

I. Introduction

10 minutes

● Introduction

(1 of 2)

- • An uninterrupted water supply is:
 - – The primary weapon for extinguishment
 - – Essential for fire fighter safety
- • Ensuring a dependable water supply is a
 - critical fireground operation and must be
 - accomplished right away.

● Introduction (2 of 2)

- ● Water sources include:
 - – Municipal and private water systems
 - – Static water sources
 - – Mobile water supply operations

II. Municipal Water Systems

25 minutes

- Municipal Water Systems
- • Provide clean water for public use.
- • Provide water for fire protection.
- • Most are owned and operated by a local
- government agency. But some
- privately owned
- • Systems includes a water source, a treatment plant, and a distribution system.

- Water Sources
- Sources include:
 - – Wells
 - – Rivers or streams
 - – Lakes
 - – Reservoirs
- Many systems draw water from several
- sources.

- Water Treatment Facilities

- ● Remove impurities
- ● All water must be suitable for drinking.
- ● Chemicals used to kill bacteria and
- harmful organisms.

- Water Distribution Systems
(1 of 5)

- • Water mains deliver water from treatment facilities to the end user.
- • Include pumps, storage tanks, and
- reservoirs

- Water Distribution Systems
(2 of 5)

- • Water pressure
 - – Generally 20-80 psi
 - – Hydrant pressure should not drop below 20 psi.
 - – Usually produced by pumps (directly or indirectly)

● Water Distribution Systems (3 of 5)

- ● Water pressure may also be produced by gravity.
- – Gravity-feed system
- – Elevated water storage towers

- • Water mains typically follow a grid system.
- • May have dead-end mains
 - – Water enters from only one direction.
 - – Limited available water supply
 - – Multiple hydrants rob water from each other.

(5 of 5)

- • Water main valves
- – Control valves: located throughout system to shut down sections
- – Shut-off valves: used to shut off water flow to individual customers and hydrants

III. Fire Hydrants

60 minutes

● Fire Hydrants

- • Provide water for firefighting purposes
- • Installed on both public and private water systems
- • Consist of an upright steel casing attached to the underground distribution system

- **Dry-Barrel Hydrants**
 - Used in cold climates
- Hydrant valve is located at the base of the barrel and allows water to flow into the hydrant.
- Water flows into the hydrant only when it will be used.
- Opened by turning nut on top of hydrant

Operating a Fire Hydrant



Step 1: Remove the cap from the outlet you will be using.



Step 2: Quickly look inside the hydrant opening for foreign objects. (Dry-barrel hydrant only.)

Skill Drill 15-1

Operating a Fire Hydrant



Step 3: Check to ensure that the remaining caps are snugly attached. (Dry-barrel hydrant only.)



Step 2: Attach the hydrant wrench to the stem nut. Check for an arrow indicating the direction to turn to open.

Skill Drill 15-1

Operating a Fire Hydrant



Step 5: Open the hydrant enough to verify flow and flush hydrant. (Dry-barrel hydrant only.)



Step 6: Shut off the flow of water. (Dry-barrel hydrant only.)

Skill Drill 15-1

Operating a Fire Hydrant



Step 7: Attach hose or valve to the hydrant outlet(s).



Step 8: When instructed, turn the hydrant wrench to fully open the valve.

Skill Drill 15-1

Operating a Fire Hydrant

Step 9: Open slowly to avoid pressure surge.



- • If water is left standing, it may freeze.
- • After each use, water drains out of barrel.
- • When hydrant is fully open, drain is closed.
- • When hydrant is fully closed, drain is open.
- • Partially open hydrant allows water to escape under pressure, thru drain.
- – Causes erosion of soil around hydrant
- – Reduces hydrant flow

Skill Drill 15-2

Shutting Down a Hydrant



Step 1: Turn the wrench to slowly close the hydrant valve.



Step 2: Drain the hose line. Slowly disconnect the hose from the hydrant outlet.

Skill Drill 15-2

Shutting Down a Hydrant



Step 3: Leave one hydrant outlet open until the hydrant is fully drained.



Step 4: Replace the hydrant cap.

● Wet-Barrel Hydrants

- • Used in locations where temperatures do not drop below freezing
- • The barrel always has water in it.
- • Each outlet is individually controlled.
- • Additional lines can be added while water is flowing.

● Location of Hydrants

- • Located according to local standards and
 - national recommended practices
 - – Every 500' in residential areas; every 300' in high-value areas
 - – Every intersection; mid-block when over set distances
 - – Based on occupancy, construction, and size of the building

Types of Hydrant

Pressure

1 of 2

- Static pressure - Pressure in the system when water is not moving
- Normal operating pressure - The amount of pressure in the system during a period of normal consumption

Types of Hydrant

Pressure

2 of 2

- Residual pressure - The amount of pressure that remains in the system when water is flowing.
- Flow pressure - Measures the quantity of water flowing through an opening during a hydrant test

Of the 4 types of Hydrant Pressure above

- Static and Residual are the two most important.

● Inspecting and Maintaining Fire Hydrants

- ● Check for visibility and access.
(1 of 2)
- ● Check for exterior damage.
- ● Ensure barrel is dry and free of debris.
- ● Ensure all caps in good working order.
- ● Open valve for water flow and remove debris.
- ● Shut down and ensure proper draining.
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- Inspecting and Maintaining
Fire Hydrants
(2 of 2)

- • To clean threads, use a steel brush.
- • To remove burrs on threads, use a triangular file.
- • Replace cracked, broke, or missing caps and/or gaskets.
- • Lubricate as recommended by
- manufacturer.

Testing Fire Hydrants

- • Fire-suppression companies are often assigned to test the flow from hydrants in their districts.
- • Testing procedures are simple, but an understanding of hydraulics and attention to detail are required.

● Flow and Pressure (1 of 3)

- • Flow is the quantity of water moving
- through a pipe, hose, or nozzle measured by its volume, usually in gallons per minute.
- • Pressure is the energy level measured
- in pounds per square inch (psi)

● Flow and Pressure

- • Static pressure: pressure when no water is moving
 - – Measured by placing a gauge on a port with no water in the system moving
- • Normal operating pressure: pressure during a period of normal consumption
 - – Measured by placing a gauge on a port during a period of normal

● Flow and Pressure (3 of 3)

- • Residual pressure: Amount of pressure that remains in the system when water is flowing
- • Flow pressure: Measures quantity of water flowing through an opening during a hydrant test
- – Measured with a Pitot gauge

● Hydrant Testing Procedure (1 of 3)

- ● Requires:
 - – Two adjacent hydrants
 - – Pitot gauge
 - – Outlet cap with a pressure gauge

● Hydrant Testing Procedure (2 of 3)

- • Place cap gauge on an outlet of first hydrant.
- • Open hydrant valve and record pressure reading as the static pressure.
- • At second hydrant, remove cap and open valve.

● Hydrant Testing Procedure (3 of 3)

- • Place Pitot gauge in stream and record as Pitot pressure.
- • At the same time, record residual pressure at the first hydrant.
- • Calculate or use look-up tables to determine flow.

IV. Rural Water Supplies

60 minutes

- Rural Water Supplies

- • Residents of rural areas usually depend on wells or cisterns to provide water.
- • No hydrants in these areas, so water must be obtained from other sources

- Static Water Sources
(1 of 2)

- • Static sources include:
 - – Rivers or streams
 - – Lakes, ponds, oceans
 - – Reservoirs
 - – Swimming pools
 - – Cisterns

● Static Water Sources (2 of 2)

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- • Must be accessible to a fire engine or portable pump
- – Is there a road or hard surface within 20 feet?
- • May have a dry hydrant permanently installed

- Mobile Water Supply Apparatus
 - Also known as tankers or water tenders
 - Designed to carry water to the fire
 - Generally carry 1,000-3,500 gallons
 - May be used to pump water directly into attack engine

● Portable Tanks (1 of 2)

- • Carried on fire apparatus to be set up at
- the fire scene
- • Typically hold 600-5,000 gallons of water
- • Tankers are used to fill the portable tanks.
- • The attack engine drafts from the tanks.

- Portable Tanks
(2 of 2)

- • Dump valves on the tankers allow them to off-load up to 3,000 gallons per minute.

- Tanker Shuttles
 - Used to deliver a large volume of water over a long period of time
- Number required depends on
 - – Distance between fill site and fire
 - – Time it takes to dump and to reload
 - – Flow rate required at the fire scene
- Eliminate delays at fill site and dump site

V. Summary

5 minutes

Summary

- • Municipal system has three components:
- water source, treatment plant, and distribution system.
- • Hydrants may be wet-barrel or dry-barrel.
- • Inspection of hydrants is needed annually.
- • Testing is done to determine maximum
- flow availability.
- • Rural water supply utilizes fill sites, tankers, and portable tanks.

End