7TH INTERNATIONAL

TALL BUILDING FIRE SAFETY CONFERENCE

Excel London | 17-19 May 2022

Tall Buildings fire safety network

FIREX INTERNATIONAL

HIGH RISE FIREFIGHTING

Tactical Options For HighRise Fires

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Brent Brooks

Toronto, Canada

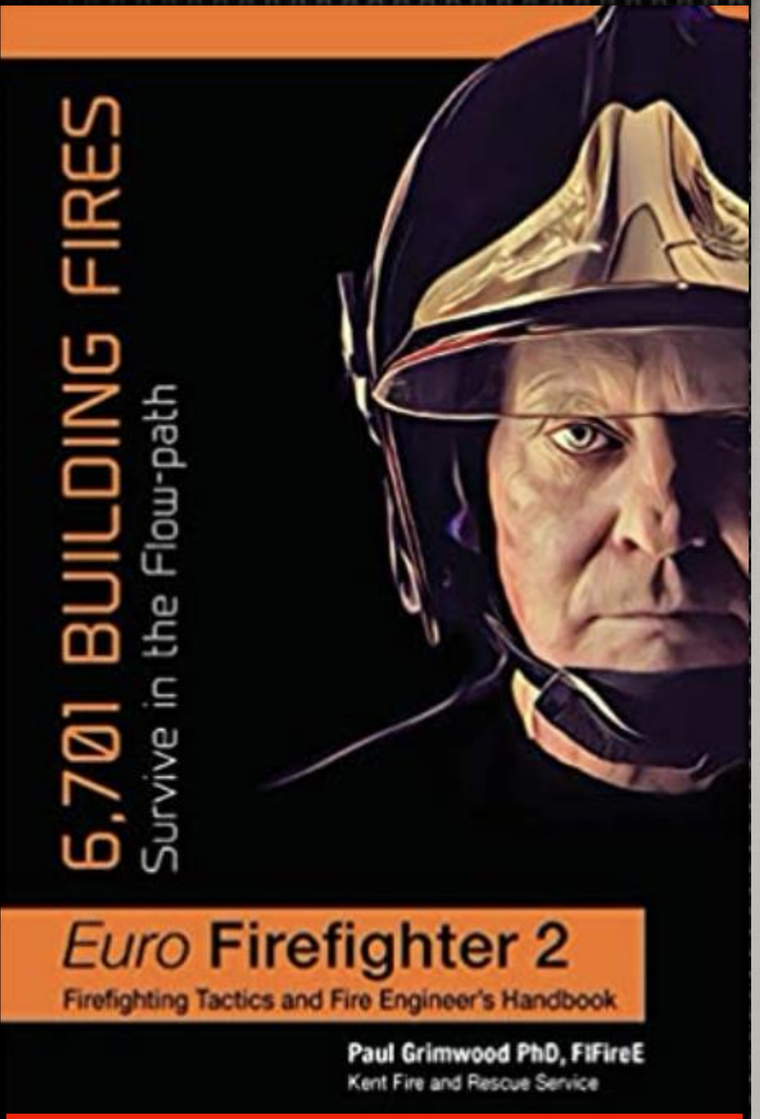
Tactical Options For HighRise Fires

“HighRise Work Sheets” found at the end of this presentation

highrisefirefighting.com

Brent Brooks is an international speaker and hands on instructor. Brent teaches HighRise Tactics and large diameter hose movements. Brent is currently a Captain with Toronto Fire Services. His 28 year career with firefighting started at Pearson Airport, with continuing duties at (De Havilland) and Bombardier Aero Space Crash Fire Rescue teams. He is assigned to Toronto's High Rise Unit. Brent has developed the IMS, training and RND for High Rise Operations. Brent's experience includes serving on numerous committees all related to High Rise Firefighting. He continues to travel the world attending conferences, symposiums, and hands on training. He has spoken on complex building systems, help run the 2019, 2020 Canadian HighRise conference, Started the HighRise Round Table in Toronto, hosted the Toronto & Montreal HighRise Summit and is a member of the Council Of Tall Buildings based out of Chicago. He also represents Canada as a member of the T70 Tall Building Safety Committee based out of London England. Brent shares information with Fire Departments from all over the world and has developed a network with subject matter experts related to High Rise Firefighting. Brent has spoke at Firex, Tall Building Conference in London England and "Makin' The Stretch" Conference Colonial Park, PA. Brent continues his education by attend 4 firefighting conferences yearly and never misses HROC in the USA. Brent presents to numerous Fire Departments. Proud retired member of the Canadian Armed Forces


Toronto, Canada has two HighRise Response Trucks staffed with four FireFighters 24hrs a day
HR332
TORONTO Fire
HR332



What "Hose and Nozzle Package" do we use for each scenario ?

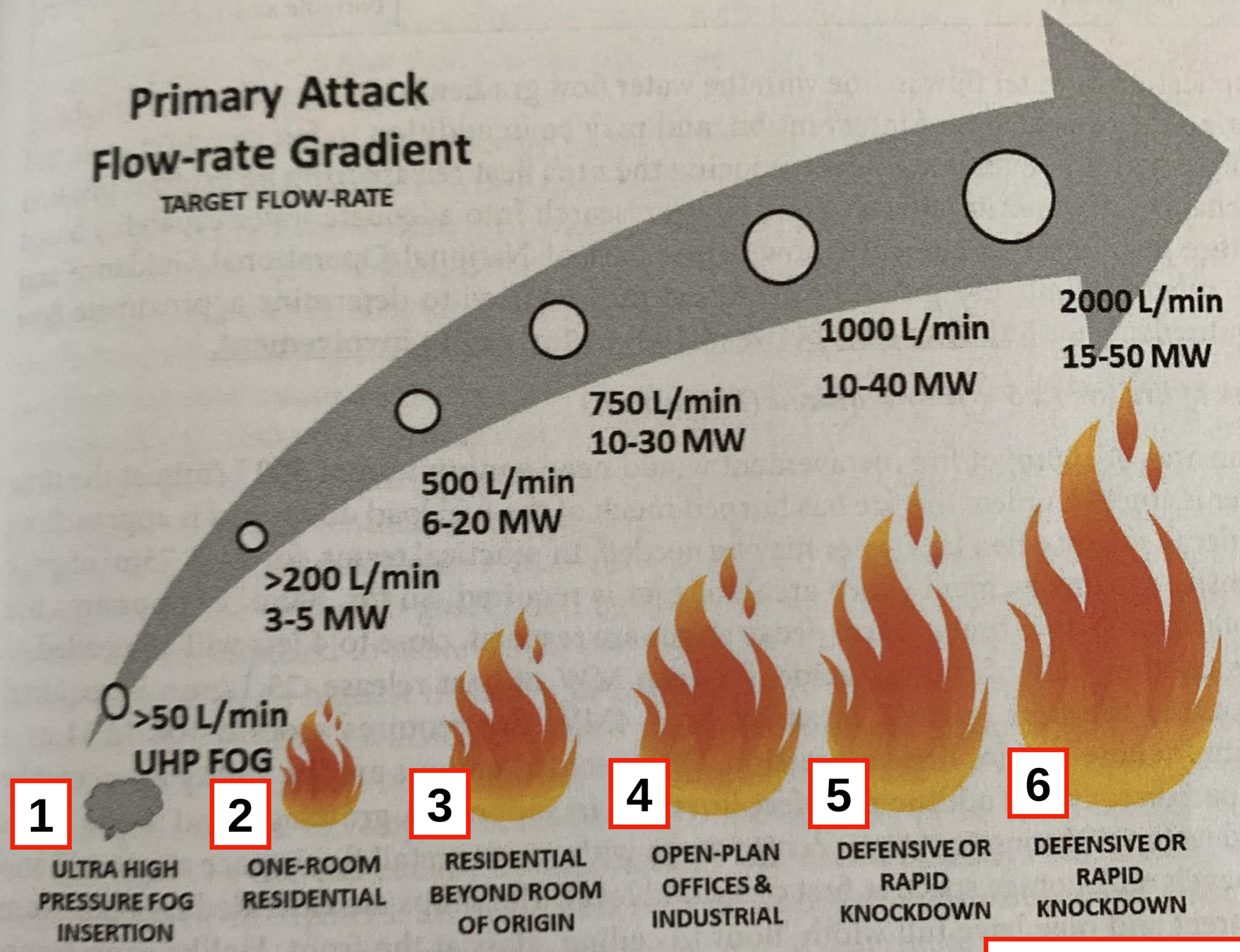


Figure 3.4: A primary attack flow gradient with target flows

Scenarios

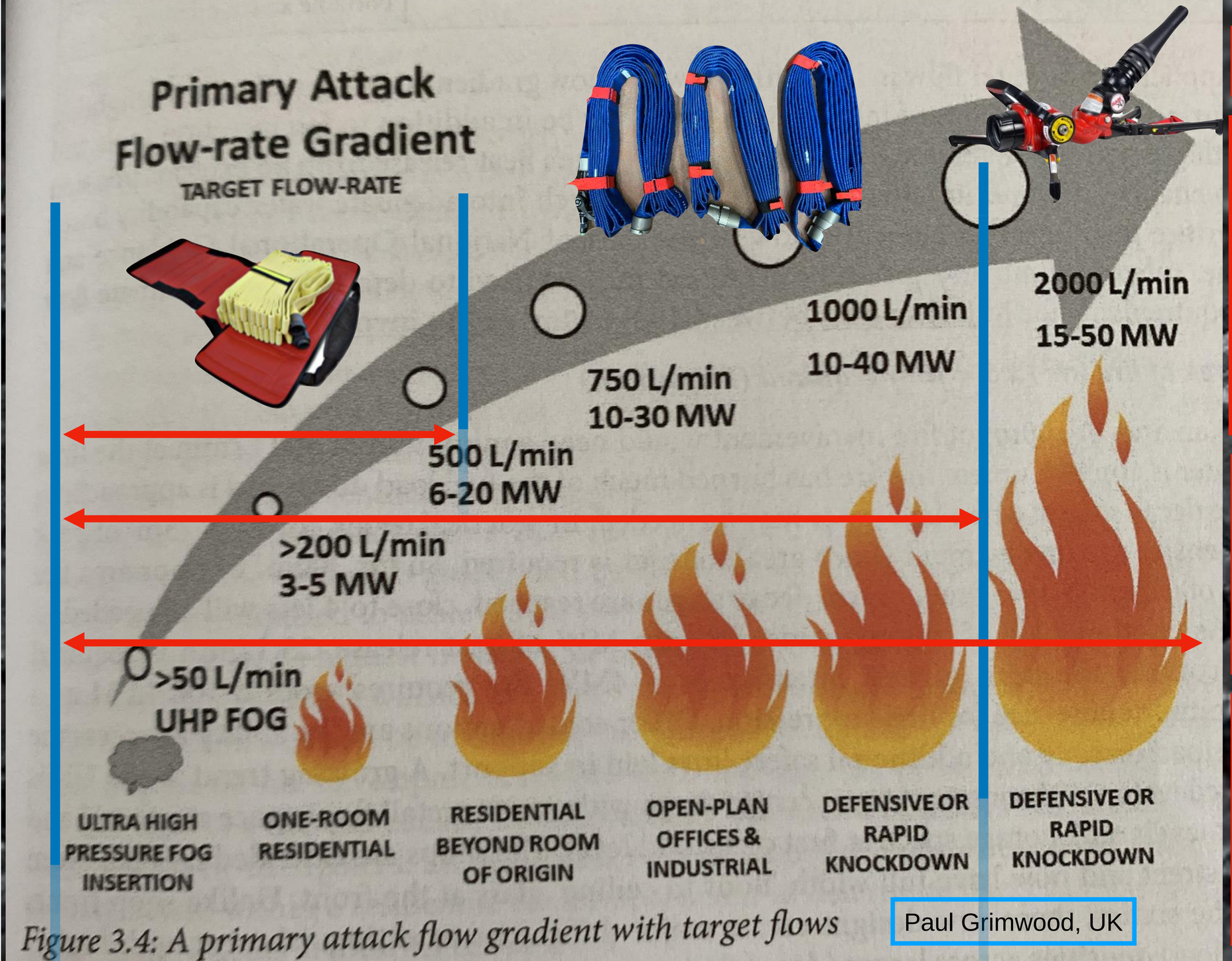


Figure 3.4: A primary attack flow gradient with target flows

Paul Grimwood, UK

Water Requirements

65mm (2.5”) hose with 1-1/8th tip meets primary attack flow gradient with target flows up to 1000 L/min (264GPM)

Portable Monitor 2000L/min (528GPM) supplied by 65mm (2.5”) hose

<u>Best Known Method:</u>
Ascend, prepared for the worse, with a hose & nozzle package capable of a “rapid knock down”.

Equipment for 1st & 2nd in crews

Kit = 10 kg (22 lbs)

Hose = 9 kg (20 lbs)
Dry 15m (50’)

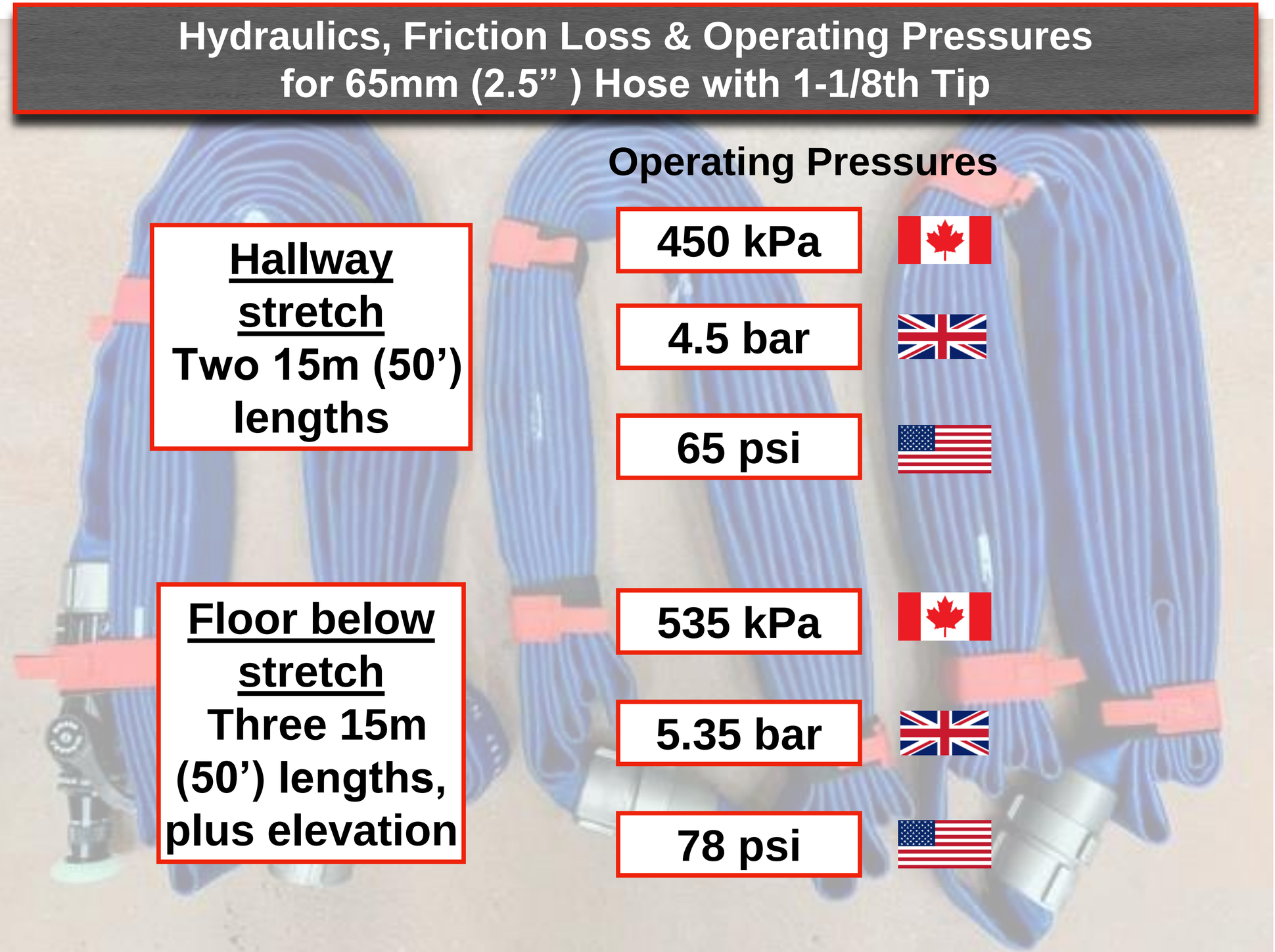
Hose = 54 kg (120 lbs)
Wet 15m (50’)

Standing with hose =
Wet 13 kg (30 lbs)

High heat low Drag
starts @13 kg (30 lbs)
ends at 36 kg (80 lbs)

Average
adolescent = 36 kg
(80 lbs)

Hydraulics, Friction Loss & Operating Pressures for 65mm (2.5”) Hose with 1-1/8th Tip



Hallway stretch
Two 15m (50’) lengths

Floor below stretch
Three 15m (50’) lengths, plus elevation

Operating Pressures

450 kPa
4.5 bar
65 psi
535 kPa
5.35 bar
78 psi

Friction Loss

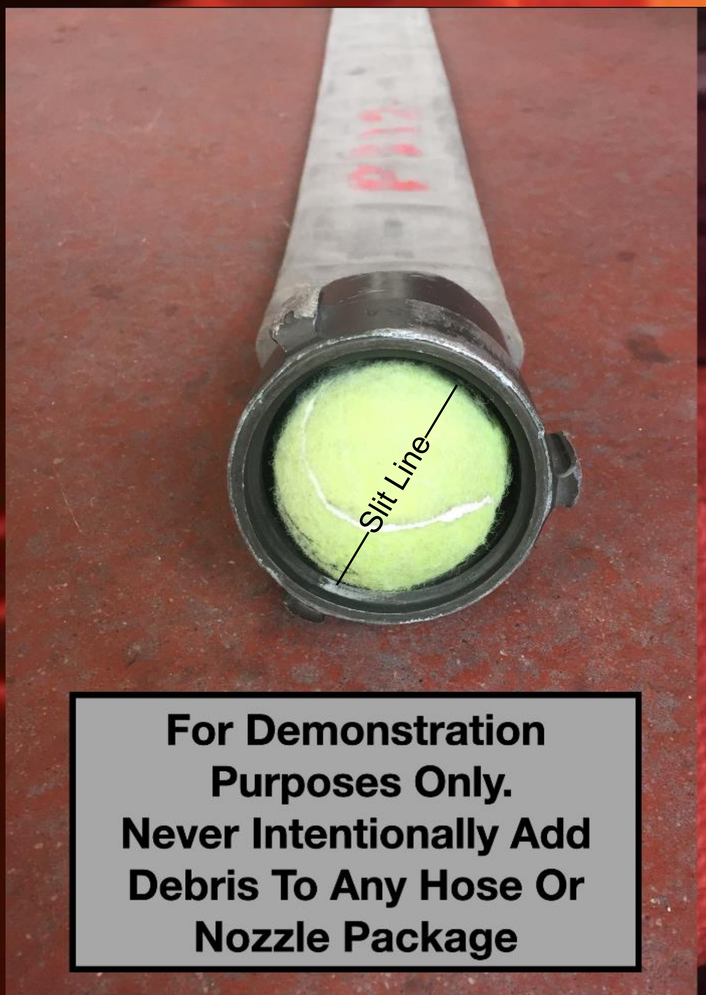
Nozzle
350 kPa
3.5 bar
50 psi

15m (50’)Hose pack
50 kPa
0.5 bar
7 psi

Elevation loss per floor
35 kPa
0.35 bar
5 psi

Standpipe Debris

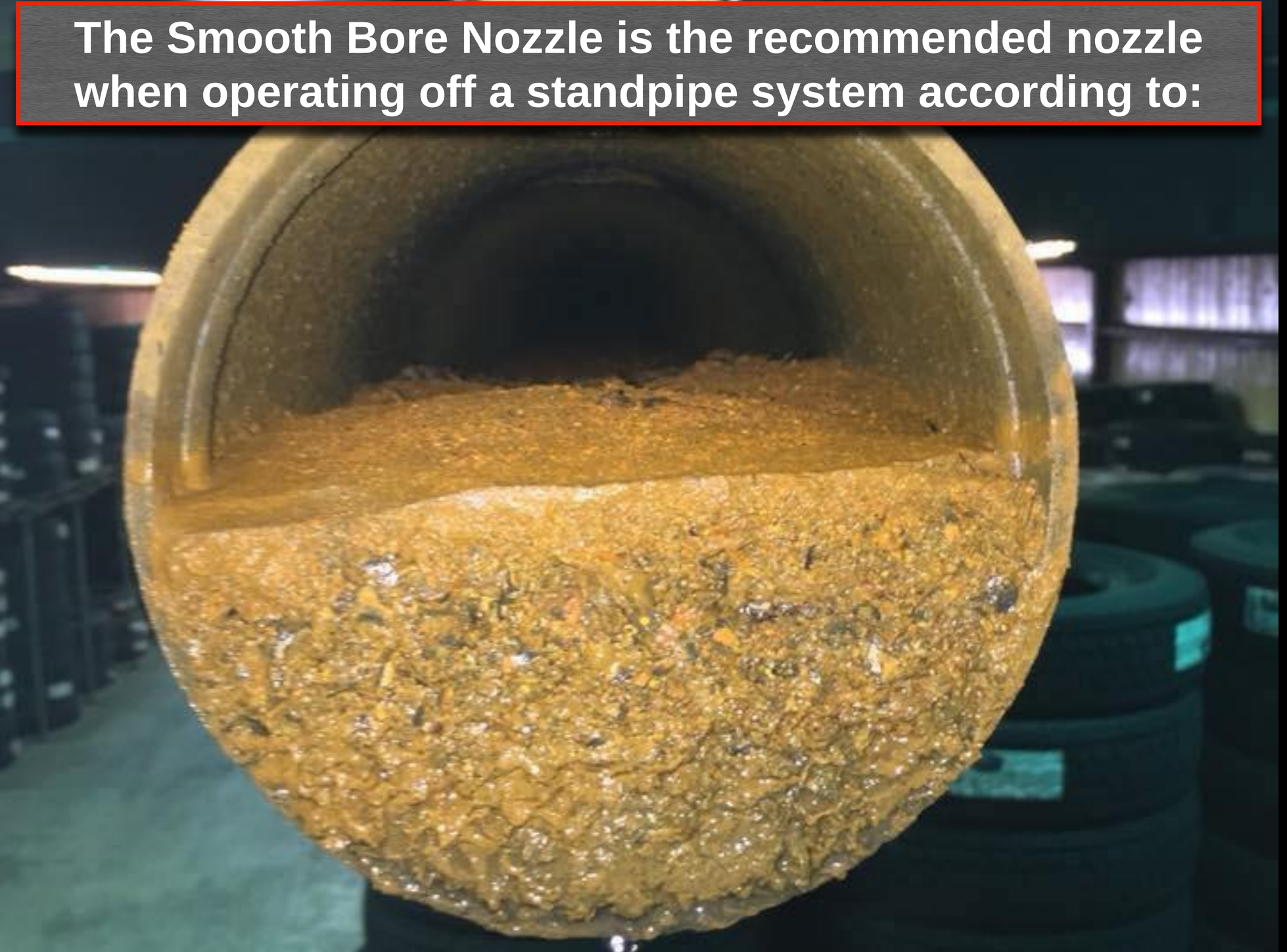
Smooth Bore Vs Fog Nozzle



For Demonstration Purposes Only.
Never Intentionally Add Debris To Any Hose Or Nozzle Package

SunFlower Seed Demonstration Fog Nozzle

The Smooth Bore Nozzle is the recommended nozzle when operating off a standpipe system according to:



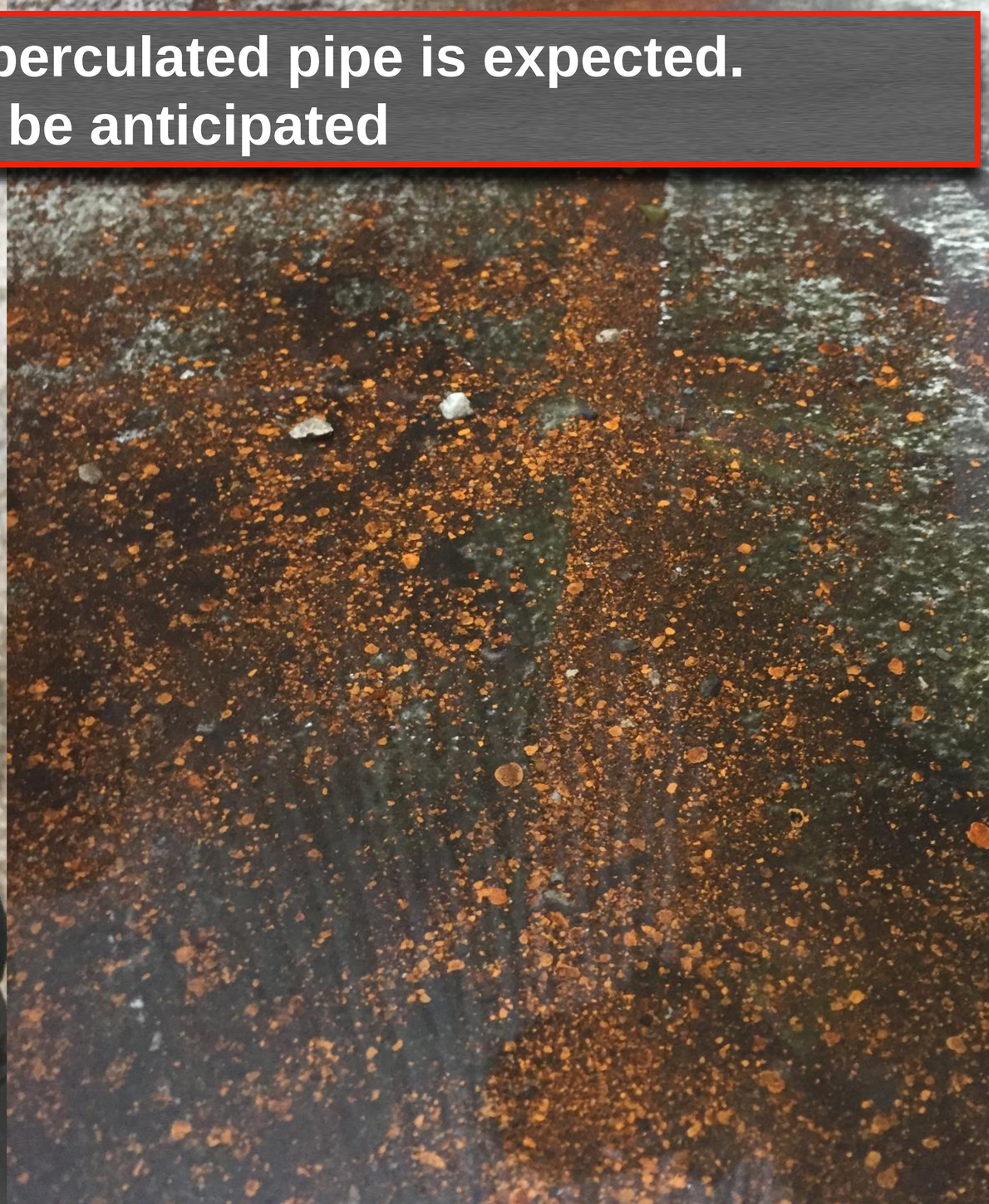
NFPA 14

NFPA 13E

NFPA 1710

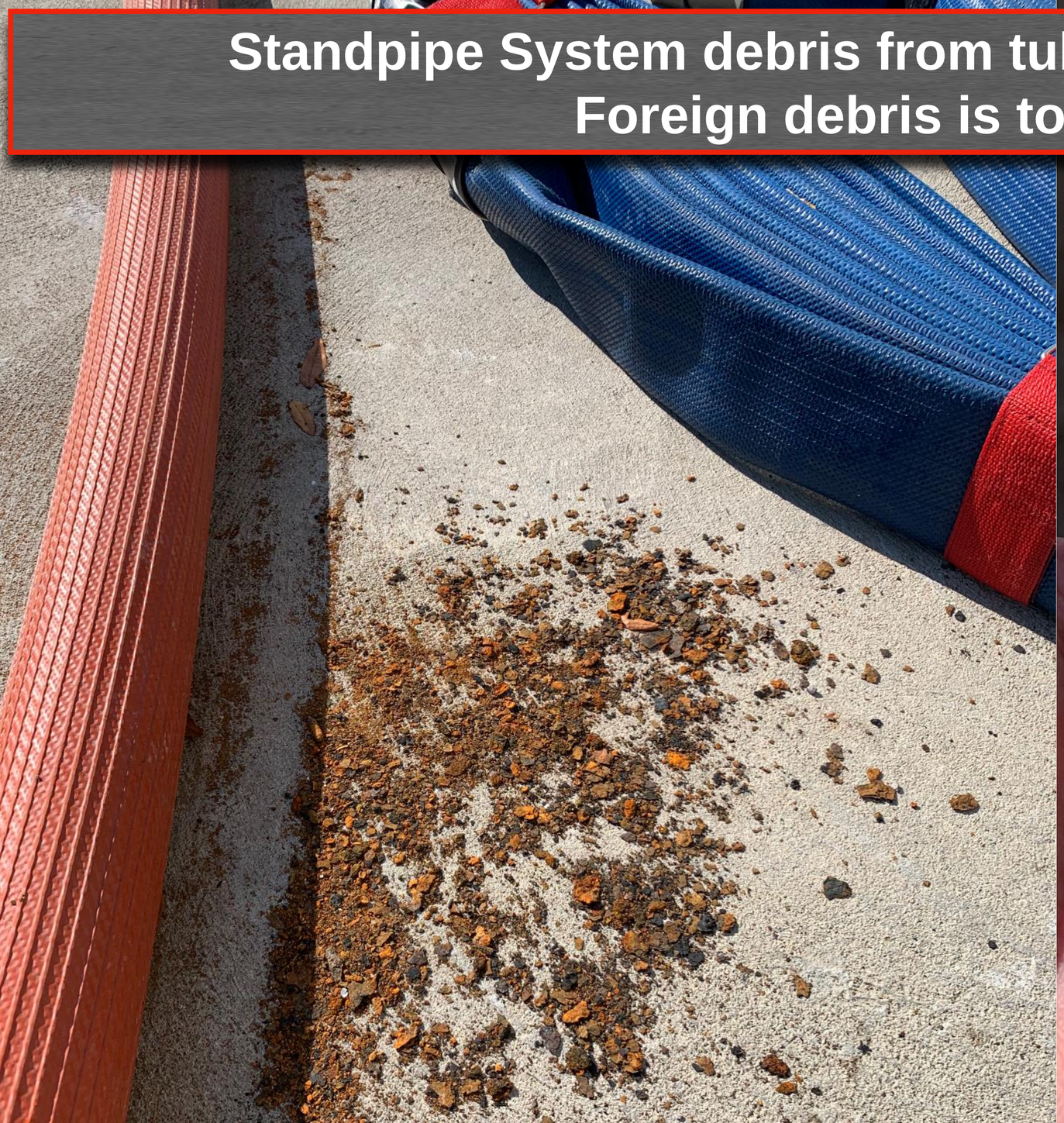
Or any Firefighter that has had a nozzle clog

Standpipe System debris from tuberculated pipe is expected.
Foreign debris is to be anticipated

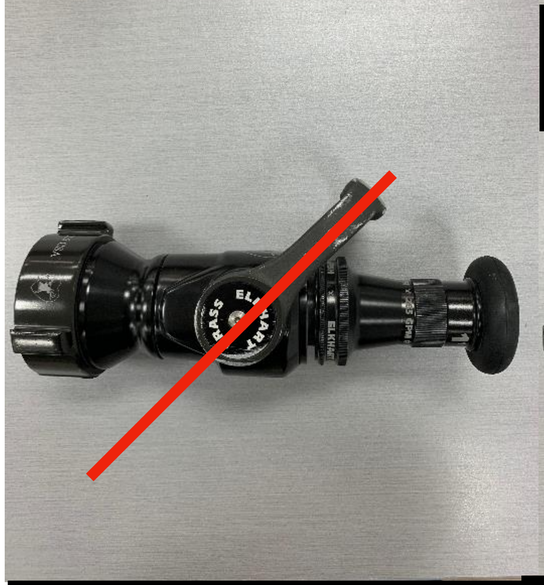


Normal Standpipe System Water (don’t drink ;)

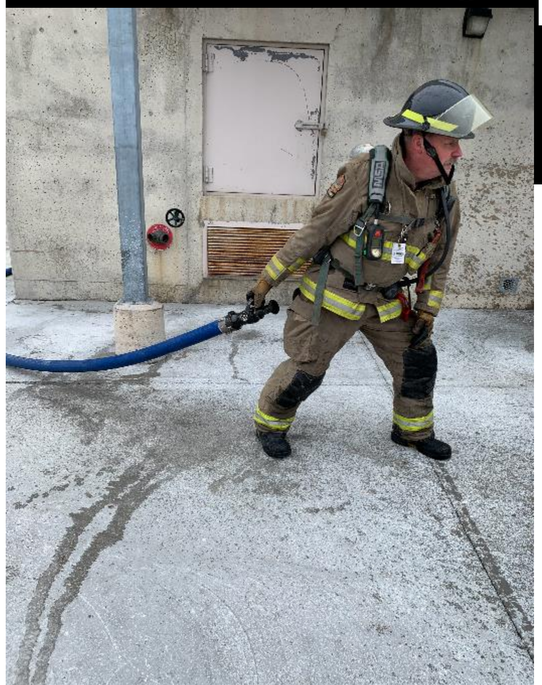
Standpipe System debris from tuberculated pipe is expected.
Foreign debris is to be anticipated



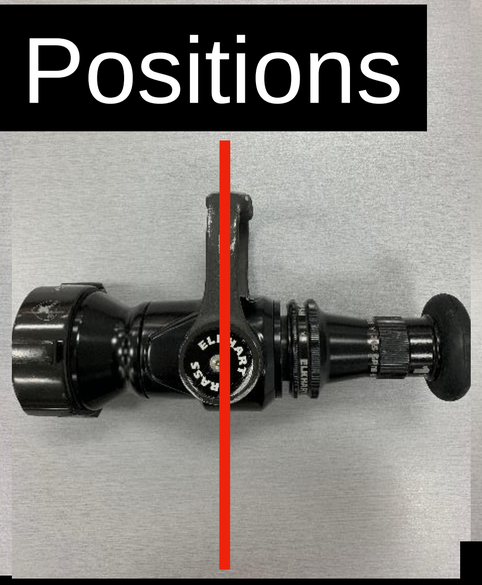
Nozzle Bale Positions



Closed
While moving



Overhaul or flow rates similar to a water can

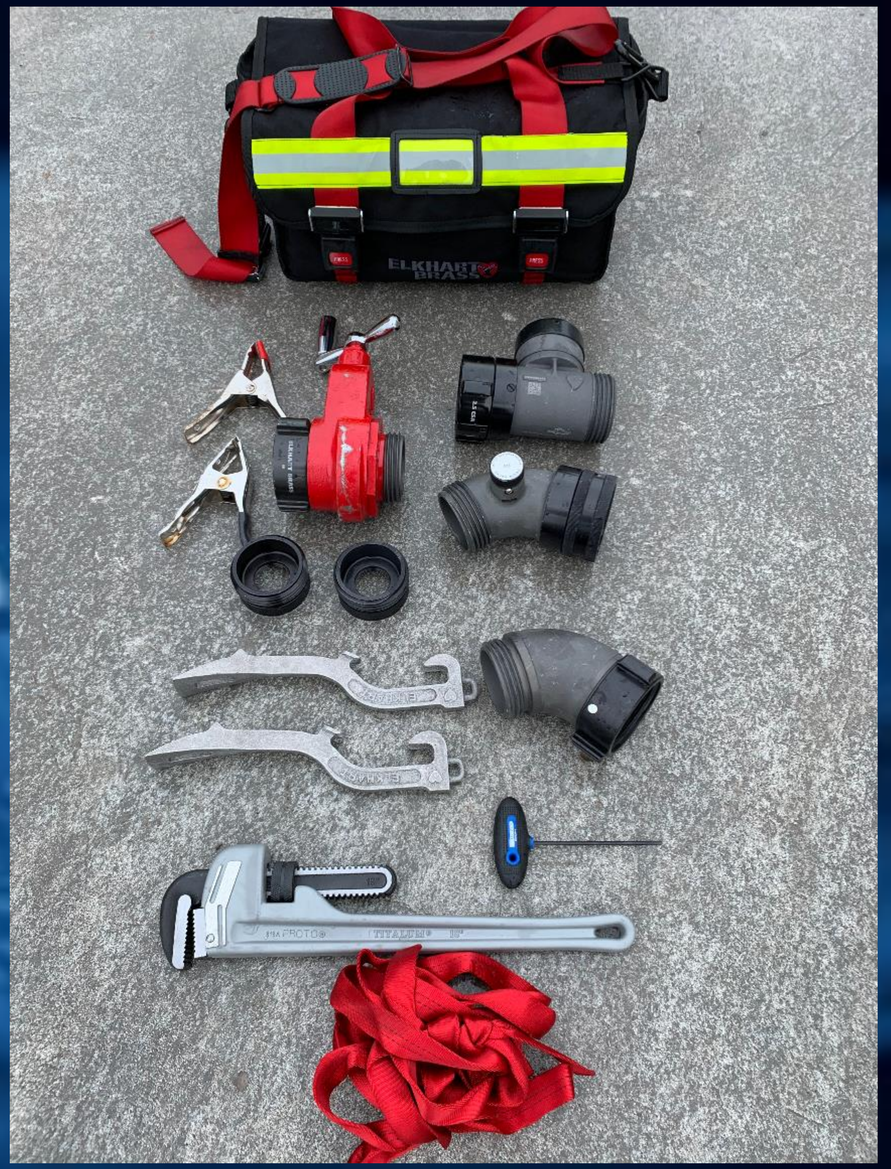


Broken stream, fog and hydraulic ventilation

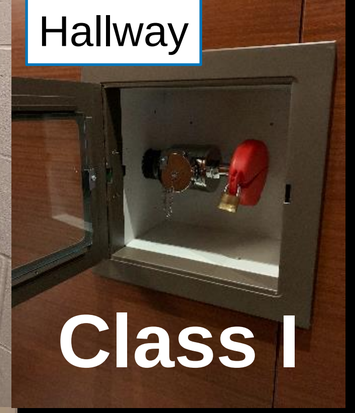
Opened fully
1003Lpm
(264 gpm)
Take nozzle reaction to ground

Standpipe Kit

*Gate
*45 Degree Elbow
with Bleeder
*60 Degree Elbow
*2 - Hose Spanners
*2 - Increasers
*18” Pipe Wrench
*Door Control Strap
*PRD Adjustment Key
*Pressure Gauge



Standpipe Types



Class I

65mm (2.5”) discharge outlet
Designed specifically for Fire Department use.
Delivers high volume of water when used with 65mm hose

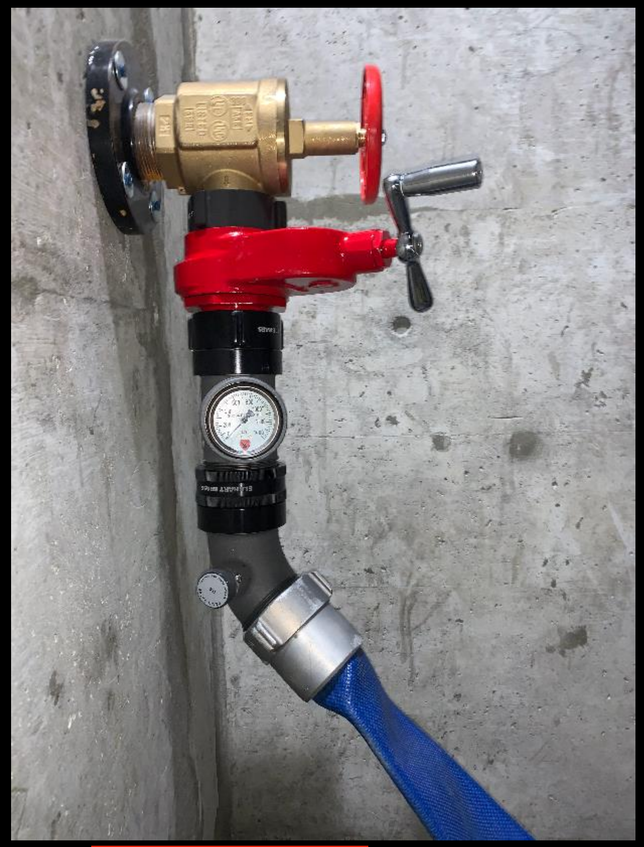
Class II

38mm (1.5”) discharge outlet
Designed specifically for Occupant use.
May not have a fire pump and domestically fed.
Poor unknown pressures.
Single jacketed hose.

Class III

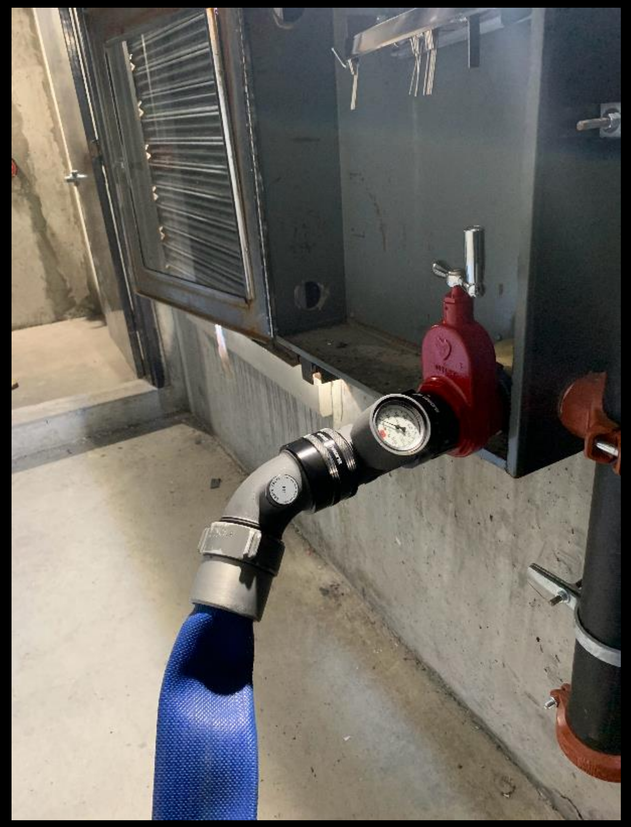
38mm (1.5”) and 65mm (2.5”) discharge outlets
Designed for both Fire Department and Occupant use

Hooking Up



Class I

Class II



Class III

“Gate and Gauge” helps in trouble shooting the system. Know your flow. What size of Fire can we fight?

HighRise Tactics

- 65mm (2.5”) Bresnan Distributor
- Floor below Nozzle
- 38mm (1-1/2”) Bresnan
- Opposing Tip Nozzle
- Portable Monitor
- Exterior Attack
- CAFS

Wind Impacted Water

- Floor Below Nozzle
- Bresnan Distributor
- Opposing Tip Nozzle

“Video”

This fire is similar to what we encounter.

The fire unit’s door is opened and smoke fills the hallway.

The FireFighters in this video are preparing to control the door with a pike pole in case the windows fail and the fire is wind impacted causing a flow path. (50/50 chance)

Close the fire unit’s door and reset if wind impacted

“Video”

This fire is more involved with high heat and wants to come into the hallway

The FireFighters hit this fire from the protection of the hallway with the full potential of the nozzle.

Remember Door Control, in case the fire wins (reset)

“Video”

The Punch

1003 LPM @ 350 kPa
1003 Lpm @ 3.5 bar
265 gpm @ 50psi

Smoothbore Nozzle with a 1-1/8th Tip

65mm (2.5”) Hose

30M (100’) Reach of Stream


“Video”
Poor operating pressure of:
300 kPa
3 bar
43 psi
Toronto, Canada 100 Cavell Ave November 30, 2020

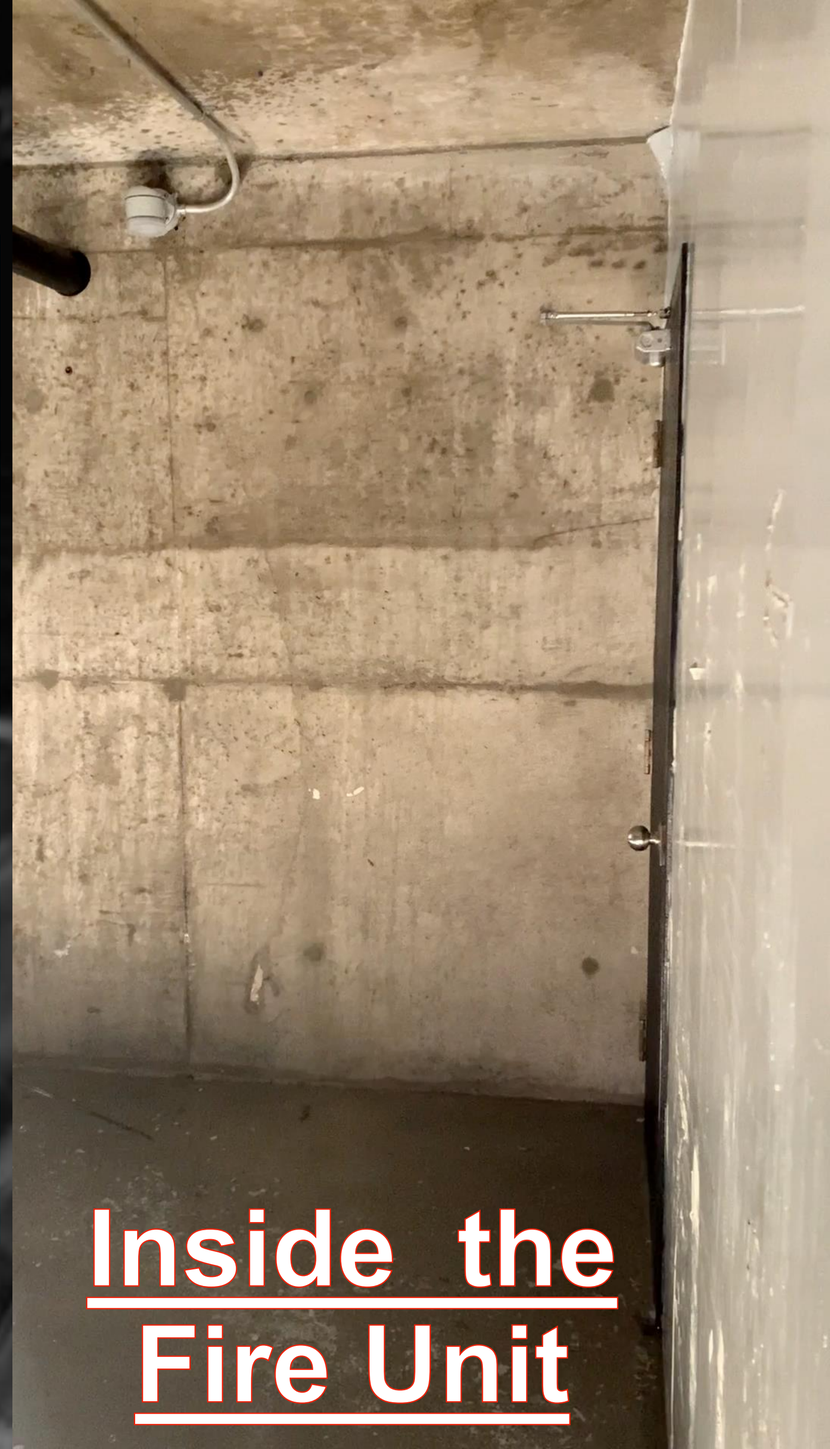

od for making entry, into the

Step #1

Use the full potential of the nozzle. keep the large hose line grounded

Hallway

"Video"



Inside the Fire Unit

In 1 second water travels 100 feet

You are testing the windows & knocking the fire down (flow)

Balcony, solarium, sliding doors, windows (glass)

If the windows fail and you are deep inside the fire unit, you could be in trouble if the fire is wind impacted. (50/50)

Flow the full potential of the nozzle 1003 Lpm (264 gpm) targeting the water stream at the ceiling (research UL water mapping study link below)

https://ul.org/Water%20Mapping%20Research%20Report%20and%20Online%20Training%20Released

Step #2

Move in and remain in contact with the door. keep the large hose line grounded

“Video”

“Video”

Overhaul & Hydraulic Ventilation

Step #3

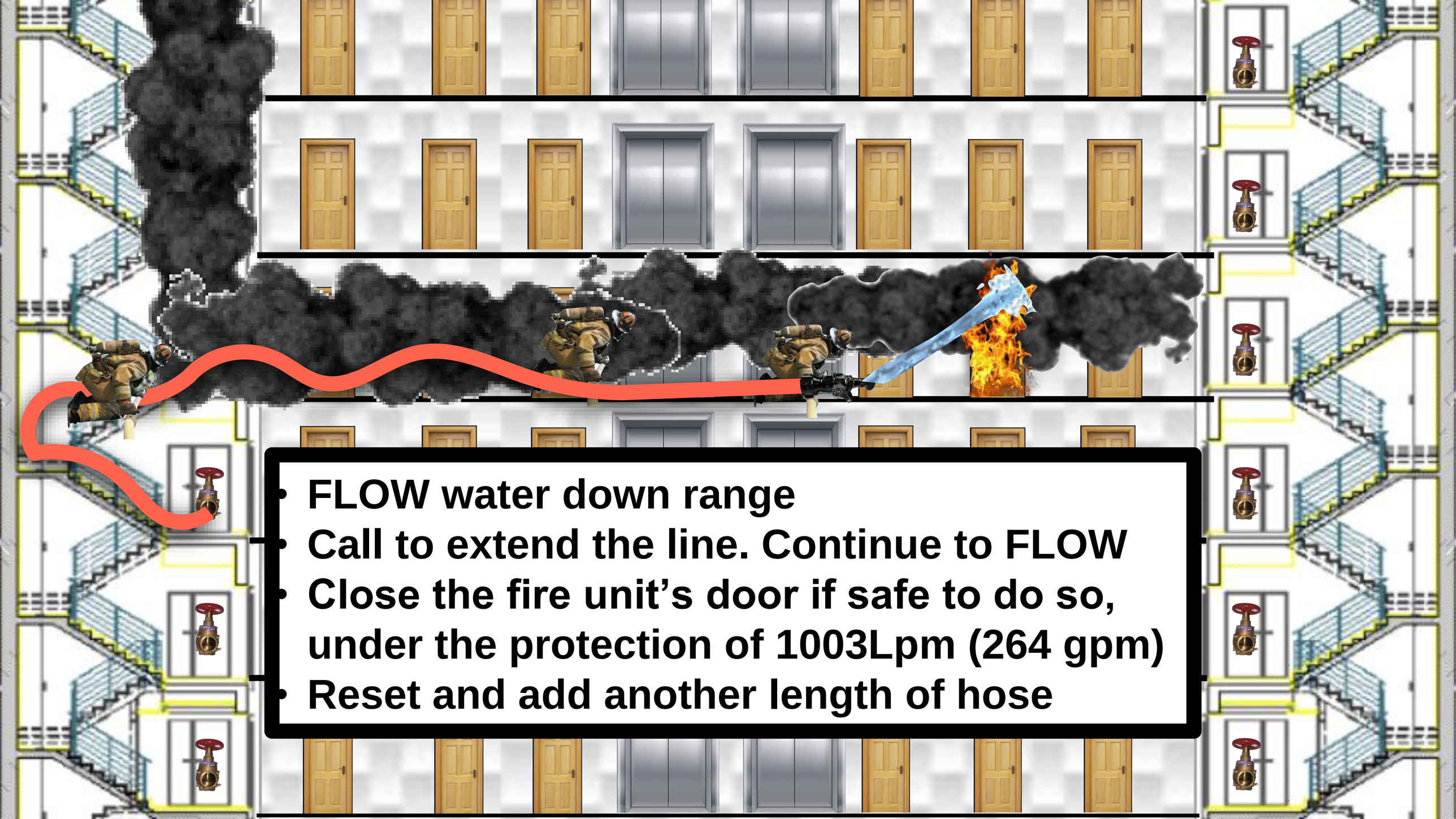
When you're able to do so, standup and switch to a broken stream (hit & move)

"Video"

Halligan Pike The Door

“Video”


You Have Come Up Short!
Unable to make the fire Unit



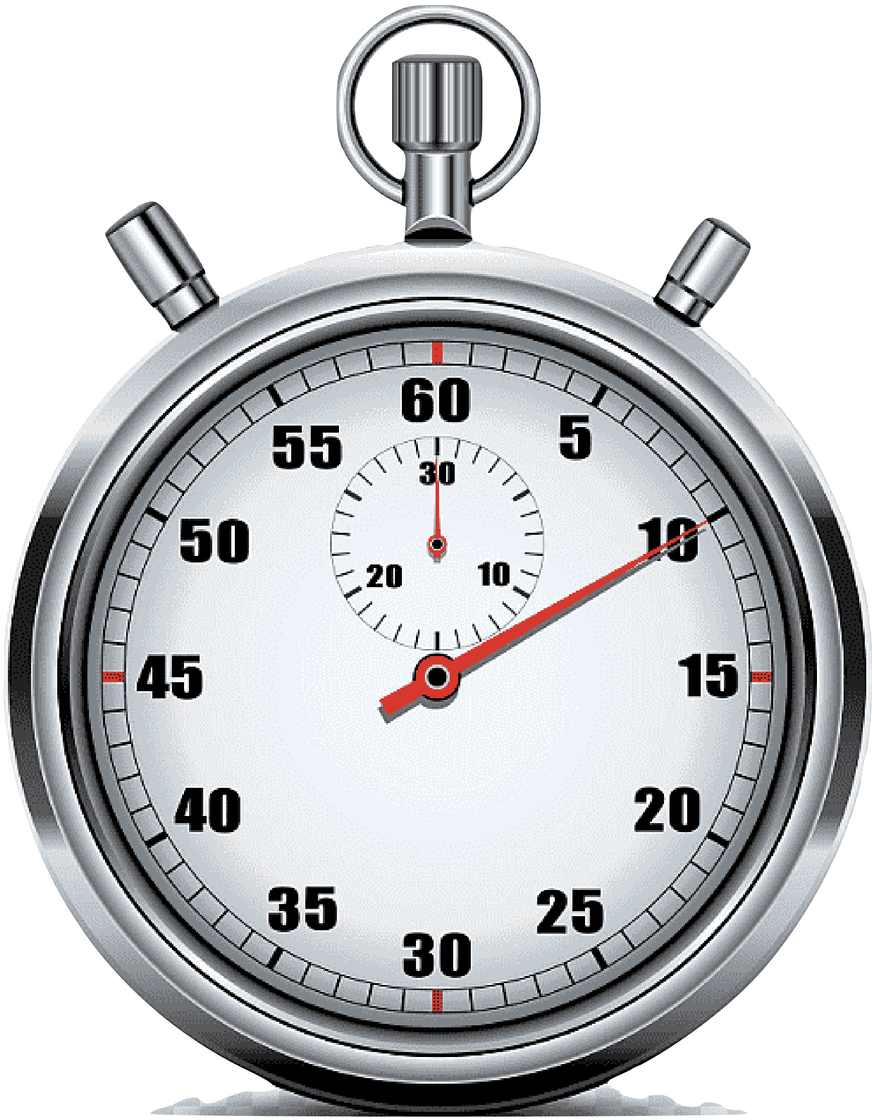
- FLOW water down range
- Call to extend the line. Continue to FLOW
- Close the fire unit’s door if safe to do so, under the protection of 1003Lpm (264 gpm)
- Reset and add another length of hose

If safe to do so, send a firefighter down range to close the fire unit’s door under the protection of 1003Lpm (264 gpm)

Use a thermal imager and your experience to make this decision
(risk versus reward)

If you are able to close the fire unit’s door, then you will have stoped the fire and smoke from entering the hallway and the stairwells
(Think: Occupant survivability in the common areas)

Reset for the next tactics in this presentation



Adding A Length (Leap Frog)

Step #1

Step #2

You can still flow water with the tip removed. You will loose reach of stream but gain more volume of water. (you are still protected)

Adding a Length

- Call for an additional crew.
- This crew will bring forward three hose packs of 65 mm (2.5”) hose and a standpipe kit. (exact same equipment as the first in crew)
- The nozzle Firefighter will indicate how many lengths to be added to reach the fire.

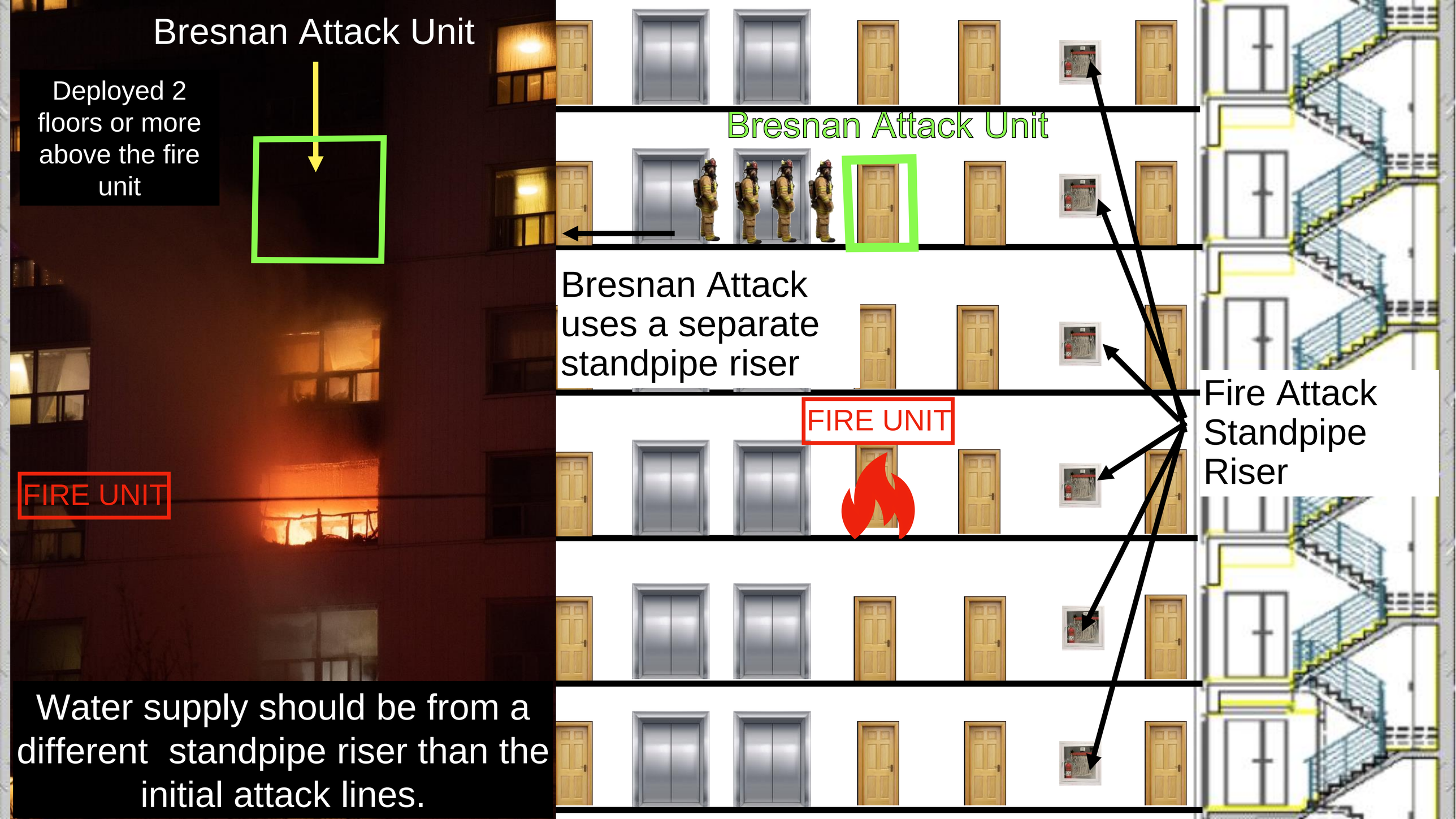
15m, 30m 45m (50’,100’,150’)


65mm (2.5”)
Bresnan Attack

Bresnan Attack

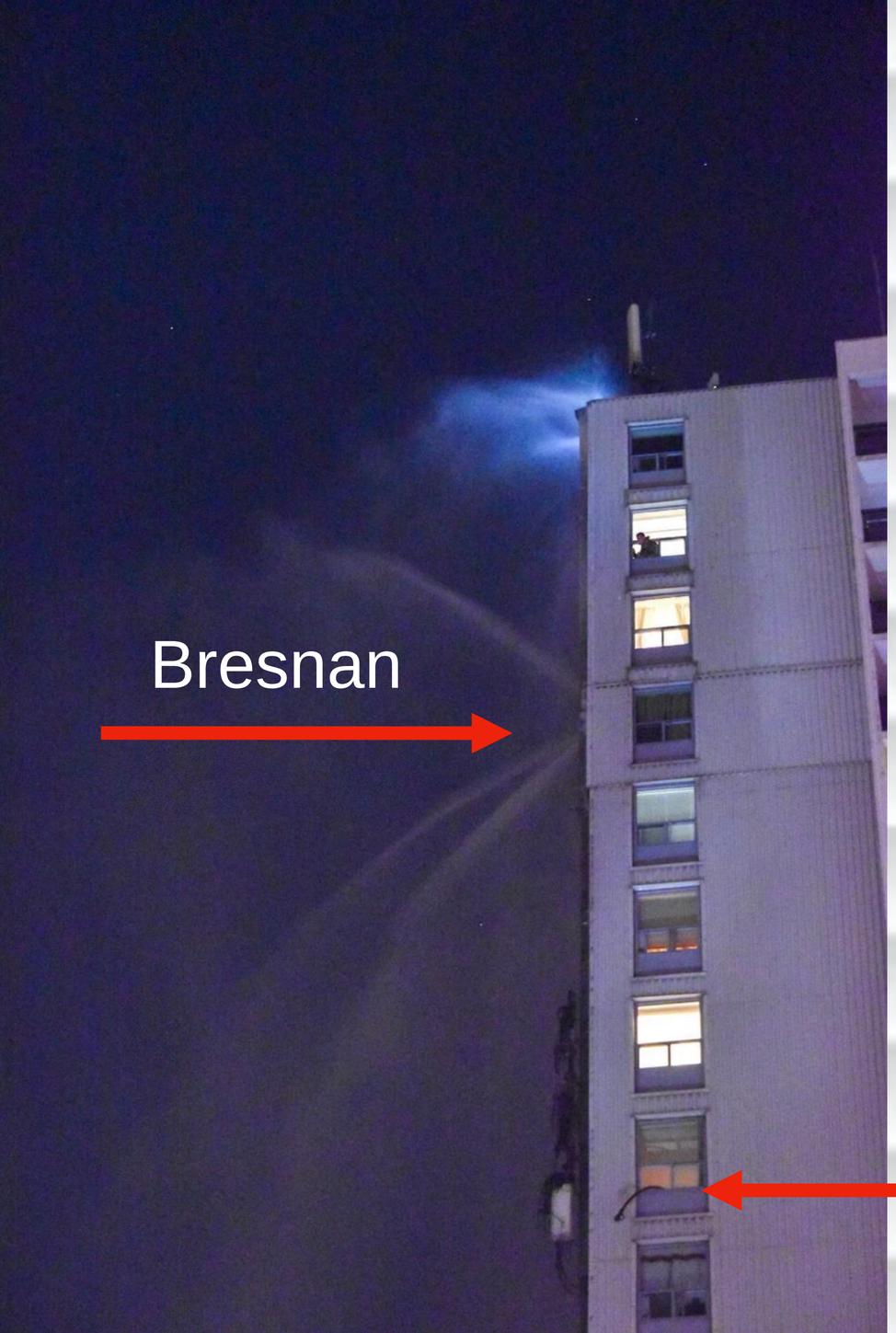
Each firefighter brings an extra SCBA bottle plus forcible entry tools.

Water supply should be from a different standpipe riser than the initial attack lines.


Bresnan Attack Unit
Deployed 2 floors or more above the fire unit
FIRE UNIT
Water supply should be from a different standpipe riser than the initial attack lines.
Bresnan Attack Unit
Bresnan Attack uses a separate standpipe riser
FIRE UNIT
Fire Attack Standpipe Riser

Conditions and fire spread speed will dictate the deployment floor fo

“Video”



A 65mm (2.5”) Bresnan was deployed off the roof.

Hose lines not able to the reach fire

- Floor Below Nozzle
- Opposing Tip Nozzle
- 38 mm (1-1/2”) Bresnan
- Portable monitor

The 3 Nozzle Pack is designed to be carried through revolving doors, elevators and stairwells

Flow Rate:

900L/min

@ 350 kPa

Floor Below Nozzle

“Video”

5TH Alarm

235 Gosford Boulevard

Floor below nozzle

3 stories reach of stream from the Floor Below Nozzle.

Toronto Nov 15, 2019

Floor Below Nozzle

FIRE UNIT

Nozzle is Deployed one floor below fire

FIRE UNIT

Floor Below Nozzle

Fire Attack Standpipe Riser

Water supply should be from a different standpipe riser than the initial attack lines.

The Floor Below Nozzle can be used for exterior cladding fires

There is a strong nozzle reaction when used this way

30m (100’) reach of stream

“Video”

38mm Bresnan

Flow Rate: 500 L/min @ 350 kPa.

* No nozzle reaction

4” Coring Bit fits the 38mm (1-1/2”) Bresnan

“Video”

38mm (1-1/2”)

Bresnan

Queen Street

Fire, Toronto

June 2, 2020

“Video”

Coring tool is used to investigate and locate the fire for nozzle placement

Opposing Tips Nozzle

Two opposing water streams with 1/2” tips

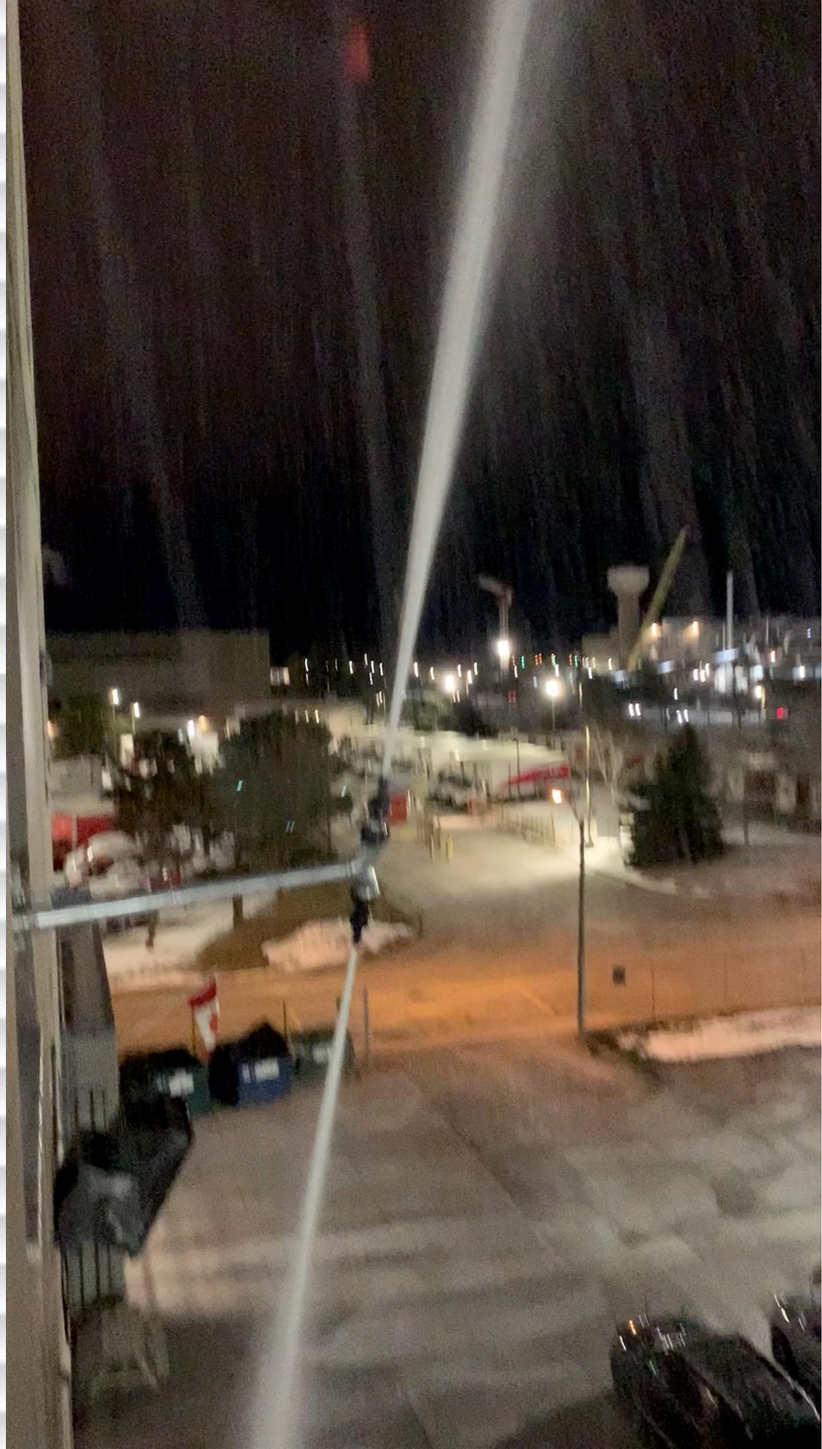
24m (80’) reach of stream off each side For a total of 48m (160’)

Can cut through cellulose and batt insulation

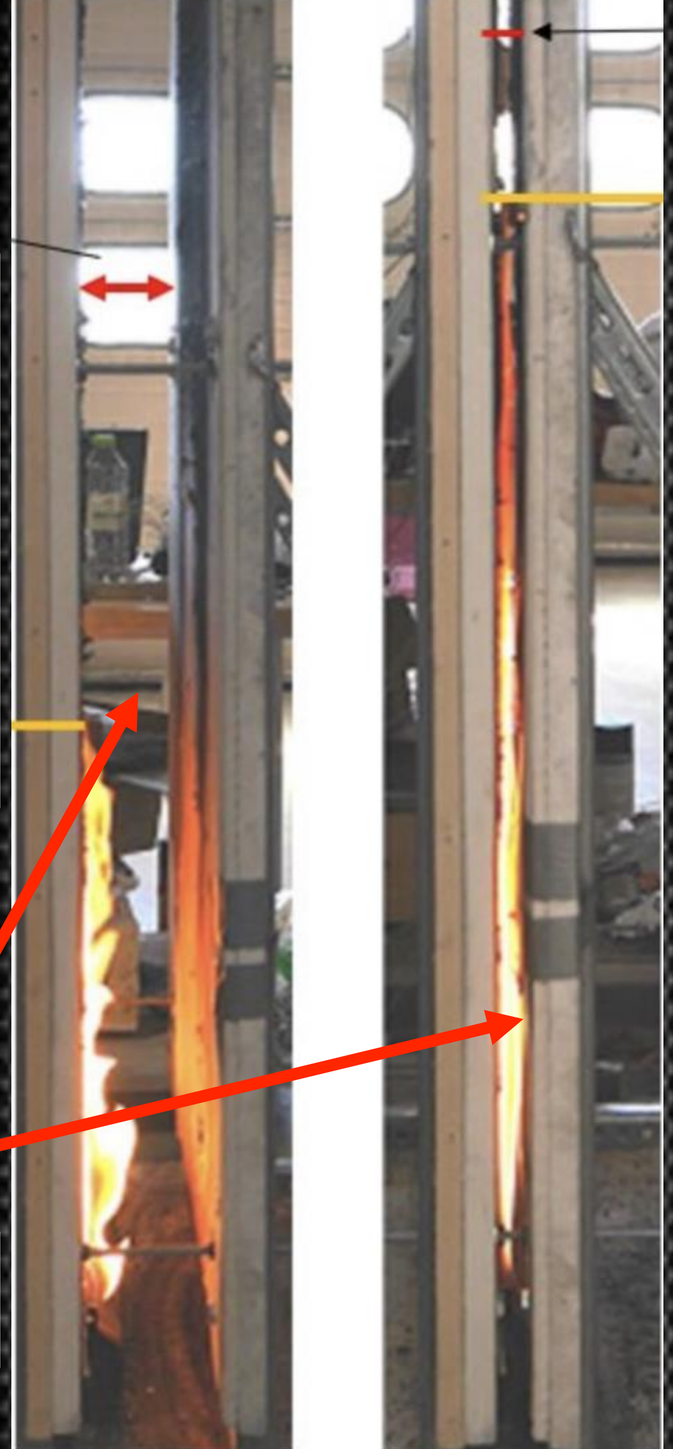
No nozzle reaction

Opposing Tips Nozzle

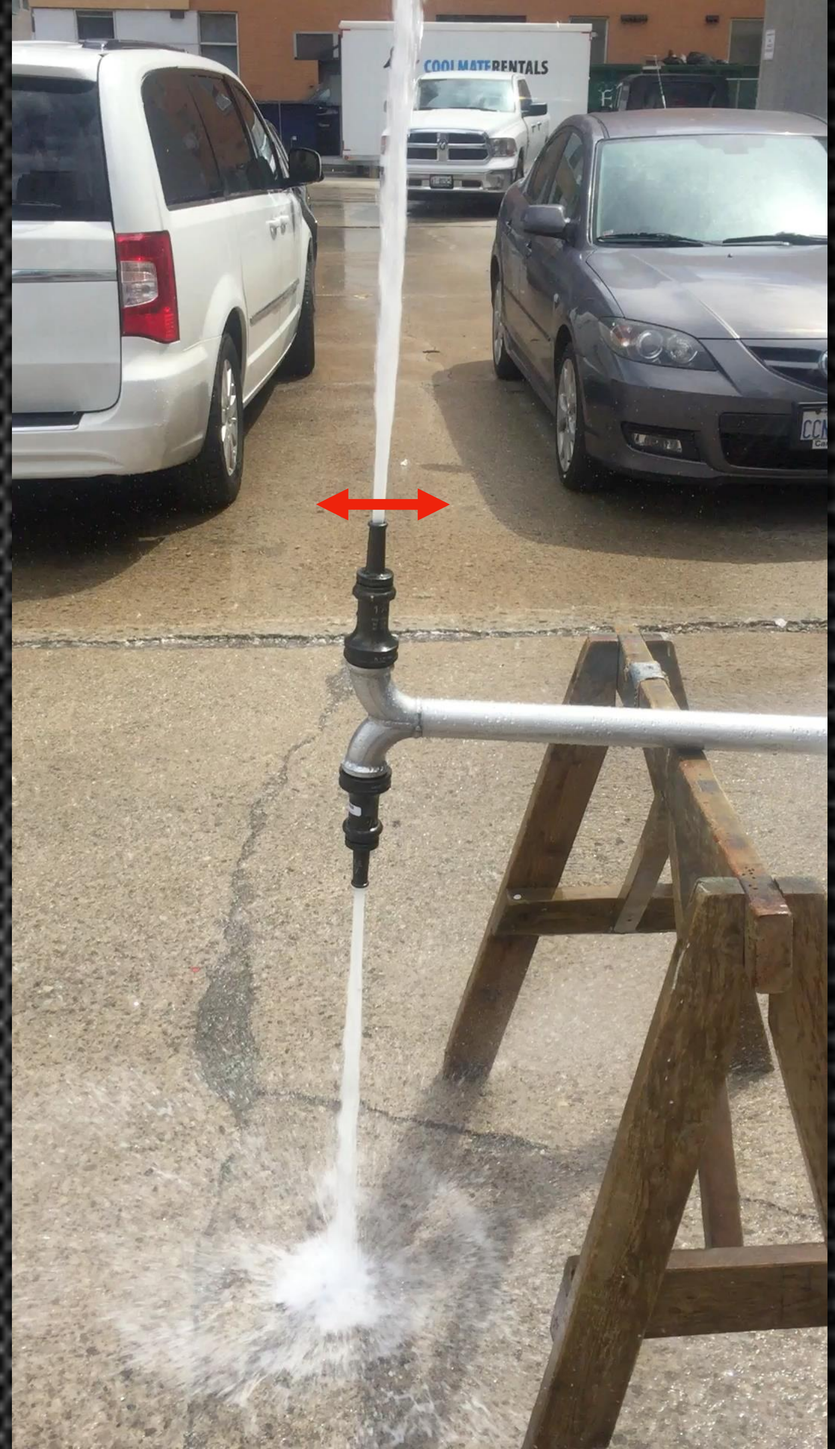
“Video”



Exterior Cladding and Hidden Voids



Voids



1/2” Tip

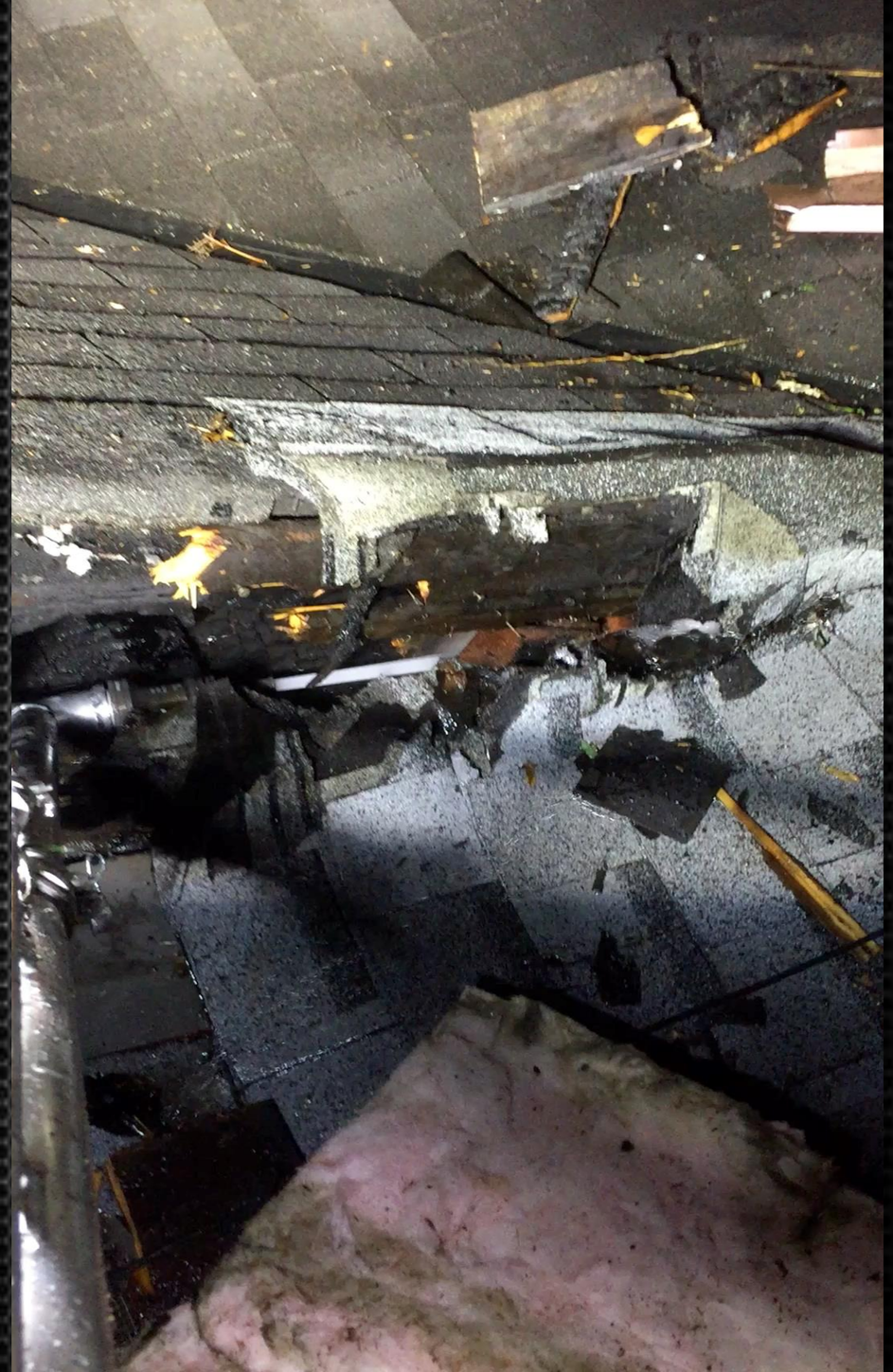
“Video”

Baldwin Street Fire

Toronto

September 20, 2018

“Video”




Portable Monitor

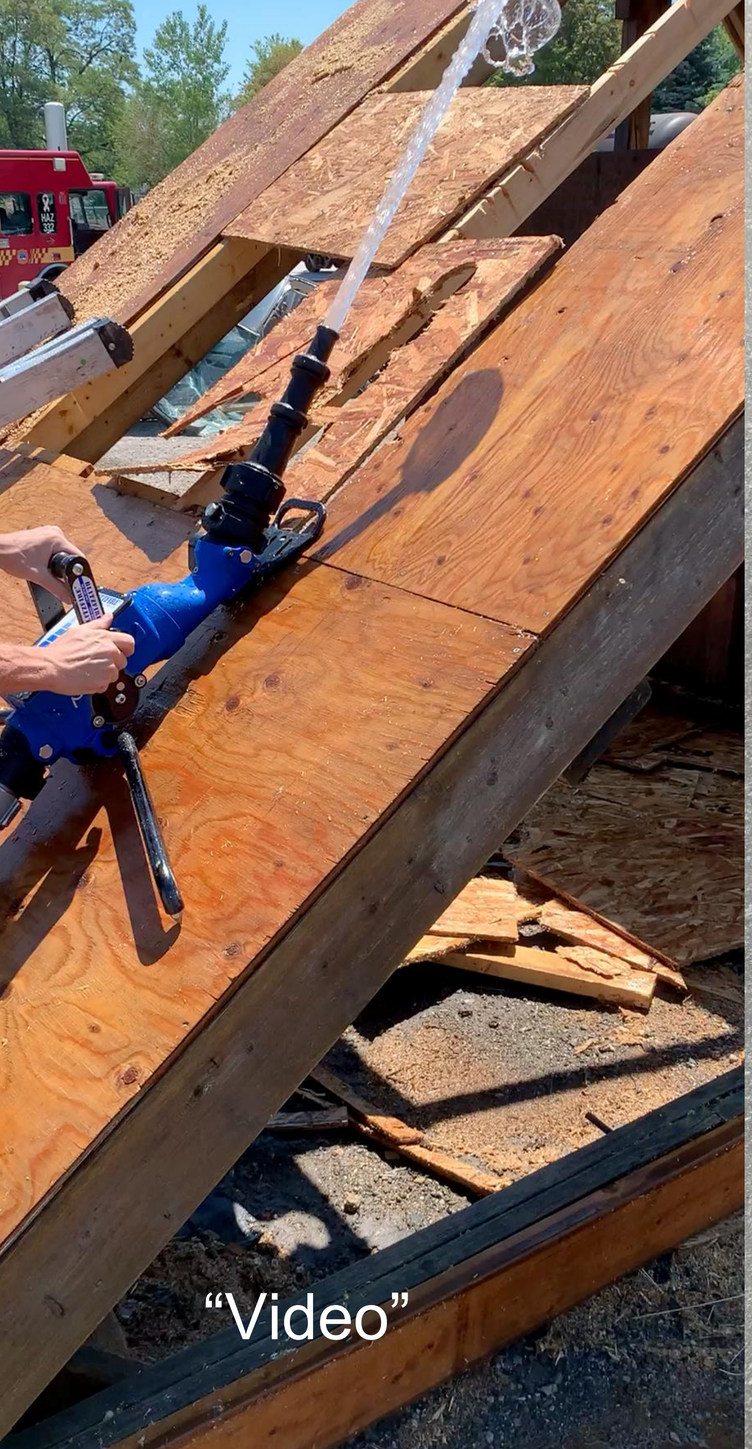
Portable Monitor

Can flow 2000 L/min.

Stream can go as low at 10 degrees in elevation.

It can be maneuvered interior.

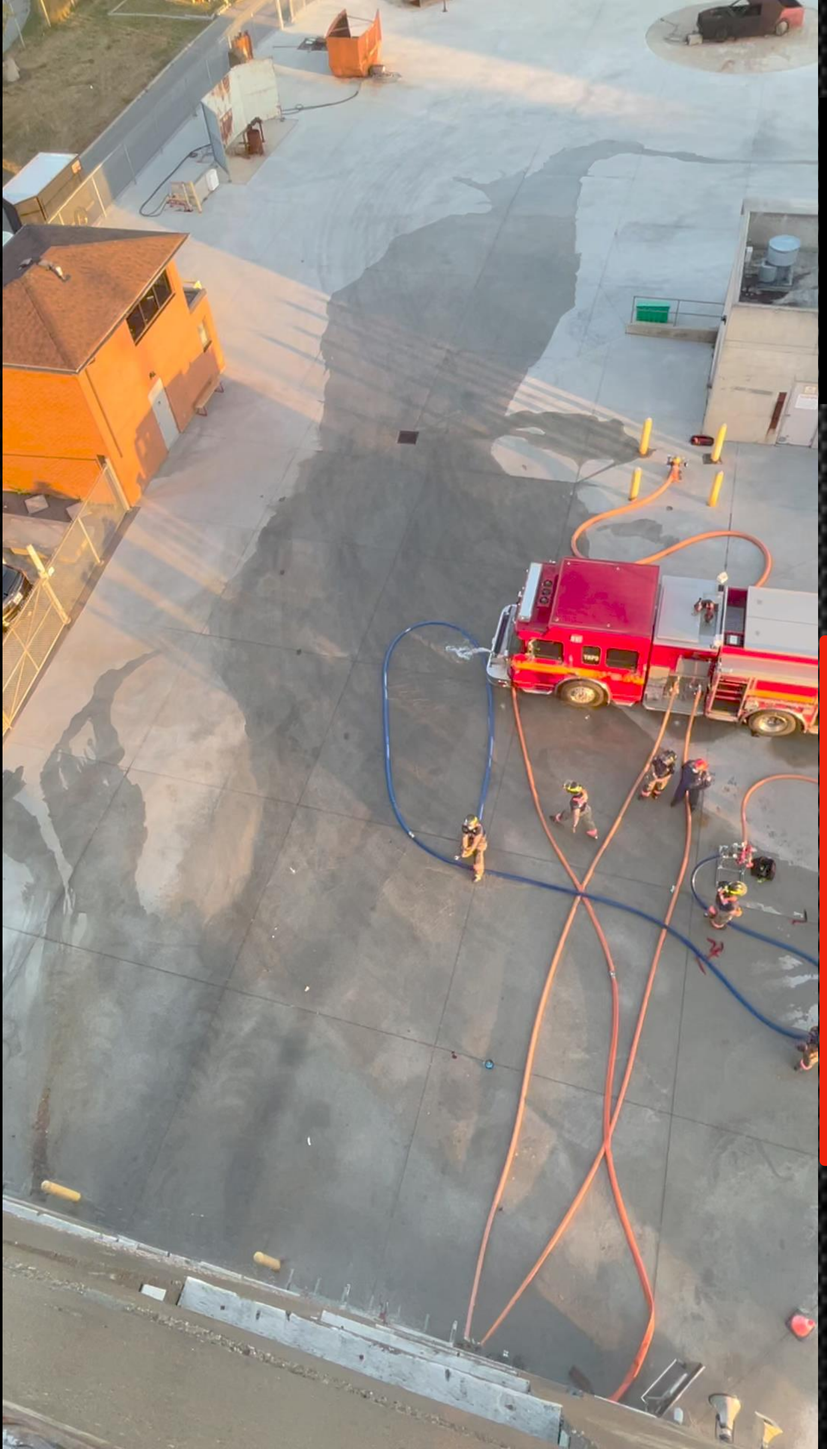
Has an automatic shut off if control of nozzle is lost



“Video”

Ability to add to the front

“Video”



Exterior Smooth Bore Attack

7 storeys with 350Kpa @ the nozzle flowing 1003Lpm

Catastrophic Standpipe System Failure In High-Rise Buildings

Catastrophic Building System Failures

4 aerosol extinguishers for:
Basements, Hydro Vaults,
Apartment suites

Portable
Compressed
Air
Foam System

Door Control F/F

FST Deployment F/F

Prepares FST's F/F

CAFS F/F

Door Control Webbing

4 - FST Extinguishers

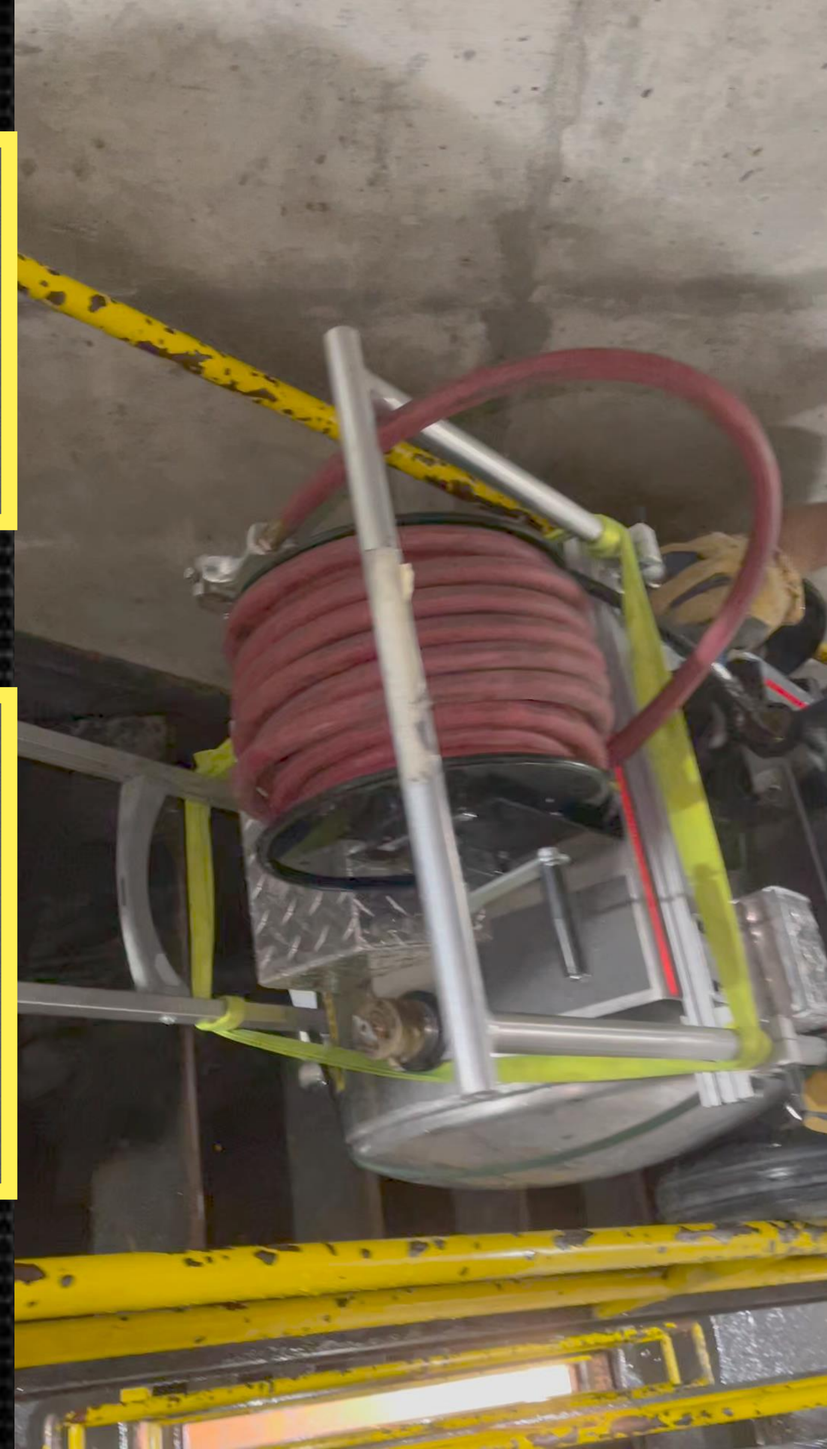
CAFS

Power Stair Climber

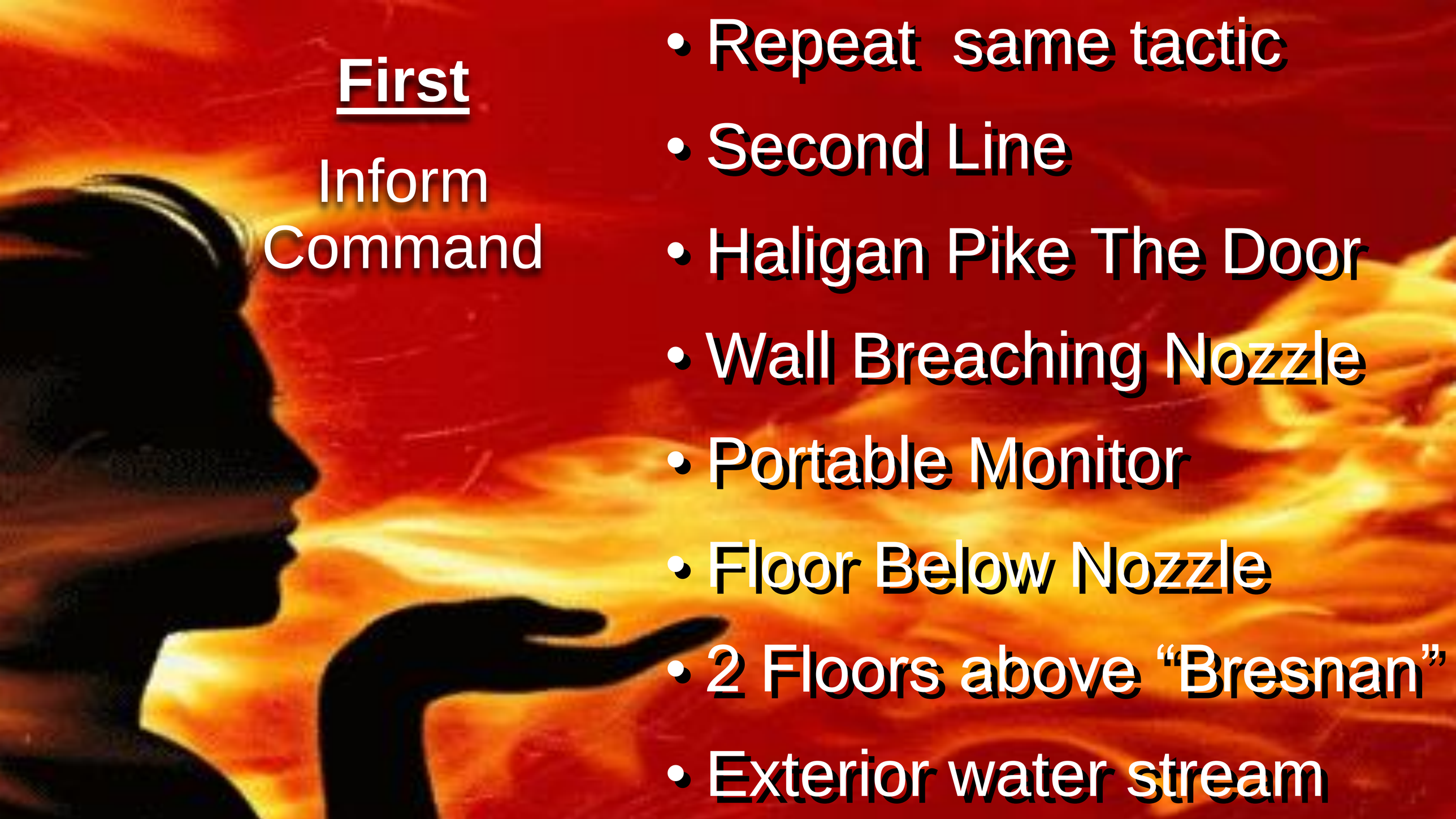
Refilling off the standpipe system with the remaining head water left in the building

Ascending and descending stairs with a power stair climber

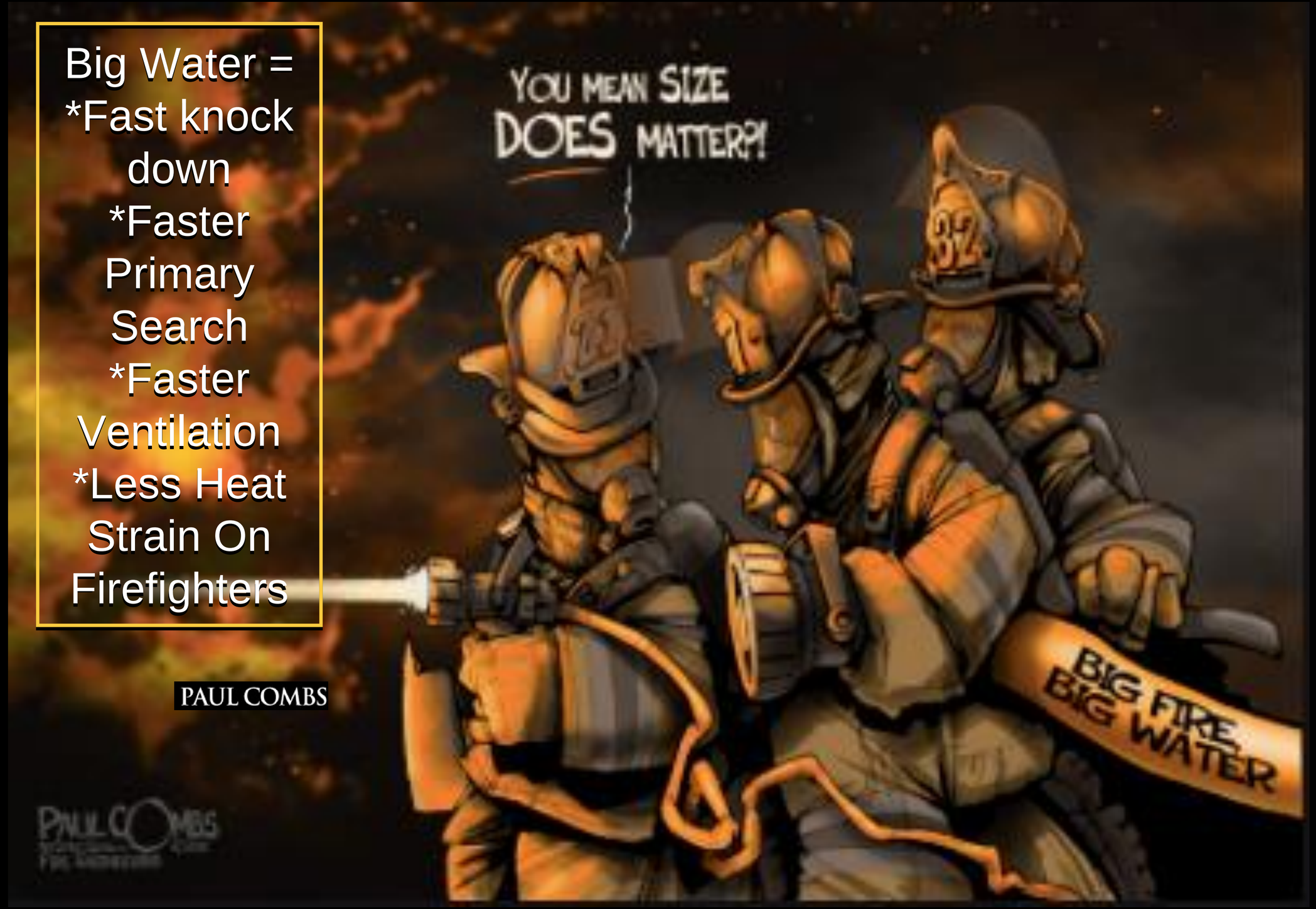
“Video”




BLOOR STREET
R CLARK


First
Inform
Command
• Repeat same tactic
• Second Line
• Haligan Pike The Door
• Wall Breaching Nozzle
• Portable Monitor
• Floor Below Nozzle
• 2 Floors above “Bresnan”
• Exterior water stream

Big Water =
*Fast knock down
*Faster Primary Search
*Faster Ventilation
*Less Heat Strain On Firefighters



Best Known Method:

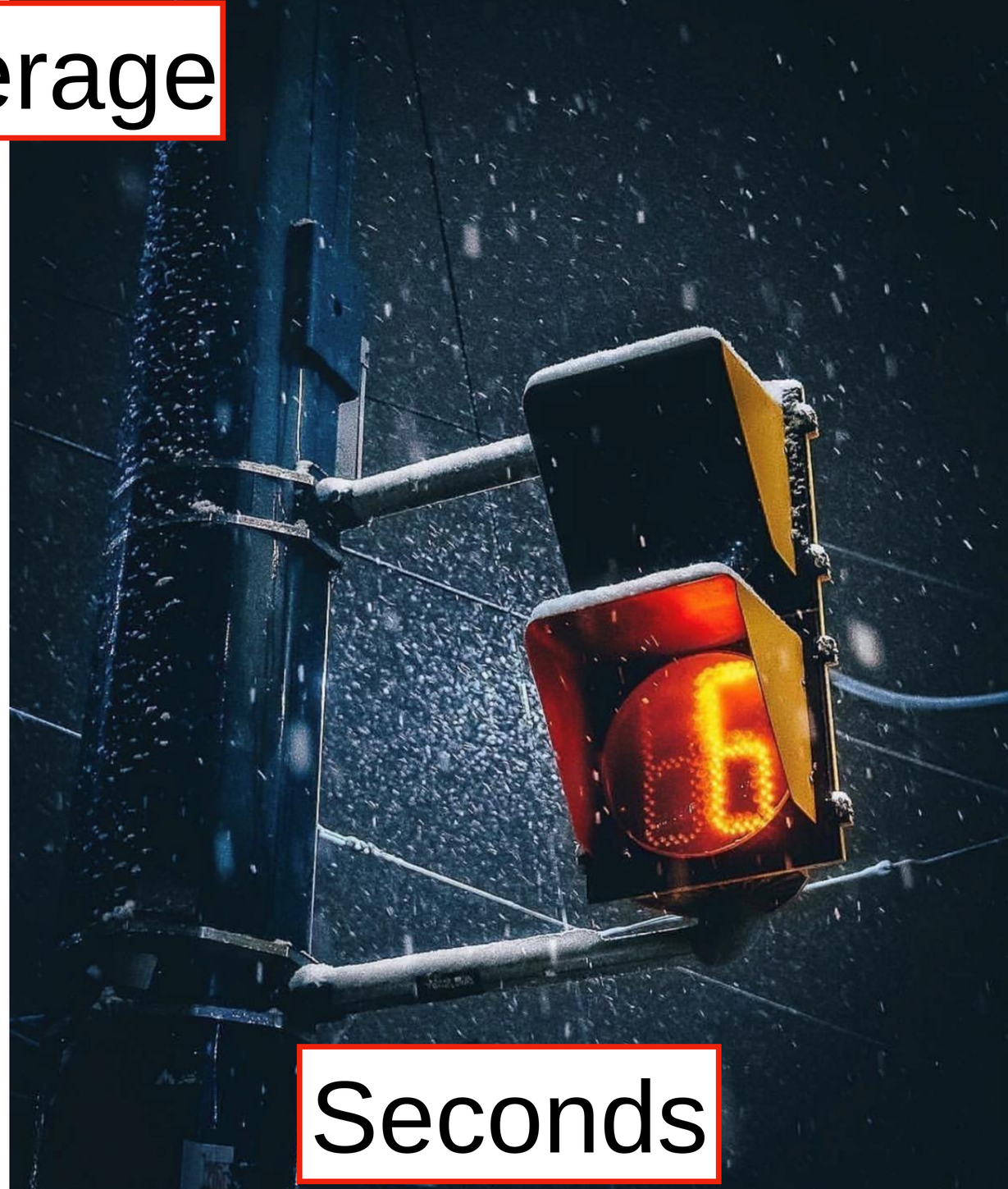
Ascend, prepared for the worse, with a hose & nozzle package capable of a “rapid knock down”.

Why?

- You only have “ONE Good Chance” when working at elevated heights for a fire that has 50/50 chance of being wind impacted. We call this the surprise behind the door. Be prepared.
- Introducing smoke into the common areas (hallways, stairwells, elevator shafts) will call for more resources. Multiple team tactics will now have to be executed by using the stairs in bad conditions.
- Smoke complicates evacuation and shelter in place options.
- Vertical response times will slow the stabilization of the incident.
- Using a larger diameter hose-line gives us multiple options, as you saw in the presentation.
- Fact comparison: Our hose pack weighs 9kg (20 Lbs). The water Can weighs 11 kg (25Lbs)
- When forced to use a larger diameter hose line after the smaller hose line was unsuccessful, will be difficult. The new line will be deployed in bad conditions. Crews will have to make the mental switch from a routine hose line, known as “flow and go”line, to a “hit and move” hose line. It’s not easy switching from a strong muscle memory to a weaker muscle memory. (we see this in our recruiting classes with multiple sets and reps)
- Panicked occupants require more resources as their actions are unpredictable the longer the fire burns and smoke allowed to spread. (you have “ONE Good Chance”)

On average

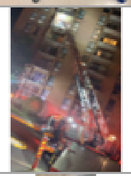
Minutes



Seconds

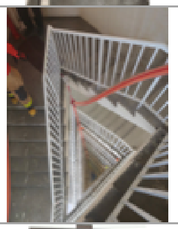
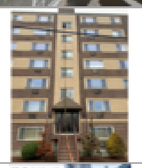
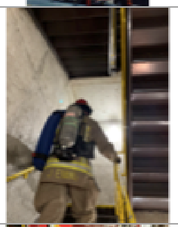
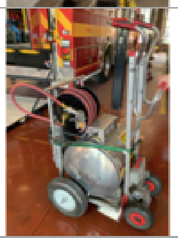
Tactical Options For HighRise Fires

Smoke and fire containment is key. In all scenarios the" fire unit" and stairwell doors must be controlled.

Senario	Attack	Equipment
Clear Hallway	Frontal Attack. Stretch on the fire floor	
Dirty Hallway	Frontal Attack. Stretch from the floor below	
Hose Line Came up Short	Continue to flow water down range towards the fire unit	
Unable to reach the fire unit because of untenable conditions	Contain smoke and heat to the fire floor by controlling the stairwell doors. Prepare 2nd 65mm hose line	
Still unable to reach the fire unit because of untenable conditions	Retreat to the attack stairwell and hold. Wait for direction from the IC to reattempt frontal attack	
Floor below nozzle not practical for the scenario	Wind driven water method	
Waiting for interior crews to change tactics	Exterior Attack with smooth bore nozzles targeting the ceiling of the fire unit	
Other Options	Flanking Attack	

Water Supply Issues

Smoke and fire containment is key. In all scenarios the" fire unit" and stairwell doors must be controlled.

Senario	Tactic	
Inadequate water supply	Pump 1400 KPA into the FDC.	
No water	Well-hole stretch. Improvised Standpipe	
No water, No well-hole	Exterior hose stretch. Improvised Standpipe	
No water	Improvised Standpipe off an Aerial device	
No water	Stairwell Stretch from ground level with no well-hole	
Catastrophic failure. No water. Out of hose stream reach.	FST extinguishers & Portable CAFS	

Presentation prepared by: Brent Brooks

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