Modern Firefighting Strategies

Matching Modern Firefighting Principles to Your Operational Plan

Chief Mike Richardson

Introduction

To explore the details contained in modern firefighting principles, based on recent studies and tests conducted in the US. We will explore ways in which these principles can help you to improve your operational strategies and planning.

Background

Mike Richardson, Fire Chief, Decatur FD

- Rural Community VFD
- Growing City Combination FD
- Thriving City Career FD
- Growing Rural Combination FD
- From alone in a Brush Truck to Commanding Multiple-Alarm

Setting the Stage

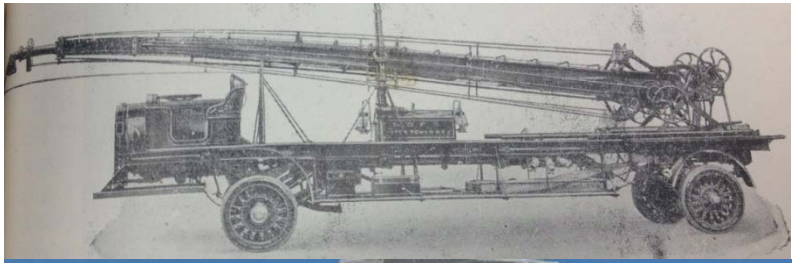
- Fires are down by more than half since the 1970's.
- You can't go to enough fires to put all the pieces together.
- You get 1% of your basic training on fire behavior.
- Just because you can go somewhere does not mean you should (Turnout gear and SCBA provide a factor of safety, they are not meant to be pushed to the limits).
- If you know why, you can be a thinking firefighter and not a robot.
- To be a thinking firefighter you have to have knowledge and not beliefs; "that's the way we have always done it" is a dangerous statement.
- Experience and knowledge have to coexist, you don't gain experience if you don't know what is happening.
- You need the how to go with the why, don't overlook the basics.

Misconceptions about Modern Fire Principles include….

- Never ventilate…
- Never go inside…
- Never do a primary search
- Always throw water from the outside…
- Never vertically vent…
- Everything you did in the past is wrong…

No amount of technology is going to replace the need for you to know your profession

Turnout Gear



Apparatus

SCBA

Tools

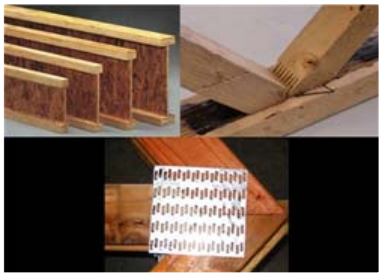
Your workplace has changed, you have to evolve

Larger Homes

Open Spaces

Evolving Fuel Loads

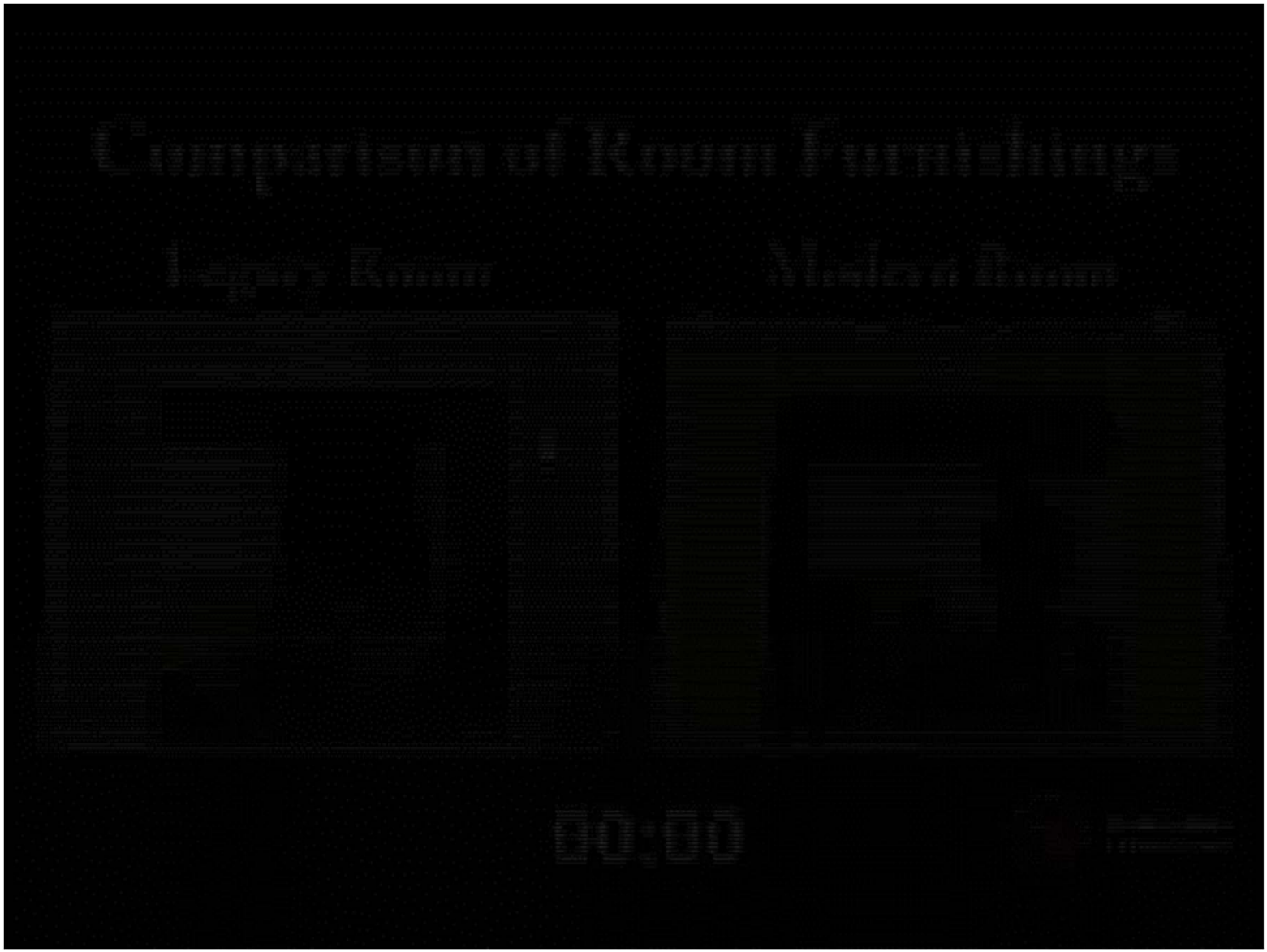
Inc. Voids Spaces



Changing Bldg. Materials

Smaller Lots

New Technologies


Comparison of Known Formaldehyde
Paper Room
Media Room
00:00

Your workplace has changed, you have to evolve

Faster fire propagation

Shorter time to flashover

Rapid changes in fire dynamics

Shorter escape times

Shorter time to collapse

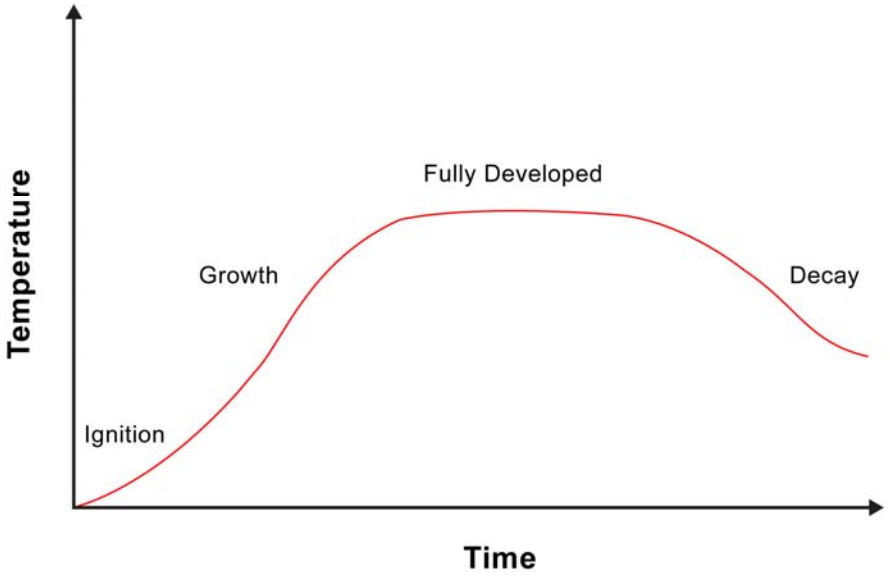
Inc. Exposure Problems

New and Unknown Hazards

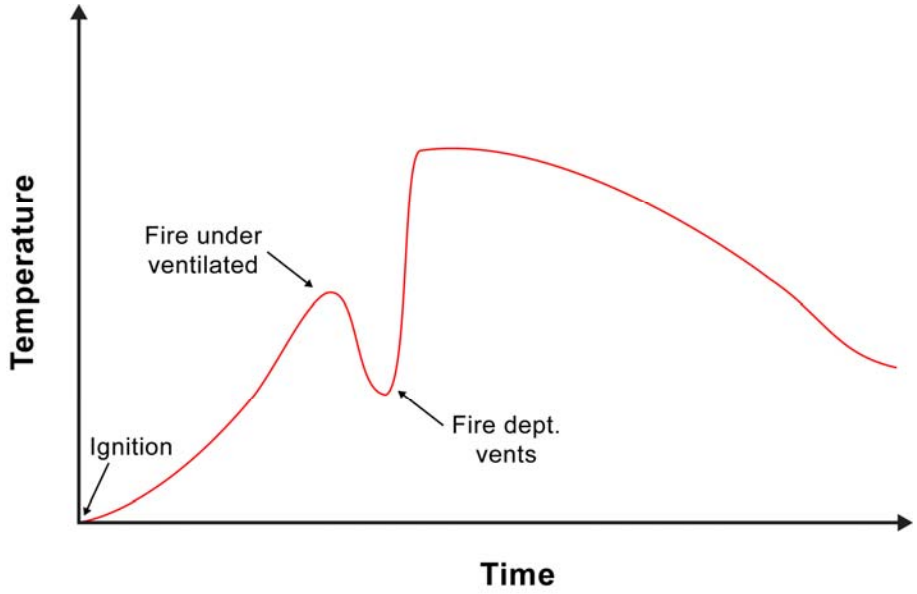
Science drives Innovation and Efficiency

The stages of fire development change when a fire becomes ventilation limited.

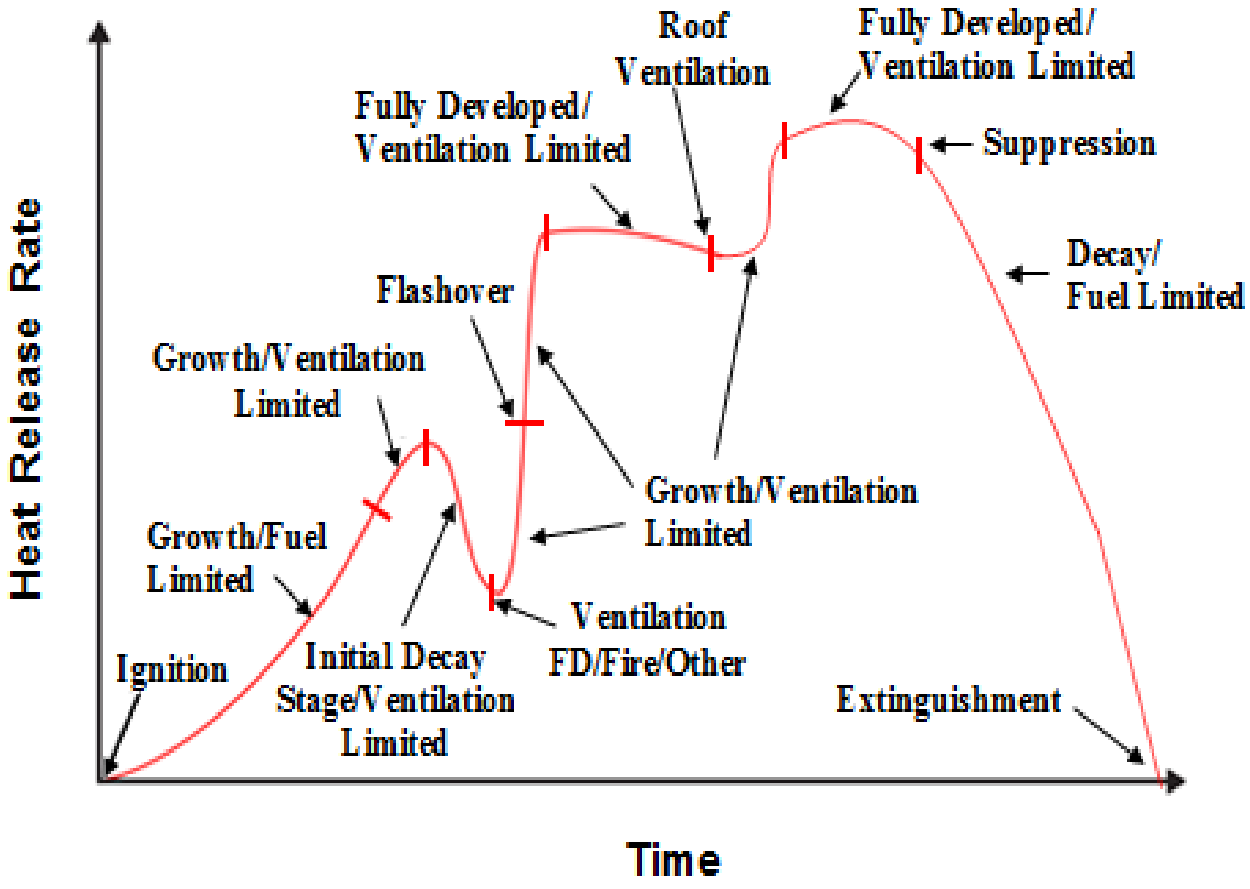
Traditional Fire Behavior
Fuel Controlled Fire



Typical Structural Fire Behavior
Ventilation Controlled Fire

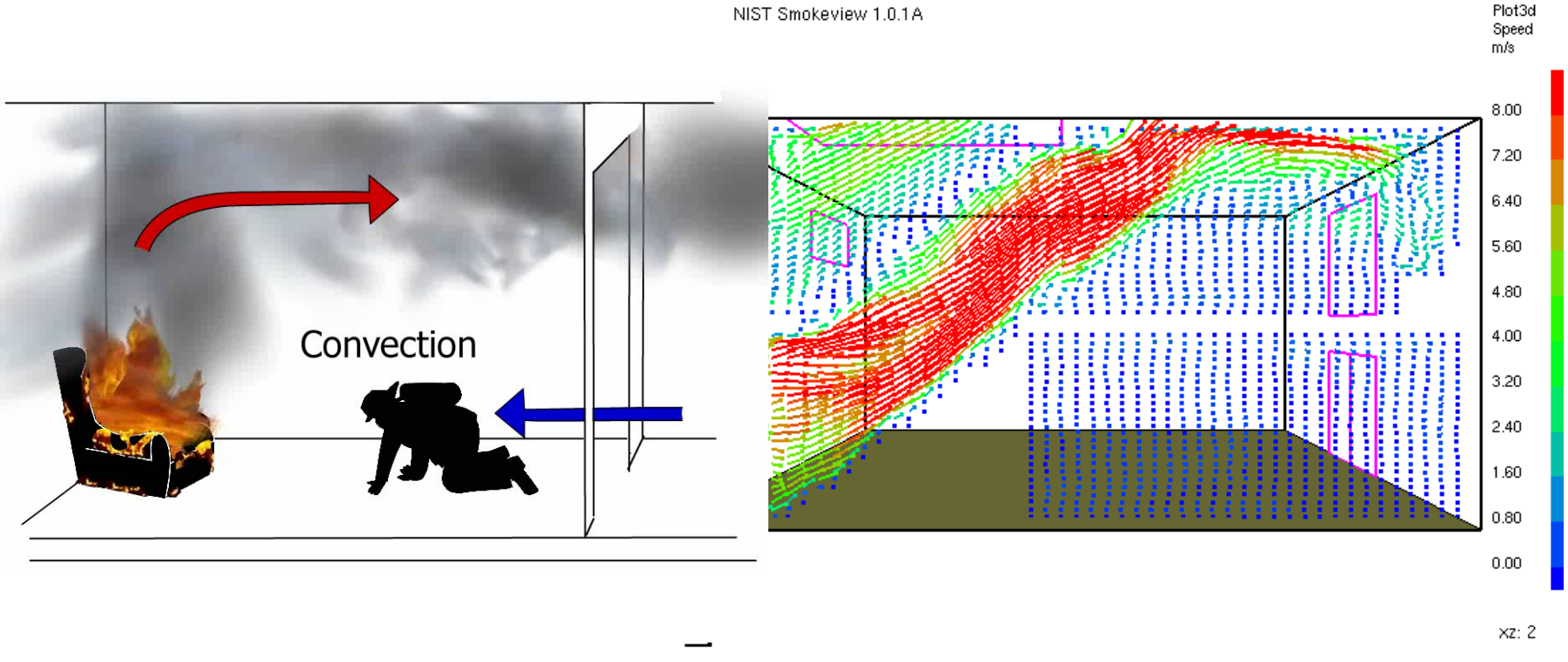


Stages of Fire Development

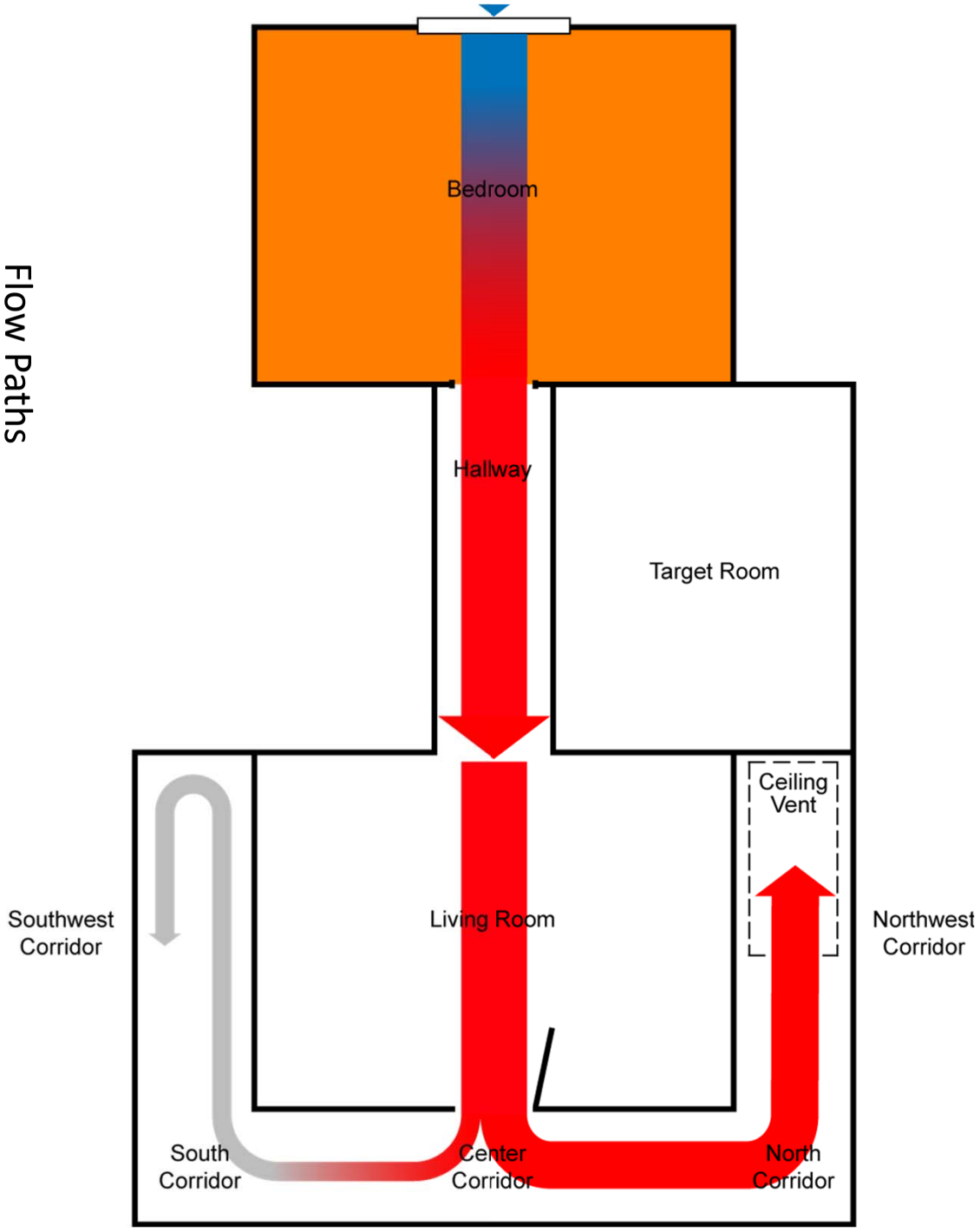


Never be between where the fire is and where it wants to go without water or a door to close.

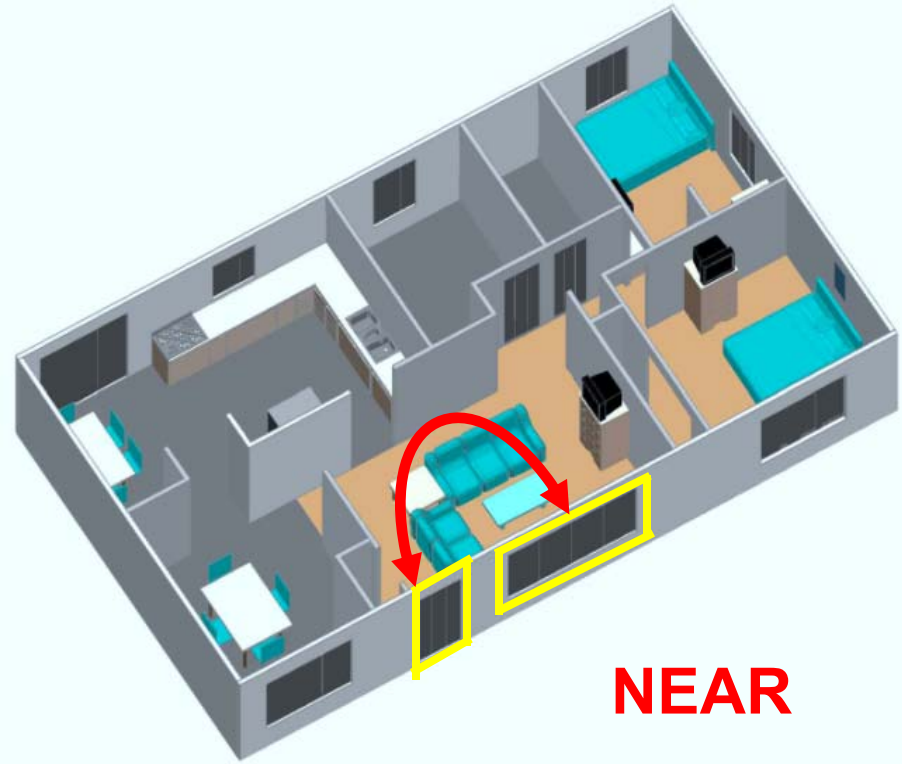
The flow path is the volume between an inlet and an outlet that allows the movement of heat and smoke from the higher pressure within the fire area towards the lower pressure areas accessible via doors and window openings.

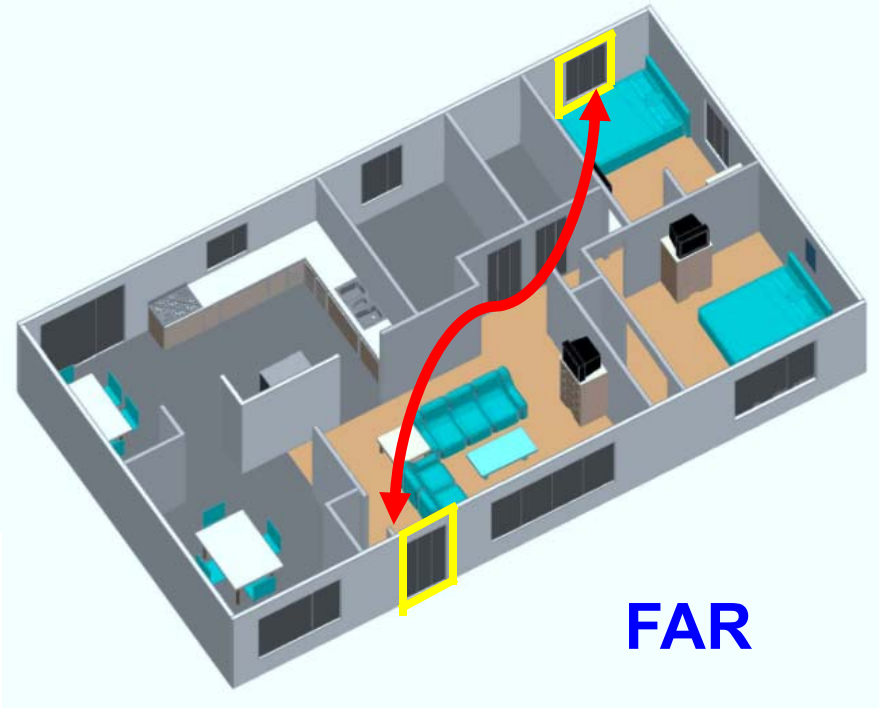


Flow Paths


Bedroom
Hallway
Target Room
Ceiling Vent
Southwest Corridor
Living Room
Northwest Corridor
South Corridor
Center Corridor
North Corridor

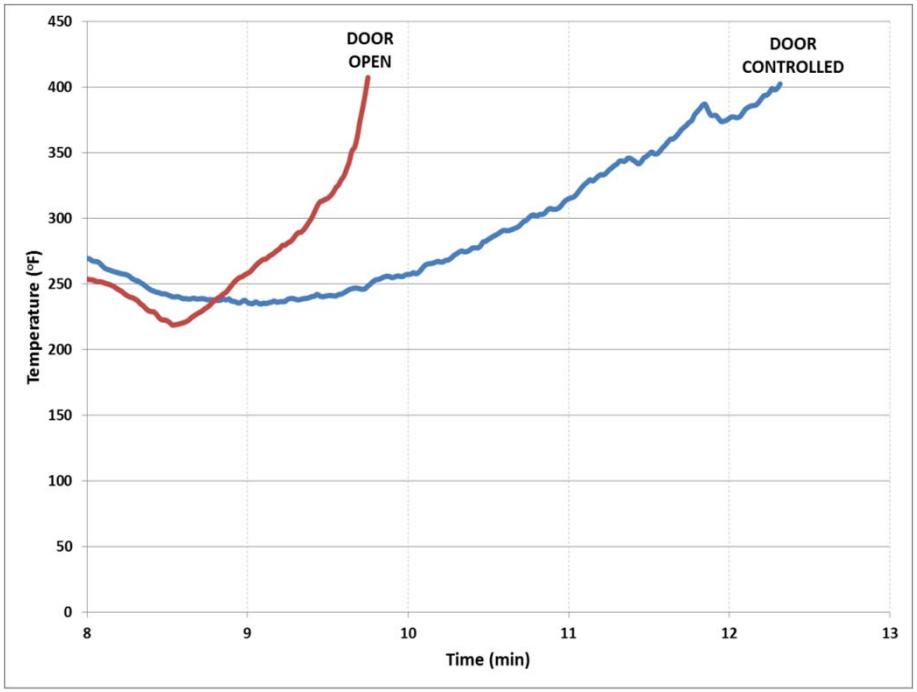
Fire flows from high pressure to low pressure.

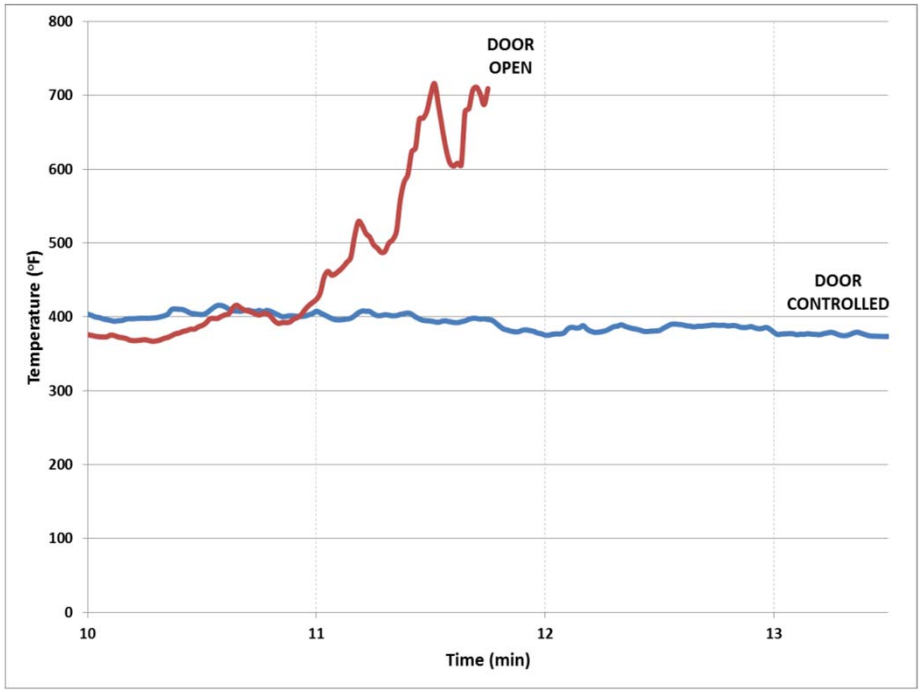





0:00
NIST

Controlling the door: Limit the air, limit the size of the fire.





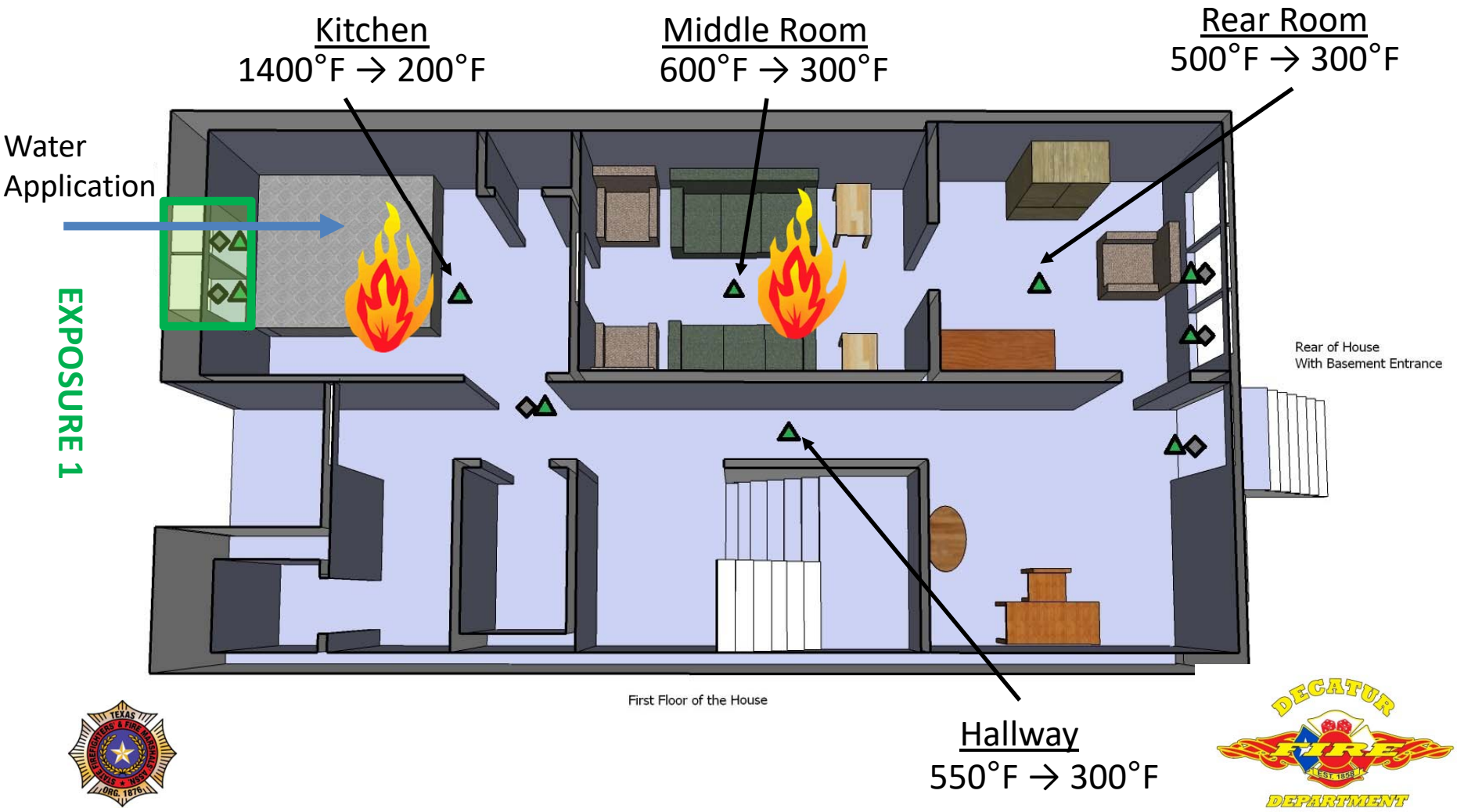
- Door control is a temporary action (water on fire / door open)
- Door control is not only for hoseline advancement (search)
- Door control is not only for the front door (apartments)
- If door may relatch then use tool, hoseline or different tactic


DOOR CONTROL
DOOR OPEN
FRONT
FRONT
5X REAL TIME
UL

Water does not push fire.

Flow Path from Kitchen Windows
Rail Road Flat 2 (642A) – 14 Seconds of Water

Fire Cannot be Pushed – No Flowpath




Front
Rear
702F
2000+
700
109F
Exterior
Kitchen IR
NIST 07:30
Rear Room IR

Flow path and suppression must be considered together.

Structural Fire Tactical Goals

S.L.I.C.E.R.S.

Sequential Actions

Size Up
Locate the Fire
Identify and Control Flow Path
Cool the Space from Safest Location
Extinguish the Fire

Actions of Opportunity

Rescue
Salvage

(Table 2: SLICERS Acronym)

SLICE-RS

SIZE UP

- On Scene Report
- Building Construction
- Fire Presentation
- Smoke Presentation
- Time of Day
- Survivability Profile
- What is Going On Now
- Must Include a 360!

SLICE-RS

Location of the Fire

- May not be immediately obvious
- May not ever be obvious from the exterior
- Utilize smoke conditions and smoke presentation to make an informed decision as to fire location
- Determine the best access point for cooling

SLICE-RS

IDENTIFY / CONTROL FLOW PATH

- Be aware of the existing ventilation exhaust and / or intake openings
- Coordinate any fire department ventilation openings with command and crews to manage flow paths
- Control The Door!

We would never consider putting a crew on the roof with a hose line and making entry through a ventilation opening.

But we do that very thing at the front door when we enter.

SLICE-RS

COOL FROM A SAFE LOCATION

- This does not mean exterior only
- If naturally made openings exist, a quick hit from the exterior will help to “RESET” interior conditions
- Cool the atmosphere before making entry if fire progression and size-up dictate
- Have a second attack line ready for entry

SLICE-RS

The first priority in fire attack is to quickly get a line in position to apply water to the fire.

Remember that the attack line must get water on the fire as quickly as possible.

SLICE-RS

Extinguish

- Extinguishment can occur from multiple locations depending on the situation, interior or exterior
- Priority is to ensure a safe atmosphere prior to entry and interior hose line for extinguishment of the seat of the fire
- Aggressiveness is still a necessity!

SLICE-RS

RESCUE

- WE ARE NOT PLACING A LOWER PRIORITY ON RESCUE!
- We are ensuring that the atmosphere to effect a rescue is safer for both **civilians** and fire personnel
- Imminent Rescue
- Consider the patients well being

SLICE-RS

- Rescue is an action of opportunity and can take place at ANYTIME during the operation
- Train to step over a victim to shut the door first
- Cooling the fire first, makes the conditions better EVERY TIME!

SLICE-RS

SALVAGE / OVERHAUL

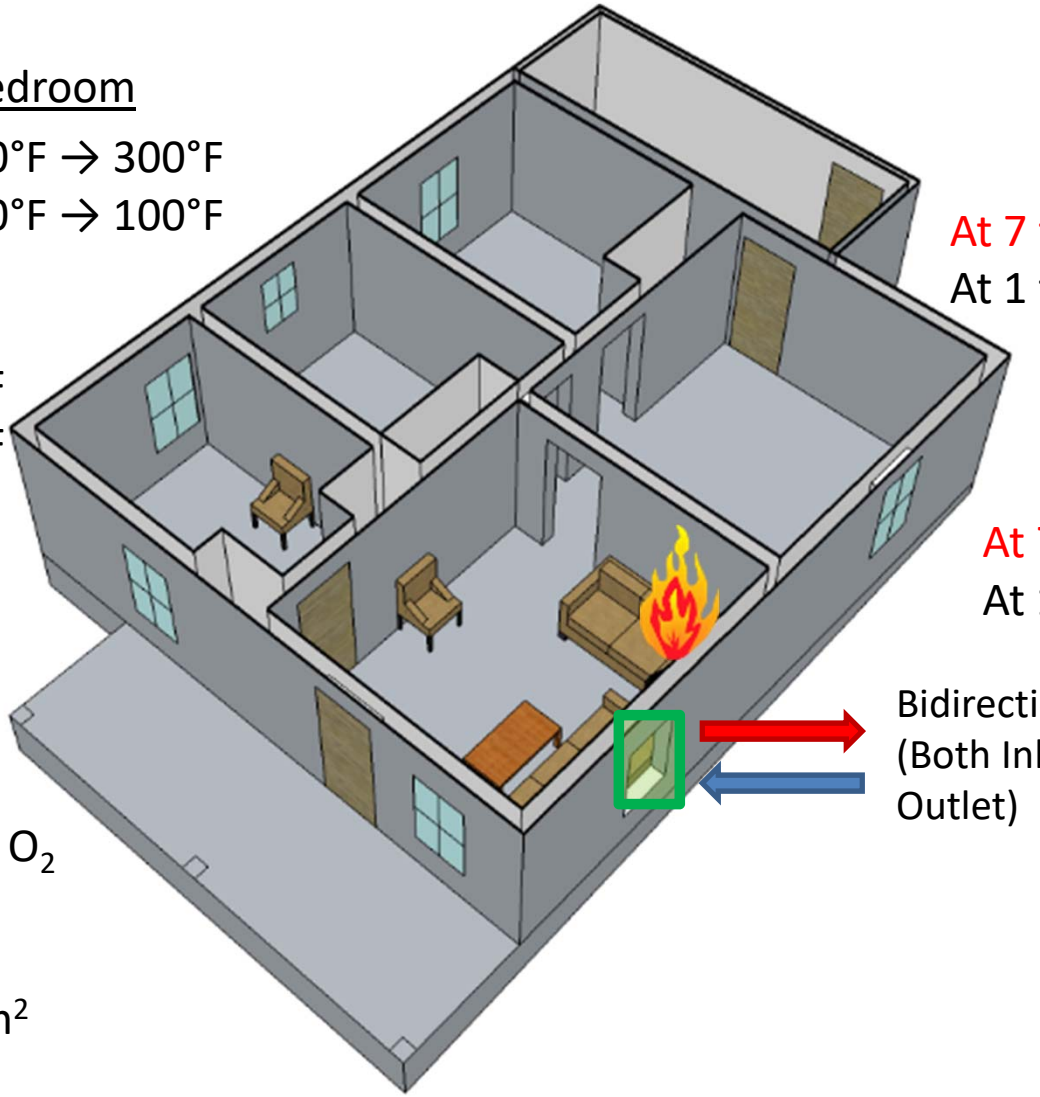
- Close the door!
- Searching for hidden fires and extension.
- Include atmospheric monitoring for respiratory environmental hazards.
- Recognition of the break-over point between IDLH conditions and safe respiratory conditions.

Door between 2 rooms. The photos below were taken at the scene of the LODD of Firefighter Mark Falkenhan (Baltimore County, MD) Jan.19, 2011


TEXAS
FIREFIGHTERS & FIRE MARSHALS
STATE ★ NBC
ORG. 1876


DECATUR
FIRE
EST. 1858
DEPARTMENT

Impact of Venting the Living Room Window



Rear Bedroom

At 7 ft: 300°F → 300°F
At 1 ft: 100°F → 100°F

Middle Bedroom

At 7 ft: 300°F → 300°F
At 1 ft: 100°F → 100°F
7 kW/m^2 → 5 kW/m^2

Front Bedroom

At 7 ft: 120°F → 120°F
At 1 ft: 70°F → 70°F
At 3 ft: 20% O_2 → 20% O_2
1% CO_2 → 1% CO_2
0% CO → 0% CO
0 kW/m^2 → 0 kW/m^2

Kitchen

At 7 ft: 400°F → 450°F
At 1 ft: 100°F → 100°F

Living Room

At 7 ft: 600°F → 700°F
At 1 ft: 200°F → 200°F

Bidirectional Flow (Both Inlet and Outlet)

Impact of Exterior Attack through Living Room Window with no other Ventilation

~ 30 seconds of water

Rear Bedroom

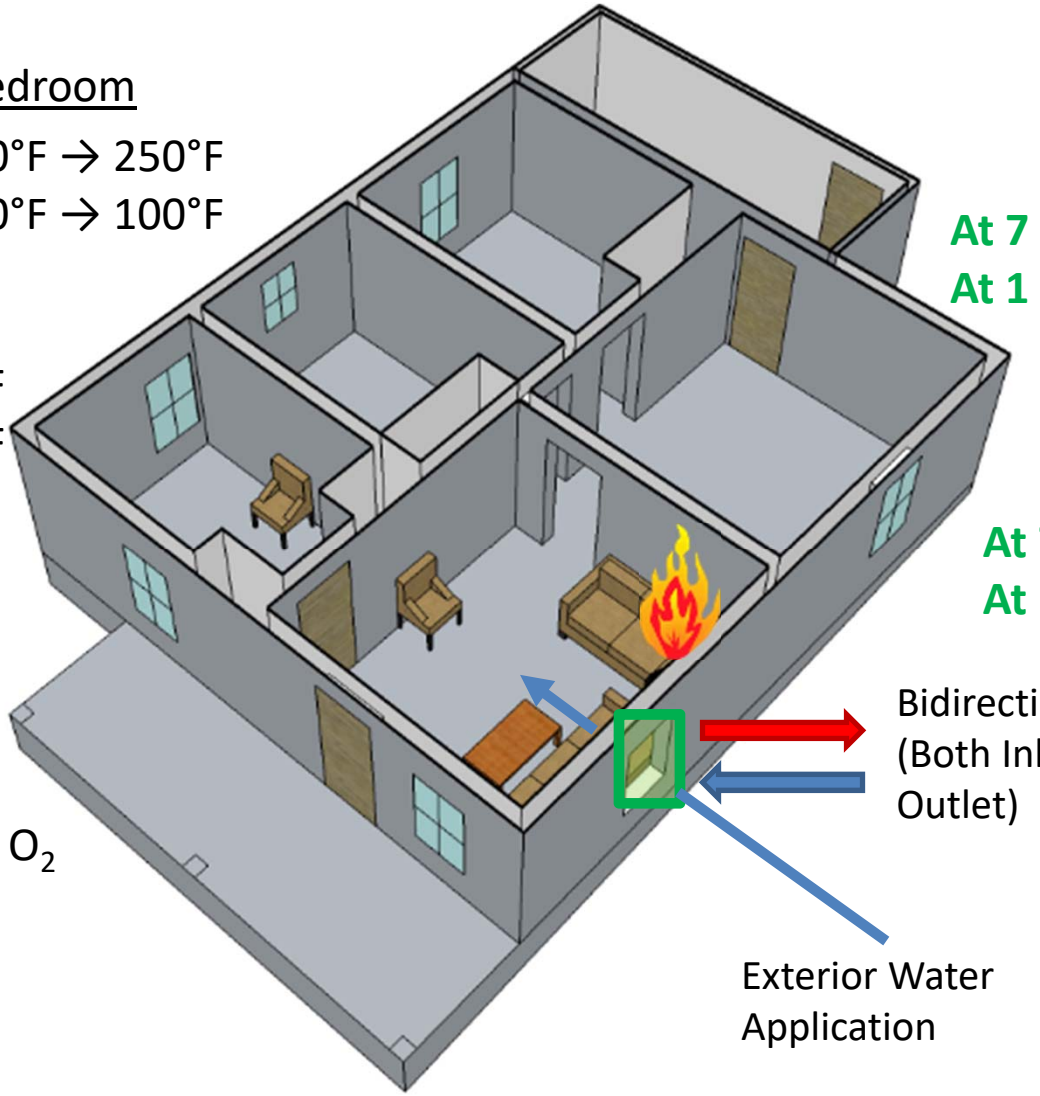
At 7 ft: 300°F → 250°F
At 1 ft: 100°F → 100°F

Middle Bedroom

At 7 ft: 300°F → 250°F
At 1 ft: 100°F → 100°F
5 kW/m^2 → 4 kW/m^2

Front Bedroom

At 7 ft: 120°F → 120°F
At 1 ft: 70°F → 70°F
At 3 ft: 20% O_2 → 20% O_2
0 kW/m^2 → 0 kW/m^2



Kitchen

At 7 ft: 450°F → 300°F
At 1 ft: 100°F → 100°F

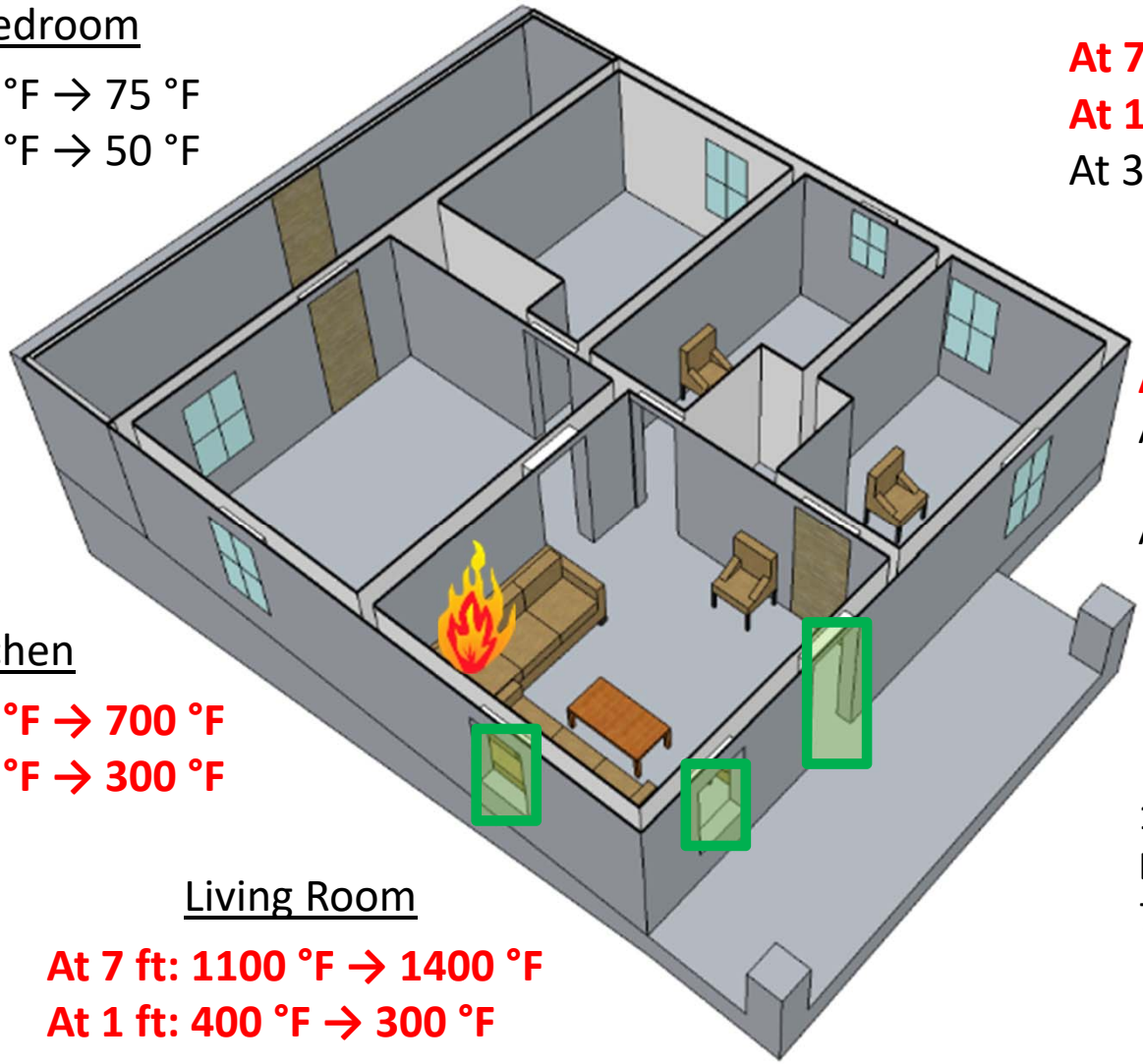
Living Room

At 7 ft: 700°F → 100°F
At 1 ft: 200°F → 70°F

Bidirectional Flow (Both Inlet and Outlet)

Exterior Water Application

Impact of Opening the Front Door



Rear Bedroom

At 7 ft: 70 °F → 75 °F
At 1 ft: 50 °F → 50 °F

Middle Bedroom

At 7 ft: 600 °F → 700 °F
At 1 ft: 200 °F → 300 °F
At 3 ft: 4 kW/m^2 → 4 kW/m^2

Front Bedroom

At 7 ft: 80 °F → 90 °F
At 1 ft: 50 °F → 50 °F

At 3 ft: 20% O_2 → 20% O_2
0% CO_2 → 0% CO_2
0% CO → 0% CO
3 kW/m^2 → 3 kW/m^2

Door Knob Inside Room:
100 °F → 200 °F
Door Knob Exposed to Fire:
700 °F → 1200 °F

Kitchen

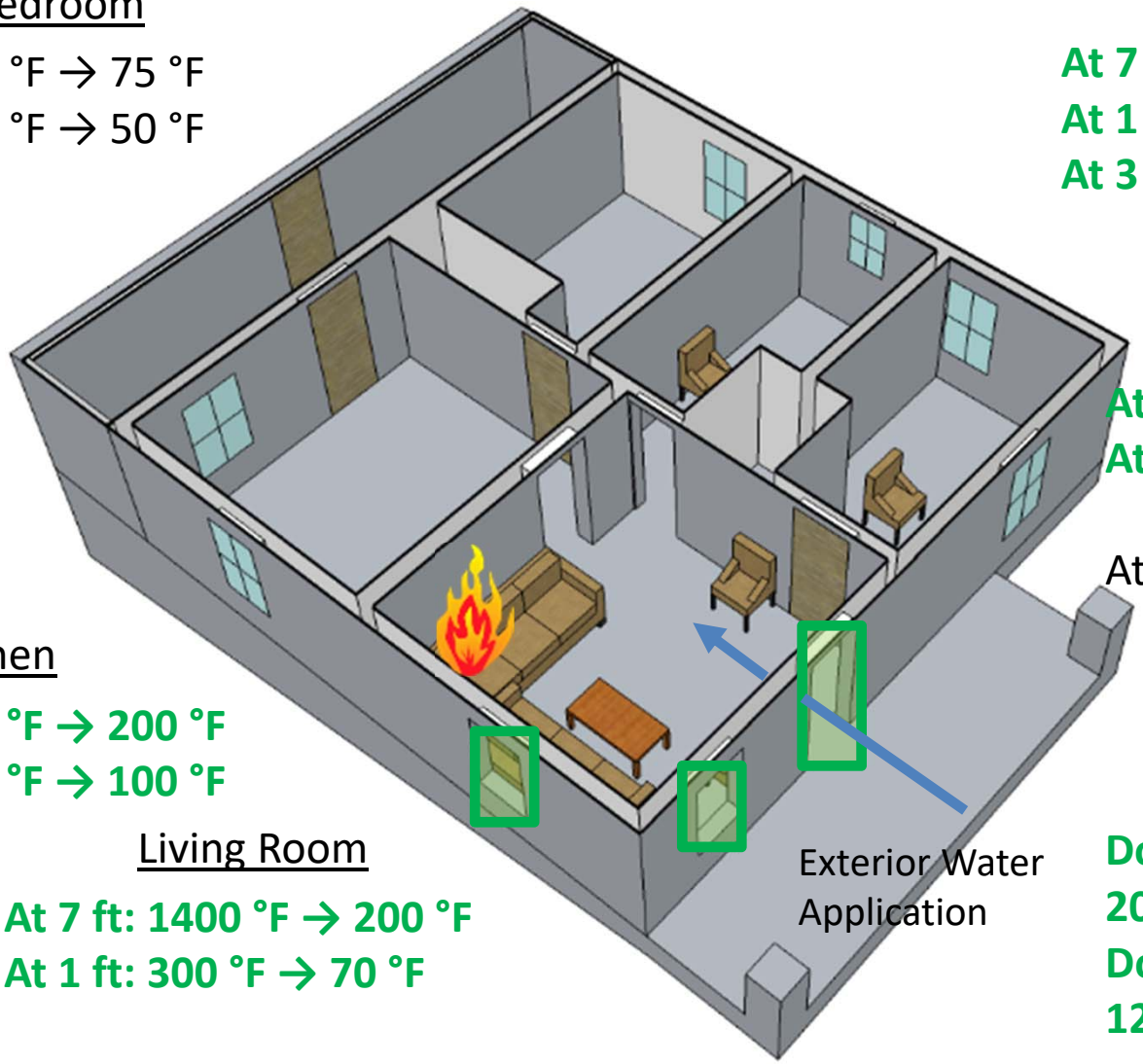
At 7 ft: 500 °F → 700 °F
At 1 ft: 200 °F → 300 °F

Living Room

At 7 ft: 1100 °F → 1400 °F
At 1 ft: 400 °F → 300 °F

Impact of Exterior Water through the Front Door

~ 75 seconds of water



Rear Bedroom

At 7 ft: 75 °F → 75 °F
At 1 ft: 50 °F → 50 °F

Middle Bedroom

At 7 ft: 700 °F → 200 °F
At 1 ft: 300 °F → 100 °F
At 3 ft: 4 kW/m² → 1 kW/m²

Front Bedroom

At 7 ft: 90 °F → 80 °F
At 1 ft: 50 °F → 50 °F

At 3 ft: 20% O_2 → 20% O_2
0% CO_2 → 0% CO_2
0% CO → 0% CO
3 kW/m² → 1 kW/m²

Kitchen

At 7 ft: 700 °F → 200 °F
At 1 ft: 300 °F → 100 °F

Living Room

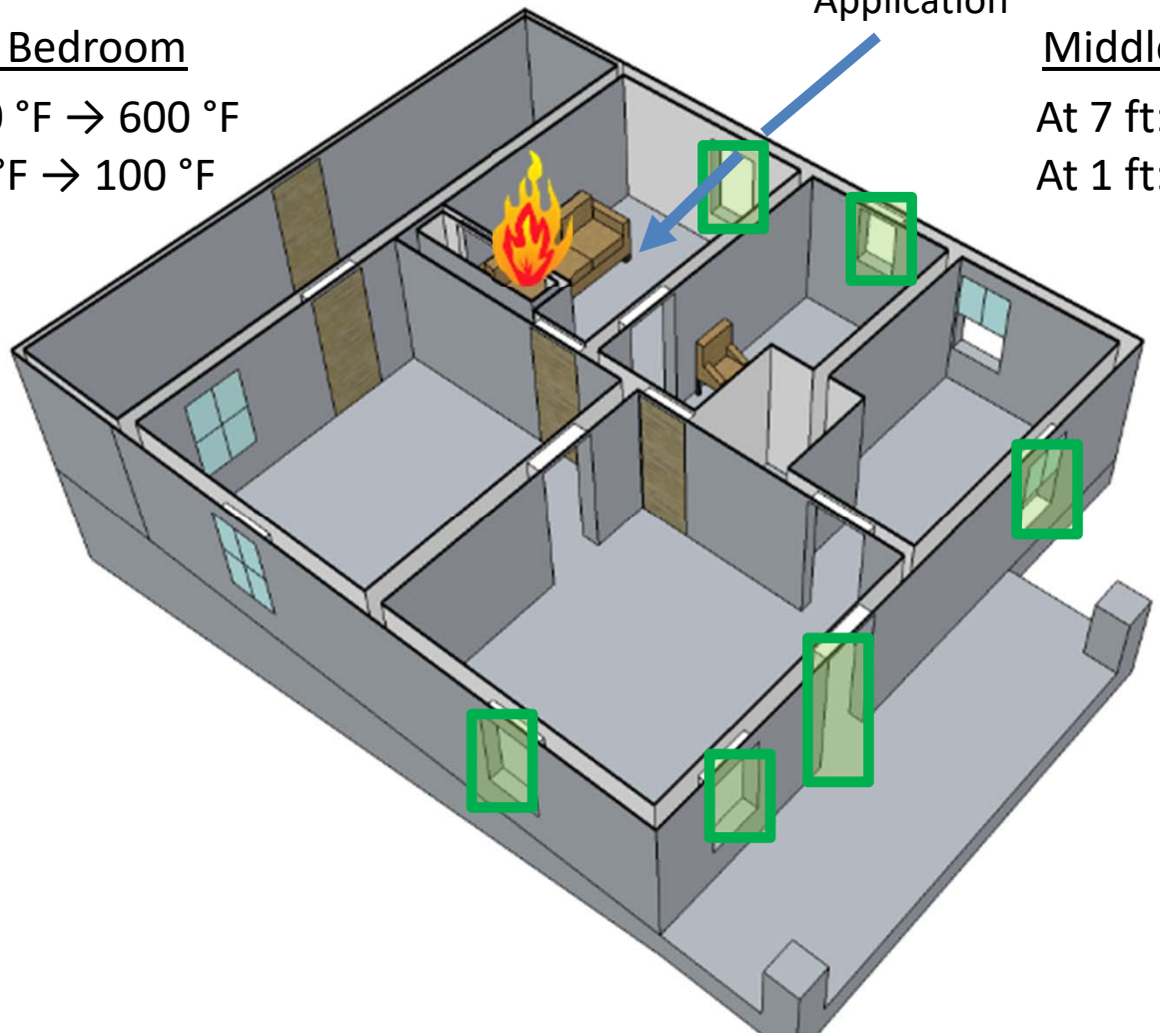
At 7 ft: 1400 °F → 200 °F
At 1 ft: 300 °F → 70 °F

Door Knob Inside Room:
200 °F → 100 °F
Door Knob Exposed to Fire:
1200 °F → 300 °F

Impact of Fog Nozzle Suppression through Rear (Burn) Bedroom Window

Applied for 60 seconds

Exterior Water Application



Rear (Burn) Bedroom

At 7 ft: 2300 °F → 600 °F

At 1 ft: 100 °F → 100 °F

Middle (Target) Bedroom

At 7 ft: 700 °F → 200 °F

At 1 ft: 300 °F → 100 °F

Where Do We Go From Here?

- Train Your Department
- Explain that this is scientifically founded and not opinion based to get support
- Work on the naysayers *(You will have them)*
- Develop SOGs (ISFSI Samples Available)
- Train on SLICE-RS Deployment Drills

Give SLICE-RS the training effort it deserves!


TEXAS
FIREFIGHTERS & FIRE MARSHALS
STATE ★ NBC
ORG. 1876


DECATUR
FIRE
EST. 1858
DEPARTMENT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