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 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.
• 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
Skill Drill 15-1
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 2: Attach the hydrant wrench to the stem nut. Check for an arrow indicating the direction to turn to open.

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

• 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.
• 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 consumption
• 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
• 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.
• 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)

• • 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