Firefighting Water Supply

Brad Fiore – Fire Chief
Cottekill Volunteer Fire Company
How Water Extinguishes Fire

- Cooling is the primary manner.
- Smothering may also occur to a lesser extent.
- Steam displaces heat, smoke, and fire gases.
Two Methods of Calculating Fire Flow

1. The Iowa State method

2. The National Fire Academy method

*Courtesy of Ron Jeffers, Union City, NJ*
Iowa method

• Developed in the 1950’s at Iowa state university
• Based on analysis of extensive empirical evidence from live fire tests
• Used for isolated single compartment
• 30 sec one application of a fog stream

\[
\text{Required Flow}_{(30 \text{ s})} = \frac{\text{Length} \times \text{Width} \times \text{Height}}{100}
\]

100 = the cubic feet of steam created by ½ gallon of water
National Fire Academy method

- Developed in the 1980’s at the National Fire Academy
- Based on the knowledge of experienced fire officers
- Designed for offensive interior operation involving a direct attack
- Incorporates the attack, backup, & exposure protection

\[
\text{Needed Fire Flow} = \left( \frac{\text{Length} \times \text{Width}}{3} \right) + \left( 0.25 \times \frac{\text{Basic Fire Flow per Exposure}}{\text{involvement}} \right)
\]
The LGA/Water UK National Guidance Document on the "Provision of Water for Firefighting"

• Housing
  • Not more than 2 floors = 480lpm
  • Up to 2100lpm for more than 2 floors
• Industry
  • Up to one hectare – 1200lpm
  • 1 – 2 hectare – 2100lpm
  • 2 – 3 hectare – 3000lpm
• Shopping & Offices
  • 1200lpm – 4500lpm

• VILLAGE HALLS
  • 900LPM
• PRIMARY SCHOOLS
  • 1200LPM
• COLLEGES & LARGE HEALTH FACILITIES
  • 2100LPM
# Types of Water Supplies

**On board**

- Water carried on engines & Tankers/Tenders
  - Engines – 1800 to 3785 liters
  - Tankers/Tenders – 9500 Liters

**Pressurized**

- Hydrants
- Direct supply
- Relay pumping

**Static**

- Ponds, Rivers & Bore hole wells
- Relay pumping
- Tanker/Tender Shuttle
Onboard Supply
Tank Water

• Limited supply
• Initial knock down
• Requires a positive water supply to be established
Pressurized Supply

- Limited to the flow of the hydrant
- Is a positive and continuous supply
- Requires laying 64mm hose from hydrant to the engine
static Supply
Ponds, rivers, & bore hole wells

- Limited only to the pump size of engine at the draft site
- Is a positive and continuous supply
- Requires relay pumping or shuttling water
Relay pumping

Long distance pumping
Boost's pressure
Overcome friction loss
Table 7.1a Maximum distances for required flowrates between pumps operating at 7 bar for 70mm and 90mm hose with standard instantaneous couplings.

<table>
<thead>
<tr>
<th>REQUIRED FLOWRATE litres/min</th>
<th>MAXIMUM DISTANCE BETWEEN PUMPS (metres) OPERATING AT 7 bar</th>
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<tr>
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<td>70mm single</td>
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<td>40</td>
</tr>
<tr>
<td>3000</td>
<td></td>
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</tbody>
</table>

Relay pumping

- Long distance pumping
- Boost's pressure
- Overcome friction loss
Tanker Shuttle

- Hauling water over long distances
- Can be pumped off into engine
Tanker Shuttle

- Or pumped off into portable holding tank
Tanker Shuttle

Supply Engine at the dump site provides water to the attack engine