| | T329 | 3000 | 500+ | | | 3000 | Rear/Sides |
| | T339 | 3000 | 750+ | 2 – 1 ¾ | | 3000 | Rear/Side |
| | T719 | 3000 | 500+ | | | 3000 | Rear/Side |
| | | | | | | | |
| ODF | WT582! | 2400 | 150+ | Forestry | | 3000 | Rear |
| | | | | | | | |
| PCFD 1 | T91 | 3000 | 1000 | 2 – 1 ¾ | 600' of 4" | 3000 | Rear/Side |
| | T81 | 3000 | 1000 | 2 – 1 ¾ | 600' of 4" | 3000 | Rear/Side |
| | T71 | 2000 | 1000 | 2 – 1 ¾ | 600' of 4" | 3000 | Rear/Side |
| | T41 | 3000 | 100 | | 400' of 3" | | |
| | | | | | | | |
| Salem FD | T7 | 3000 | 500+ | 1 – 1 ¾ | | 3000 | Rear/Side |
| | T5 | 3000 | 500+ | 1 – 1 ¾ | | 3000 | Rear/Side |
| | | | | | | | |
| Scio | T91 | 3000 | 1000+ | 1 – 1 ¾ | 200'of 2 ½<br>200' of 5" | 3500 | Rear/Side |
| | T92 | 3000 | 1000+ | | 200'of 2 ½<br>200' of 5" | 3500 | Rear/Side |
| | | | | | | | |

--MORE TENDER RESOURCES ON NEXT PAGE--

* Tender equipped with front bumper nozzle and can pump in motion.

\+ Draft Capable

! Four Wheel Drive Tactical Tender

| Department | Radio # | Tank | Pump | Preconnect | Supply | Port Tank | Dump |
|---|---|---|---|---|---|---|---|
| Silverton | T419 | 3000 | 500+ | 1 - 1 ¾<br>2 – 3” | 300 – 3” | 2500 | Rear/Side |
| | T418* | 2000 | 750+ | 2 - 1 ¾<br>2 – 3” | 300 – 3” | 2500 | Rear |
| | T428* | 2000 | 750+ | 2 - 1 ¾<br>2 – 3” | 300 – 3” | 2500 | Rear |
| | T489 | 3000 | 1000+ | 2 - 1 ¾<br>2 – 3” | 300 – 3” | 2500 | Rear/Side |
| | B417* | 1250 | 250+ | 3 – 1 ½<br>2 – 1” | 200 – 3” | | Rear |
| | | | | | | | |
| Stayton | T80 | 3000 | 500 | | 100’ of 3” | 3000 | Rear/Side |
| | T81* | 1800 | 1000+ | Forestry | 200’ of 3” | NO | Rear/Side |
| | T82* | 1800 | 1000+ | Forestry | 200’ of 3” | 2000 | Rear/Side |
| | T83* | 1800 | 1000+ | 1 ¾ | 300’ of 3” | NO | Rear/Side |
| | | | | | | | |
| Sublimity | T52 | 3000 | 500+ | 2 – 1 ½ | | 3000 | Rear/Side |
| Tangent | T71* | 3000 | 750 | | 200’ of 3” | 3500 | Rear/Side |
| | T73* | 3000 | 750 | | 200’ of 3” | 3500 | Rear/Side |
| Turner | T959* | 3000 | 1000+ | 2 – 1 ¾<br>1 – 2 ½ | | 3000 | Rear/Side |
| | T969 | 2500 | 750+ | 2 – 1 ¾ | | 2500 | Rear only |

* Tender equipped with front bumper nozzle and can pump in motion.
\+ Draft Capable
! Four Wheel Drive Tactical Tender