



Engineering



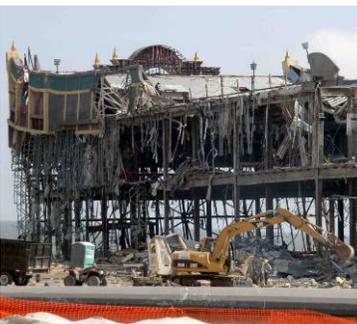
Fire Investigations



Environmental Consulting



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Catastrophe Response

E85: The New Fuel in Town

An Analysis of E85 and What it Means to Fire Investigators and Laboratories

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Depending on where you are located, you may be seeing more service stations with signs offering Flex-Fuel, Propel, etc. But what exactly are these products? To quote Wikipedia (usually not a good idea but in this case the information is correct), the product they are selling is E85.

“**E85** is an abbreviation for an ethanol fuel blend of up to 85% denatured ethanol fuel and gasoline or other hydrocarbon by volume. E85 is commonly used by flex-fuel vehicles in the United States and Europe. In the United States, government promotion of ethanol in general and E85 in particular has encouraged a growing infrastructure for retail sale of E85, especially in corn growing states in the Midwest.”*

*Source: Wikipedia, www.wikipedia.org, 2012.

This information may be reassuring to those who are concerned about the environment and global warming, but what does it mean for fire investigators and laboratories? The bottom line is it will make their lives more difficult. Here is what the use of E85 as an accelerant means to the fire investigator and lab.

Burn Patterns

Alcohol fires burn much quicker and cooler than most fossil fuels like gasoline or kerosene. While liquid alcohol is still plenty hot to get standard combustibles burning like a couch, paper, and thinner sections of wood, the lower flame temperatures and other factors, like increased volatility, leave little or no burn patterns on wood and similar flooring. The effect on carpet is typically a glazing of the nap, producing a pattern more resembling radiant heat damage rather than a typical accelerant pour pattern. Alcohol fires almost never produce burn-through in carpet or padding. In the typical aftermath of a fire, the “burn pattern” from alcohols is nearly impossible to detect visually, even after carefully digging out the scene.

Another clue which may be harder to find is smell. Everyone who has worked a fire scene knows that smell can play a key role in a fire investigation. There are the common smells of burned wood, plastic, cooking residue, and some not so common, that may require a bit more investigation or laboratory testing to identify. In some cases, the sense of smell can supply the “eureka moment” when a piece of debris is moved and a whiff of gasoline hits the nostrils. Many petroleum-based fuels have pungent and characteristic smells, including gasoline, kerosene and diesel fuel. Alcohol also has a characteristic smell, but it is not as striking as the petroleum products. Combine this disadvantage with the almost universal presence of water from fire suppression and the smell of alcohols may be nearly non-detectable among the other smells at the fire scene. A perfect example is the characteristic smell of “alcohol” in a shot of hard liquor versus the absence of that smell in beer where there are lower levels of alcohol and other fragrant ingredients present.

Fire Suppression

As we all know, fire departments must use plenty of water to make sure the fire is out. Unfortunately, because alcohol is completely soluble in water, whatever alcohol that may still be present is most likely running through a storm drain in front of the fire scene. That means in all probability, the chemical evidence will be lost.

Fire Debris Samples

After arriving to the scene, the best samples for investigators to collect are still those near the point of origin but remember, alcohol is water soluble. Samples of soggy carpet pad and carpet are good along with wet wood. Dry ashes and charcoal, like wood however, have very little chance of retaining alcohol. Combine that with the fact that alcohol is much more volatile than almost any other ignitable liquid, and any delay in getting out to the fire scene will likely dissipate whatever traces of E85 remained. Depending on the location and weather, the window of opportunity for collecting meaningful samples may be hours versus days, as with other hydrocarbon-based accelerants.

Fire Debris Analysis

Since E85 is by definition 85% alcohol, any lab not checking for light alcohols will miss most of the product. Unfortunately, some forensic laboratories do not test for volatile components like alcohols because they can be difficult to separate from the solvents used in the ASTM test methods for ignitable liquids (ASTM E1412, E1387, E1618). Another concern is what the specific manufacturer is using as the remaining 15% hydrocarbon component. This component may be gasoline or it may be something else. There are not hard regulatory requirements for the composition like there is with gasoline, only the performance and emissions. At best, it makes the analysis about 10 times as difficult for the lab and 10 times easier to miss. That being said, rest assured that a good forensic lab can still find a drop or less of E85 in the fire debris.

For the record, the forensic laboratories at EFI Global have always tested for light alcohols on fire debris samples. To date, we have not seen much used on E85 as an accelerant, but that could change as more gas stations offer ethanol fuel blends and its use becomes more commonplace.

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