Reading Smoke – the Sequel

“Sequel”?

- “Reading Smoke” is far from absolute – therefore there is room for interpretation
- Many have “added” fingerprints to the curriculum – helping the information become more street friendly

The Sequel Plan

- Give you something to help at your next structure fire
- Review the basic process
- Update/refocus some key points
- Show some examples
- Answer some questions

The Basic Process

Reading Smoke can help you answer 3 questions:

1. Where, specifically, is the fire?
2. How big or intense is the fire?
3. How fast is it changing? (rate and severity of fire spread)

Basic Process – the Science

3 concepts:

1. Smoke is FUEL
2. The fuels have changed – more continuity and explosiveness than previously taught
3. The smoke has trigger points: right temperature and right mixture

Consider this…

The following gases create *"ladder fuels"* within smoke (remember, there are particulates and aerosols also).

Gas	Self-Ignition Temperature	Flammable Range
Acrolein	450°F	3-31%
Benzene	928°F	1-8%
Hydrogen Cyanide	1000°F	5-40%
Carbon Monoxide	1123°F	12-74%

The Basic Process (cont.)

Process Rules:

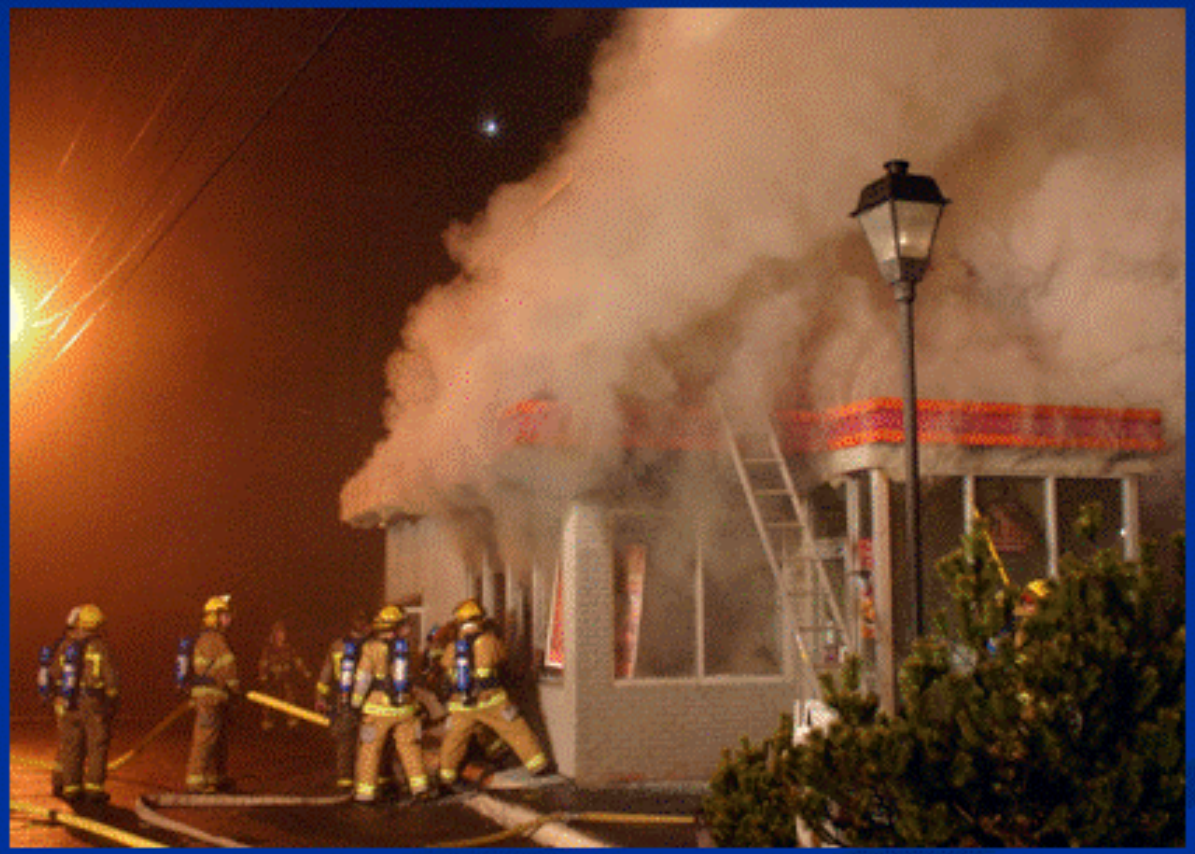
1. Nothing is absolute
2. Compare ventilation openings *(restricted or unrestricted, smoke or no smoke)*
3. Start measuring rate of change *(seconds or minutes)*

The 3-Steps for "Reading Smoke"

1. Inventory & compare smoke attributes: *volume, velocity, density, and color*
2. Factor in influences that change the meaning of VVDC
3. Answer the questions

STEP 1: Inventory and compare the key attributes

- **Volume**
- **Velocity (Pressure)**
- **Density**
- **Color**



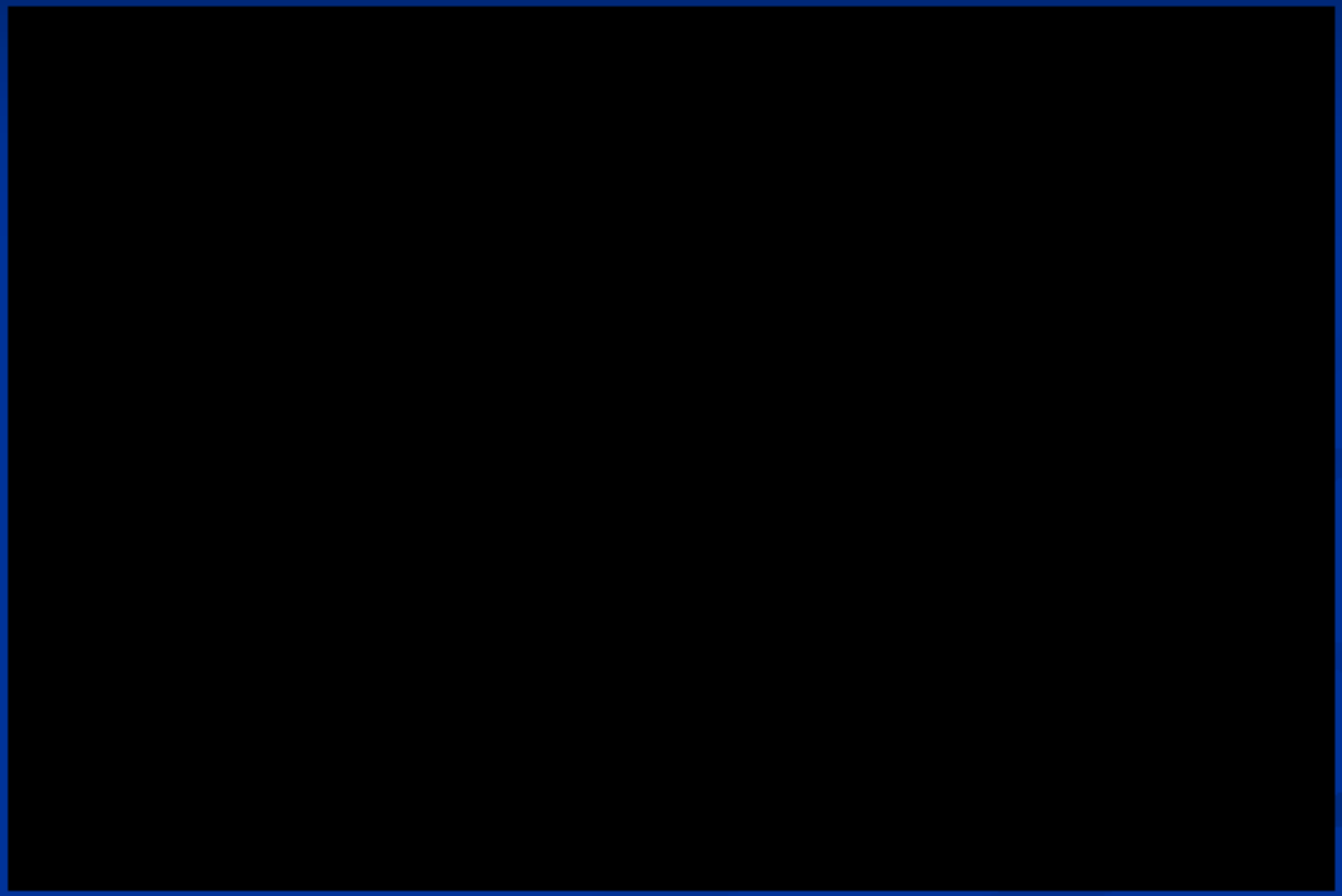
VOLUME

- Gives an impression
- Establishes relativity to the “box”
- Remember: a small volume of smoke from a very large box is significant
- Volume is a source of pressure (velocity)

VELOCITY (Pressure)

- How fast is the smoke leaving?
- Turbulent or Laminar?
- Is laminar heat or volume pushed?
- Compare velocity from like-sized openings to find fire location

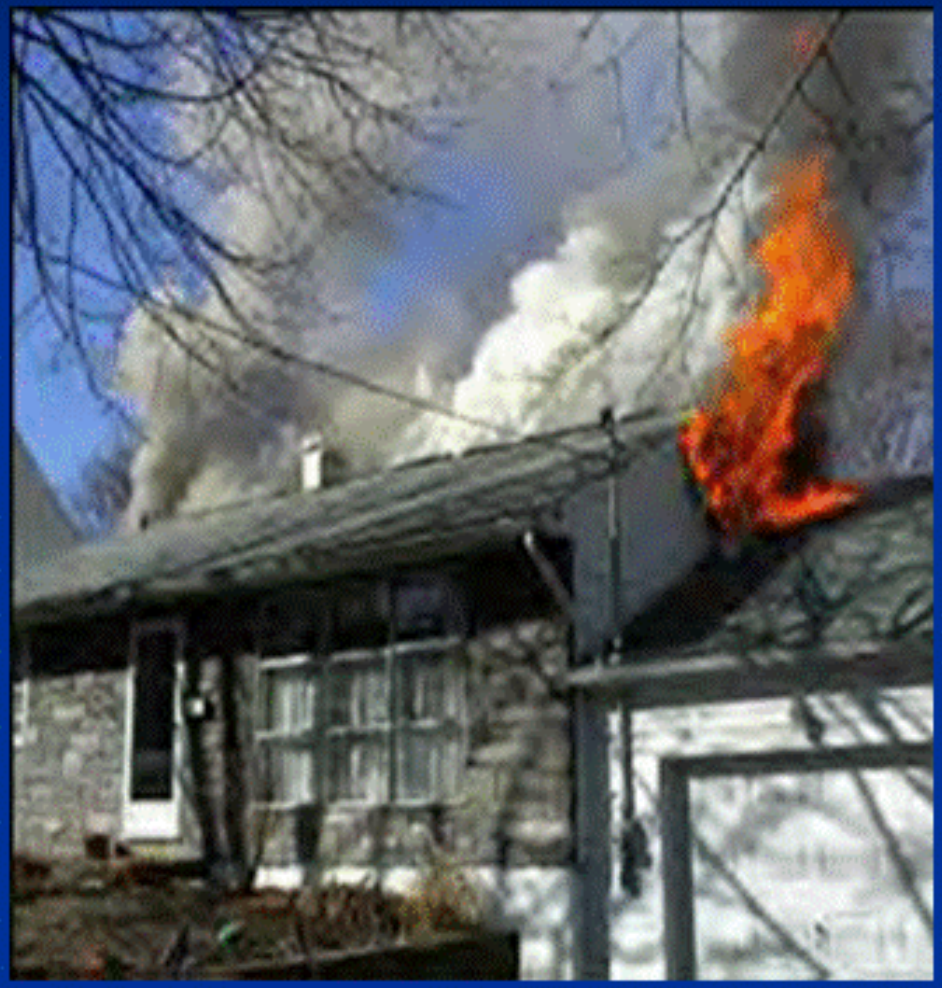
Turbulent vs. Laminar



Density

- Most Important Factor
- Tells you the future
- Continuity of Fuel
- Likelihood of an Event
- “Degree” of the Event

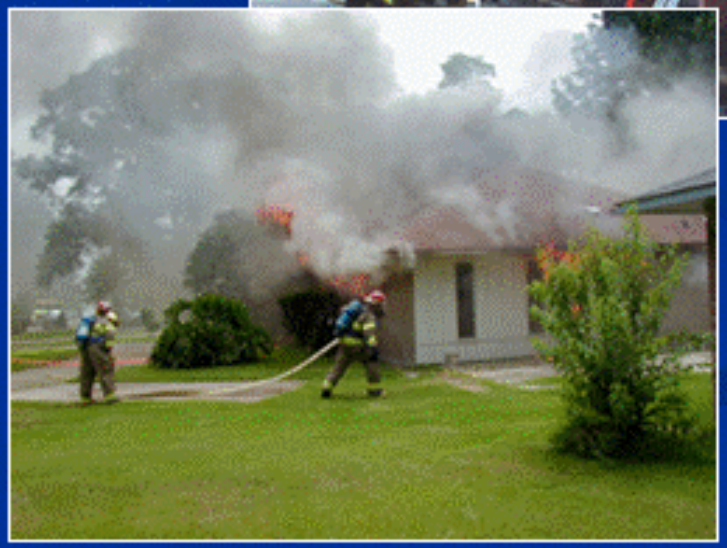
Color



- Tells Stage of Heating
- Should compliment velocity to find location of fire
- “Brown” Smoke is usually unfinished wood being heated
- Remember, smoke color can be *filtered* over distance or through resistance

STEP 2: Factor in Influences

- Container *(defines the significance of VVDC)*
- Weather



STEP 3: Answer the Questions

- Where's the fire?
- How big or Intense is the fire?
- How fast is it changing? *(rate and severity)*

Update/Refocus

- Velocity trumps color
- *ANY* thick, fast moving smoke is ignitable
- Zero visibility makes you a slave to your environment

Update/Refocus

Turbulent smoke is ready to flash – and indicates that floor temperatures are past human life thresholds (zero rescue profile!)

Manage it – but reduce your risk-taking!

Update/Refocus

Opinion: Ventilation has never been more important and needs to be our #1 tactical priority *(make the building and fire behave!*)*

**Tom Brennan – we'll never forget you!*

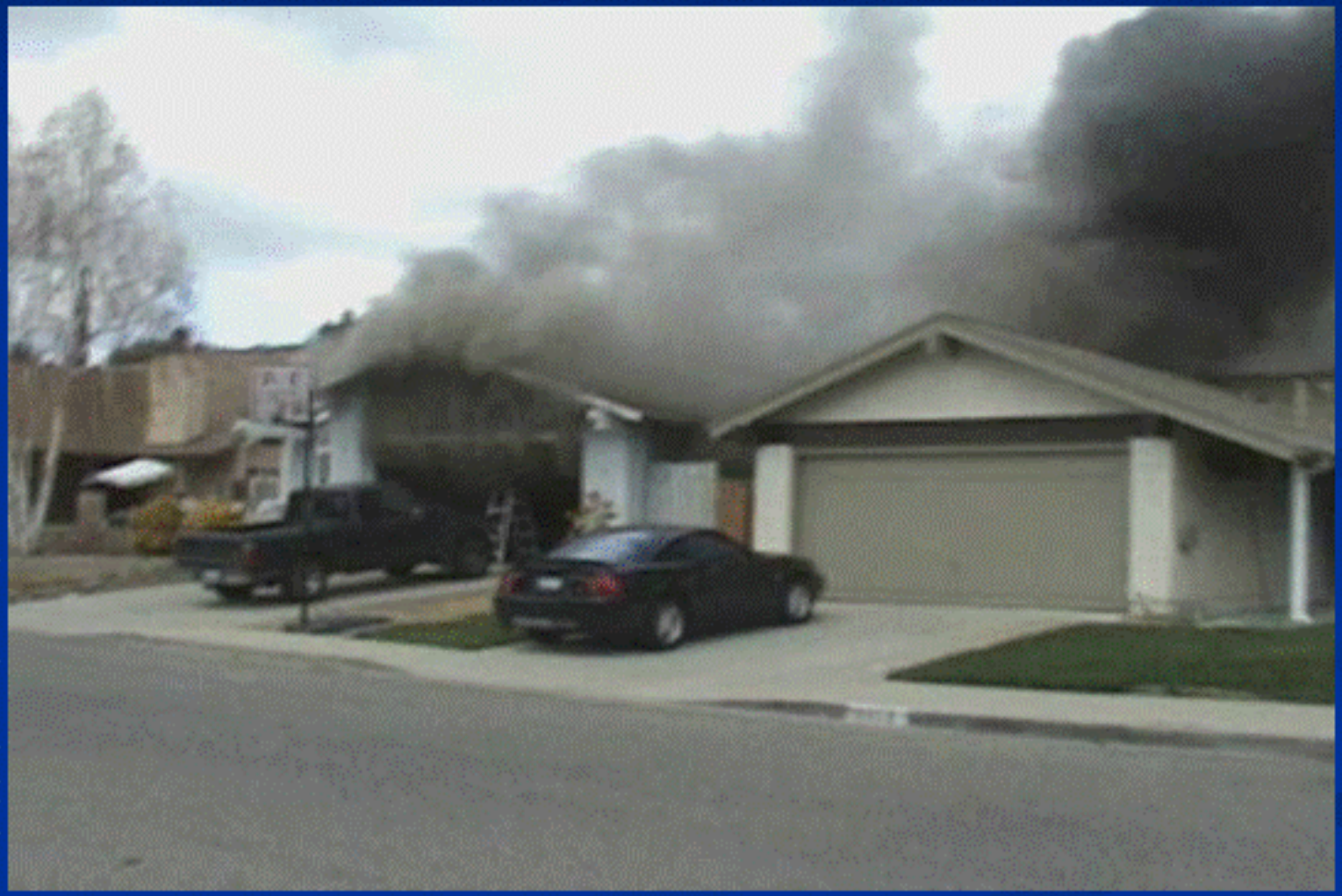
Short Cuts (not absolute)

- Black/Thick/Fast = heat and explosive
- Black/Thin/Fast = flame near
- White w/Speed = hot – but distant
- Uniform speed/color from many places = deep seated
- Brown = unfinished wood being heated

(a warning sign of collapse in lightweight wood structures)

New Example

(can you get a better read?)



QUESTIONS?

Be Safe – *Make it Safe*