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 Distribution Systems (4 of 5)

- 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 Distribution Systems (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

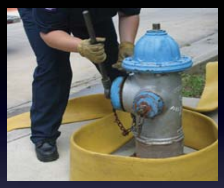
- Fire Hydrants

  - 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

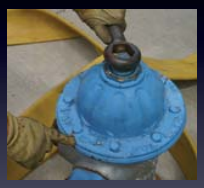


Step 1: Remove the cap from the outlet you will be using.

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).

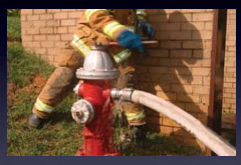
Step 8: When instructed, turn the hydrant wrench to fully open the valve.

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 (1 of 2)
  - 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.
  - Replace cap.

- 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 (2 of 3)

- • 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

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)

-
- 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