

Operating Guideline # 833

Water Mapping

December 7, 2023



PURPOSE:

The purpose of this Operating Guideline is to have firefighters anticipate where water goes when applied from a hose to the room of a residential structure. Firefighters should then be able to correctly apply water to fire, thereby increasing safety for firefighters and occupants.

ISSUE/RATIONALE:

Using science to measure how different water application techniques can benefit firefighters when applying fire streams for fire attack. Improper or inadequate use of fire streams may lead to worsening fire conditions, increasing the risk to firefighters.

During a structure fire, a nozzle firefighter's visibility is often limited to the first few meters of the stream. Due to the limitations of structural turnout gear, the firefighter cannot enter the compartment of origin without applying water to cool the atmosphere. Limited visibility and the need to apply water to the compartment before entering, make it important to understand where the water from the hose is going.

GUIDELINE:

1. All members of the Muskoka Lakes Fire Department should take the 45 minute ["Water Mapping in Residential Structures"](#) FSRI online course. In this online course, firefighters will learn how to anticipate where water goes when applied from a hose to the room of a residential structure. Submit your certificate to training to receive compensation.
2. Steeper angles are better when applying water into doorways and windows, science has shown that more water is distributed along the walls/ceilings of the room.
3. There is minimal difference in water distribution when streams are applied from a door or a window. Therefore apply water early from either position.
4. Momentum of the water is the main difference in water distribution, not where the stream comes from or how much pressure is used. Do not decrease the pressure, as you will likely decrease the flow which is required to defeat the BTU's.
5. The distance a stream has to travel has an effect on momentum, therefore applying water into a second storey window from the ground level will have greater dispersion than a first storey window from the ground level. Consequently if the stream travels further it may result in more water applying to the centre of the room rather than the walls and ceiling.
6. Regardless of the nozzle pattern chosen (O, Z, T, U), the amount of water that ended up opposite the door at the far wall was significantly larger than anywhere else in the room.
7. The pattern created by the nozzle had little effect on the water distribution. Smooth bore, straight streams and fog patterns all create similar applications of the water.
8. Bale position did have some impact in velocity and momentum, a suggestion of alternating between full bale open and half bale open would result in more water dispersion.
9. The ability to apply water to all surfaces is limited when the nozzle is located outside the compartment, firefighters should initially apply water to all surfaces from outside the compartment then transition into the compartment to better put water on all surfaces.
10. When moving down a hallway firefighters should use a wall / ceiling / wall application keeping the angle of impact steep. The bulk of the water will not enter neighbouring

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compartments as it rides the walls. It will however provide the best distribution of water down the hallway.

11. Once the compartment is reached, firefighters should apply a steep angle stream through the doorway off the ceiling to provide the best distribution in the compartment before entering.

12. If flames are visible, the firefighter should apply water to the flame base.

13. Once in the compartment the nozzle firefighter should apply water to all the surfaces including areas that could not be reached from the exterior of the room.

RESPONSIBILITY:

It is the responsibility of all firefighting staff to comply with the provisions of this Operating Guideline.

REFERENCES:

- [Occupational Health and Safety Act](#) clauses 25(2)(a,d,h)
- [S. 21 Firefighter Guidance Note: 6-26, Structural Fire Fighting – fire streams and ventilation](#)
- [UL Fire Safety Research Institute training portal](#)