Aqueous film forming foams (AFFF) contain fluorocarbon surfactants that rapidly suppress liquid pool fires, but pose environmental and health risks. Replacement efforts at the U.S. Naval Research Laboratory (NRL) have focused on how surfactants reduce the transport of fuel vapors through a foam layer, quenching the fire above. Commercial surfactants were evaluated for their ability to suppress fuel vapors through a flux chamber designed to measure heptane vapors above a 4 cm foam layer. Fluorocarbon surfactants suppress fuel vapors more effectively than the other, non-fluorinated surfactants examined. Although fuel transport through a flux chamber can provide valuable information about fire suppression, it neglects the increased foam degradation that is present in a flame environment. This limits the ability of fuel transport measurements to directly relate changes in surfactant structure to fire suppression. In an effort to measure fuel transport in a flame environment, we propose measuring carbon dioxide concentrations above a flame as foam is applied, using a 2.0 μm diode laser. Fuel vapors react in a flame to form water and carbon dioxide, and as foam is applied to the surface, fuel vapors are blocked, reducing the combustion reaction. Preliminary measurements in a Yale burner at George Washington University (GWU) have shown difficulties in probing a high temperature environment. However, we believe the measurement may be possible by measuring down-stream of the flame through a “stack” measurement over a sizable pool fire.

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Friday, September 7, 2018  
SEH B1220  
2:00 – 2:30 p.m.  
Refreshments will be served at 1:45 p.m.