



Training Reps



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Investigating Furnace & boiler backfires

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A typical call the department receives in the winter is smoke in the basement caused by a furnace or boiler backfire. While these calls seem routine, there is an explosive hidden danger as the smoke or fog produced from one of these situations is actually unburned atomized fuel oil, a condition known as a “white ghost”.

Oil-fired systems remain common in our area. They operate by injecting pressurized fuel oil into a combustion chamber where an igniter lights the fuel to create heat for forced air or water for hydronic radiators. Modern systems have safety devices that shut down the fuel system if there is a loss of combustion. However, older or poorly maintained systems may continue to pump unburned atomized fuel into the combustion chamber that will likely be above the fuel's flashpoint, creating smoke conditions. Remember that smoke is unburned fuel! On modern systems that have shut themselves down, well-meaning occupants sometimes repeatedly press the red reset button to restart the system, injecting atomized fuel into an already hot combustion chamber.

When entering a home with a suspected backfire or puff back, you may notice the house full of white to grey smoke and a fuel oil odor. Additionally, callers or occupants may describe heavy smoke conditions from the chimney ranging from white to black, combined with smoke in the residence concentrated in the basement but may be coming through vents or air registers throughout the house. If the backfire was strong enough, there is a potential for the force to blow off the flu pipe and continue to pump unburned fuel and smoke into the dwelling. Members should check combustible items around the unit as a backfire's explosive force may have pushed fire out of the combustion chamber.

While many of us discount these calls as routine, firefighters and company officers should exercise caution. Once identified, members should approach the structure as if responding to a natural gas or propane leak with an elevated LEL reading per Tactical Manual 21 and consider taking the following steps:

- Evacuate occupants and all unnecessary personnel.
- Full PPE and SCBA are required if operating inside the structure. Anticipate high carbon monoxide levels.
- Charged hose lines should be placed, and a dry chemical extinguisher should be readily available.
- In extreme cases, a fog stream can cool and disperse vapors.
- Attempt to eliminate any ignition sources – Do not forget about sump pumps and other automatically starting equipment.
- Utilize the emergency shutdown switch, usually located at the top of the basement stairs or directly on the heating device. It should have a red switch plate cover.
- Shut off the oil supply line going to the device.
- Remove combustible items from around the furnace/boiler.
- Ventilate the structure – With high vapor density, vapors will accumulate in low-lying areas of the home. However, atomized fuel may also be present in the upper areas of the house. Beware of introducing oxygen into a fuel-rich atmosphere.
- In some cases, crews must dismantle and remove the top of the device to fully extinguish the fire. The occupant shall only operate the unit once a certified technician conducts an inspection and repair.
- Double-check any chimney penetrations to ensure no fire extension.



Check out these links for more information:

<https://youtu.be/CYImOWTooPk>

https://youtu.be/J_bOVzn8lg

<https://apexoil.com/wp-content/uploads/2015/11/fo2.pdf>



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