



Albany County Sheriff's Office Critical Incident Emergency Management Unit

October 2022

Critical Incident/Emergency Management Unit

This is the monthly newsletter for the Albany County Sheriff's Office Critical Incident Emergency Management Unit. **If you have events that you would like posted in this newsletter please email them to the Fire Coordinator's office.**



Technical Rescue

In this issue

Modern Fire Behavior
Technical Rescue
Events
Training

Office of Emergency
Management

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Modern Fire Behavior Pilot Class

Coeymans Fire Department hosted a "Modern Fire Behavior" pilot class last month. The class was taught by Professor David Walsh from Dutchess County Community College and was based on studies done by UL with regard to fire behavior and firefighting tactics. It was attended by 41 firefighters. This was the last pilot. OFPC will finalize the curriculum and release the class shortly. If you have the opportunity to attend the class in the future we recommend it.



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Fire Rescue Magazine The Art of Reading Smoke: Continuity of Fuel

11.19.2021



By Phil Jose



The art of reading smoke is a process that evaluates four visible smoke attributes—volume, velocity, density, and color (VVDC)—to predict fire size, location, and future growth. Reading smoke is critical to good decision making. This skill is as important to the fire attack team at the front door as it is to the incident commander (IC) at the command post. Learn to read smoke at the front door. Understand how to interpret smoke as you force the door and make a fire attack. Use reading smoke to make your fire attack quick, safe, and effective for you and the citizens you serve.

A core concept to understand when reading smoke is that “smoke is fuel.” Where you see smoke there is “continuity of fuel” to the seat of the fire. Practitioners of the craft of firefighting recognize reading smoke is integral to effective tactical decision making. Combining the concepts of “smoke is fuel” and “continuity of fuel” during fire attack entry door operations tells you that the smoke you see is connected directly to the seat of the fire.



Albany County Sheriff's Office

Critical Incident Emergency Management Unit

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Let's examine reading smoke as part of the first attack line to provide an understanding of the concepts of "smoke is fuel" and "continuity of fuel."

Smoke Is Fuel

Smoke is the product of incomplete combustion and/or pyrolytic decomposition, which includes an aggregate of particulates, aerosols, and gases that form a plume. The concept of "smoke is fuel" brings this definition to life. The solids suspended in the thermal plume include carbon (soot), ash, dust, and airborne fibers. Aerosols (propelled liquids) typically include a whole host of hydrocarbons (oils/tar) and moisture. These aerosols, produced from burning or pyrolyzing plastics, have self-ignition temperatures as low as 460°F.

There are perhaps hundreds of named fire gases in smoke. Carbon monoxide leads the list of gases produced during incomplete burning. Other notable gases (in quantity and flammability) are hydrogen cyanide, benzene, and acrolein. Additionally, smoke can contain polyvinyl chloride, hydrogen chloride, hydrogen sulfide, phosgene, nitrogen dioxide, ammonia, and phenol—to name a few. This fuel package (plume) is a potent mix of toxic and flammable products that include a wide range of ignition temperatures.

Continuity of Fuel

"Continuity of fuel" recognizes that the smoke plume is connected from the outside of the structure, in a nonstop feed, to the seat of the fire. The smoke attribute density lets you know the strength of the connection between the plume and the seat of the fire. The higher the density, the stronger the connection to the fire. As temperatures inside the plume rise, the risk of rapid fire growth increases. When a smoke plume ignites, "continuity of fuel" predicts a rapid increase in temperatures within the smoke. This predicts increased aerosol and gas ignition and sustained burning of particulates that provides a feedback loop of energy. Without intervention, fire will burn along the fuel path, to the seat of the fire, with potentially devastating consequences. What options do firefighters have to intervene in rapid fire growth initiating from the "smoke is fuel" and "continuity of fuel" concepts?

Right Temperature/Right Mix

For the column of smoke/fuel to ignite, it needs a combination of the right temperature and the right mix with air (within the smoke's flammable range). The right temperature can be anything in excess of 450°F. The right mix in air includes a supply of oxygen sufficient to support ignition. The flammable range of the smoke aggregate can be from 1% to 74% in air! While firefighters can exercise some control over the mix, by limiting the supply of oxygen through door control and coordinated horizontal or vertical ventilation, there is no guarantee that windows won't break due to fire conditions. On the other hand, firefighters have essentially complete control



Albany County Sheriff's Office

Critical Incident Emergency Management Unit

October 2022

over the temperature of their operational area through water application. Open the line to control the temperature.

Putting It Together at the Door and in the Hallway

Picture yourself at the front door of a single-family residential fire. You and your team are ready for entry. The line is charged. Your self-contained breathing apparatus is donned. You push open the door and make a read of smoke conditions from the entry door. An initial push of smoke billows out and the fire establishes a bidirectional flow path. Smoke/fuel is exiting out the top door with fresh air going in at the bottom.

Looking down the hallway, you can see a clear thermal layer. Reading the smoke in this environment means applying your understanding of the "smoke is fuel" and "continuity of fuel" concepts along with VVDC, with emphasis on velocity and density.

Evaluate the smoke initially. Maintain an awareness of the smoke over your head as you move to the seat of the fire. Comparing an initial read of the smoke to changes that occur as you advance to the seat of the fire will tell you a lot about fire growth. Velocity and density are likely to begin increasing. The rate of increase indicates the rate of fire growth and, at some point, the fire attack team will need to control the temperature of the smoke plume to avoid smoke ignition and prevent rapid fire growth.

Smoke that is white to light grey, moving at a low to moderate velocity, will appear either laminar or only slightly turbulent. Low density means you can see the ceiling at least intermittently through the smoke layer. This combination of velocity and density generally indicates a low to moderate level of risk. Ceiling temperatures are likely at or below the low end of possible smoke ignition. It is unlikely you will see any fire within the smoke plume. Advancing under these conditions, in full personal protective equipment, is relatively safe. Vision while low should be excellent and rapid progress to the seat of the fire achievable.

Keeping a read on the smoke, note the rate of change as the fresh supply of air provided by your entry door, or any other ventilation opening, allows an almost immediate increase in fire growth, heat release rate, and smoke production. As velocity increases, you will see a transition from laminar flow to turbulent flow. The speed of the plume exiting will increase, generally combined with increased volume, resulting in the smoke layer dropping. density also increases and you can no longer see into or through

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the smoke. You may begin to see small pockets of ignition or licks of flame in the smoke plume.

At this point firefighters should strongly consider applying water to reduce the temperature of the smoke layer. Good progress can still be made to the seat of the fire. Water application should be done without disturbing the thermal layer if possible. Nozzles should have less than 10-degree pattern, straight stream, or smooth bore. While visibility matters, decreasing the temperature of the smoke/fuel mix is the more important objective. Fire attack should continue to advance while smoke plume temperatures are maintained below ignition temperatures.

As the fire continues to grow, velocity and density will also continue to rise while the color of the smoke will likely remain dark grey to black. Without the water application as noted above, firefighters in the hazard area are at significant risk as conditions deteriorate. The volume and velocity of the smoke will cause the thermal layer to push down to at or near the floor. Smoke will have significant turbulence inside the plume as well as after exiting the ventilation opening. Smoke will appear very thick as the density of fuel increases with fire growth. If the nozzle has not been opened already, then it should be opened now and remain open through fire attack.

Without water application, smoke will billow out the door and continue billowing as the smoke exits and moves from horizontal flow inside the building to vertical outside the building. ICs or other teams operating outside the fire attack area should monitor smoke conditions at the door from the initial opening through fire attack. Increasing velocity and density represent increased risk. A high volume of turbulent, thick, black smoke exiting from an entry door represents significant risk to those operating inside. Consider these conditions to be approaching a Mayday if a team is operating inside and initiate contact with interior teams to ensure the attack line is open and flowing water. A near immediate change in smoke conditions, such as a color change to white or light grey, should then be visible at the entry door.

Read the smoke when you arrive at the fire. Understand that "smoke is fuel." Recognize there is a "continuity of fuel" from where you see it to the seat of the fire. During fire attack, read the smoke when you enter. Read the smoke as you proceed to the seat of the fire. Understand that smoke needs the right temperature and right mix to ignite. You don't always control the mix. You can control the temperature through water application. Continue to read the smoke and note the rate of change for velocity and density to determine the risk and when to open the line.

Reading smoke is a tool to improve effective fire attack whether on the outside or the inside of the building. Read, think, and react accordingly for the best possible outcomes for the citizens you are sworn to protect.

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Technical Rescue

The County is working to develop Countywide Technical Rescue capability for Ice , Trench , Rope, and Swift / Surface water Rescue and obtain NYS accreditation for these teams. We have compiled data from the various Departments in the County that have these capabilities. Below are photos from the Sheriff's rope Recue team exercise in Thatcher Park on September 28th.



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NYS AFC Regional Hands-On Training **FIRE BEHAVIOR ON THE INSIDE**



**Host: East Glenville Fire District
Schenectady County
November 5-6, 2022**

@ East Glenville Fire District • 433 Saratoga Road • Schenectady, NY 12302

This intense live fire training program allows students to witness changes in fire behavior while common fireground actions are performed. Window ventilation, door control, VES, and more will take place while firefighters monitor conditions from inside the fire building, providing the rare opportunity to witness changes in fire behavior on the inside. Fire dynamics will be discussed throughout the daylong program, providing students with multiple opportunities to gain a more thorough understanding of how their actions may affect fire behavior. This eight-hour training includes a brief classroom orientation, followed by live fire hands-on training evolutions.

- **Live fire VES.**
- **Search in pre-flashover conditions.**
- **Monitor smoke, heat, and air movement from inside the building.**
- **Over 12 live fire evolutions per day.**

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NYSAFC 2022 SEMINAR SERIES

NYSAFC 2022 Seminar Series "The Five Points of Command" **With Chief/Commissioner Michael Lombardo, Buffalo Fire Department** **Three-Hour Seminar:**

The fire ground is a dynamic, ever-changing environment. It can be a daunting challenge for firefighters, company officers, and chief officers to control an emergency situation. A cohesive and smart incident action plan is critical and key to successfully controlling the chaos that we so often respond to. Personnel must understand the components of the incident action plan and how this plan effects all facets of the operation and all who are operating to attain success. Remember, this plan isn't just for and about incident commanders, but rather a framework for all on the fire ground to operate with. Whether you are a new firefighter or the chief of department, having, implementing, and understanding the incident action plan will provide the clarity and coordination for a safe and successful operation.



Instructor Michael Lombardo:

Mike Lombardo is a 43-year veteran of the fire service and was the commissioner/chief of department of the Buffalo Fire Department from 2006-2010. He is a New York state fire instructor and was a member of the development team for the New York State Firefighter Survival and Rapid Intervention programs. Lombardo has also served as a Hands-On Training instructor for NYSAFC. He is a two-time *Firehouse* magazine Heroism Award recipient and is the FDIC 1999 Tom Brennan Training Achievement Award recipient. In 2015, Lombardo was a contributor for the NFFF documentary "[Giving Courage: LODD Chiefs Speak.](#)" He provides consulting services across the United States and serves as an instructor on fire tactics, live fire attack, firefighter survival, command, and fire department operations. Lombardo is also a member of the board of directors of the Fire Department Training Network, where he developed the Fire Command program. He is currently an active member of the East Amherst Fire Department and is a past assistant chief of the Christiana (DE) Fire Department.

Registration Fee:

\$35 per person – NYSAFC Individual and Department Members

\$50 per person – Non-Members

Seating is limited at some sites. Pre-registration is encouraged. On-site registration will be accepted if space permits.

October 24 – 7:00 p.m. – Albany County, Village of Ravena Fire Department • 116 Main Street • Ravena, NY 12143

To Register: https://www.nysfirechiefs.com/files/Events_Training/Seminar%20Series%202022%20Flyer_Form%204.jpg

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Albany County Training

ALBANY COUNTY FIRE TRAINING SCHEDULE #10 2022 is now available on our website .

<https://www.albanycounty.com/home/showpublisheddocument/22107/637983203903476090>

There is now a link on our website with instructions on how to get an LMS sign on ID . We recommend that all new members should register as soon as they join so they have access to training opportunities.

<https://www.albanycounty.com/government/county-sheriff/fire-training>

Article Submissions Requested

Do you have an idea for an article for our newsletter?

Do you have a talent for writing?

Is there an area that you have a strong knowledge or interest in?

If so, please contact us. We are always looking for valuable information to pass on to the Emergency Services Community. If you seen an interesting article, let us know.

Please contact:

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