

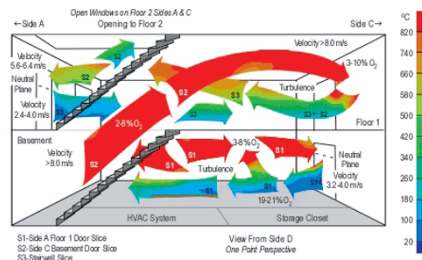
Flow Paths at Building Fires

‘RULES OF ENGAGEMENT’

The term ‘flow path’ may seem new to the fire service. In its most basic form it describes how fire, heat and smoke may travel within a fire involved structure when influenced by ventilation openings.

Actually this is nothing new and firefighters have always known that venting fires, breaking windows, opening and closing doors, making holes in roofs and even entering the front door to fight the fire may have some impact on fire development in a big way. However it is only recently that research has begun to untangle the myths surrounding the ventilation of fires. Is it better to vent? Or, is it better to hold off on venting?

Most importantly, how do we prevent our firefighters getting caught on the wrong side of a ‘flow-path’?



Ed Hartin CFBT-US.com

In a recent NIST report into a fire in Illinois where a Chicago firefighter lost his life as rapid fire progress developed through a deadly flow path, the authors identified 15 previous firefighter fatality fires reported by NIOSH where multiples of firefighters were killed or seriously injured when caught in flow paths. In fact, there have been many more than 15 cases.

(http://www.nist.gov/el/fire_research/chicago-120214.cfm)

Rapid Fire Progress

In the 1980’s we became very adept at widening scientific definitions for various forms of rapid fire development such as flashover, backdraft, smoke explosion and fire gas ignitions. Then in the 1990’s we began to realise that it was often the case that we were unable to determine with any great precision the differences in real world events where fire development reached extreme limits. Was it a flashover? or thermal runaway? or was it in fact a backdraft? Does it really matter?

If fire development can be rapid and extreme then its critical that we ensure our firefighters follow safe entry procedure and deploy from the safest point of entry.

This means far more than just ‘pulsing’ water droplets above and into a doorway. In reality it means following clearly defined rules of engagement with potential flow paths seen as a primary tactical concern.

Common Theme of Events

What is clear from an analysis of NIOSH fire reports is that there is a common theme of events in relation to the creation or existence of fatal flow paths:

1. Firefighters nearly always enter the building using the front door. This is often against a prevailing wind on the rear of the structure.
2. Firefighters rarely consider wind direction or velocity when selecting their primary point of entry for firefighting or search and rescue and this can be fatal.
3. The interior deployment of firefighters is predominantly rapid following arrival on-scene, often prior to the seat of the fire being located and a 360 degree size-up taking place.
4. In many of the reported cases firefighters were deployed to, or advanced up to, the floor above the seat of the fire, often without realising it.



Beacon Street Fire Boston 2014

5. Closing internal doors as you pass them is a way of confining fire spread throughout the building or isolating the fire compartment until water is available. There was little evidence that such actions were ever undertaken. Should a fire spread into or through the structure, or down from the attic, such door confinements may prove critical during escape.

We are all hopefully familiar with the dangers of flashover, backdraft, fire gas ignitions and other forms of rapid fire progress, but what are the tactical implications associated with firefighter deployment into what seem routine building fires?

Flow Path Rules of Engagement

1. Select the best point of entry depending on wind direction and velocity, staffing and engine positioning. This may mean entering from the rear (‘C’ side) of the structure or even the B/D sides.
2. Consider a door control assignment for the point of entry. Someone who takes control of when the door is open or closed, to prevent air feeding the fire.
3. Take a few seconds to determine the lowest floor involved in fire and enter from there if possible. On arrival we often deploy internally too quickly! Getting the right balance of rapid but safe is absolutely critical.
4. Consider softening the fire from the exterior where possible, prior to interior deployments.
5. Do not change levels/floors without first establishing some fire isolation by closing all internal doors and/or by deploying a protective hoseline.
6. Coordination of venting with fire suppression (or interior ops) has never been more important! The IC must direct this and communicate his/her directives with great thought and precision. Nobody should open an exterior door or window without the IC giving a directive to do so!

Post Fire De-briefings

Every fire response and intervention should be debriefed for flow-path management. Take the above points and critically examine each deployment and actions taken that may have influenced flow path creation or development either negatively or positively.

Flow path Training

Taking all the above rules of engagement into consideration, take various NIOSH or NIST reports of fires where firefighters were seriously injured or killed in flow path events and present each case history from the perspective of ‘could such an event be predicted and avoided in future’ if the above ROE are followed.

Are you advancing or working ABOVE or PAST the fire without realising it? Use your TIC!

Are you really going to enter from the front?

Are you entering from the lowest access floor or is the fire below your access point?

What if the wind was from the front with high gusts or velocity - do you need to create an outlet at the fire compartment prior to entry?

Do you need to control the opening of the access door?

Has the fire compartment been located?

Are you deploying too quickly?

Has a 360 degree size-up taken place?

Are there exterior rescues to be carried out that should take priority?

Is a hose-line charged and ready?

Are there persons reported trapped inside or is there a justified belief that there may still be occupants remaining within?

Are we incident aware and has critical information be communicated across to all members? For example, are all the occupants already out and safe?!



WIND FROM REAR OF HOUSE

Is there any possibility that a VEIS operation may be considered a viable option and how might this flow path creation impact on other crews working inside?



Does any flame issuing give us an indication that an exterior water stream will 'soften' the fire or 're-set' fire conditions, or have we not yet identified the fire's location or the extent of the fire spread?



Are we likely to spread or push flaming combustion, fire or smoke and heat, if we direct a constant fog pattern into an opening?

Have any flow paths been identified prior to entry?

Internally, are we closing doors as we go to reduce fire spread potential and flow path creation?

What openings exist?

What impact are they having on the fire?

Are we able to isolate the fire by closing the door to the fire compartment, prior to fire suppression taking place?

Should the front door be closed before we are ready to deploy to slow the fire spread?

Are we able to place a protective hose-line to maintain egress for interior crews?

Does any smoke or flame issuing give any indication of the fire's location, or the seat of the fire?

COMMUNICATE!!!