The pilot study was implemented after an atmospheric monitoring training session was delivered to several Greater Manchester operational watches based on Moss Side and Gorton Fire Stations by the Fire Smoke Coalition, Inc. (FSC), in October 2011.

The FSC is a US based educational organisation whose aim is to focus the required attention and resources on the consequences of breathing fire smoke, and has run an awareness campaign around the dangers of smoke inhalation, including those associated with cyanide since 1997.

Special Operations Chief Jason Krusen, President of FSC, visited the Manchester service to talk about the dangers associated with the deadly toxicants in fire smoke, with a primary focus on hydrogen cyanide (HCN) and carbon monoxide (CO), and the monitoring work the FSC has been doing in the US. Chief Krusen also delivered practical demonstrations of how to monitor the atmospheric conditions following a house fire. These demonstrations strongly encouraged GMFRS to monitor levels of HCN and CO in house fire smoke as a matter of course.

GMFRS Crew Commander Nic Lacey, has been surprised by the frequency with which his crew has seen dangerous cyanide levels, saying: “As firefighters, the majority of us appreciate that smoke consists of many hazardous components, however the actual effects of hydrogen cyanide are not so widely appreciated or indeed understood. Considering the frequency that we as firefighters and the public we serve can be exposed to cyanide during fire scene operations the issue becomes a concern. The smoke monitoring research has shown us that cyanide is present, and that greater awareness around the threat it carries is necessary.

“The better informed we are, the safer both we and the public will be.”

Stark results early on in the monitoring project have resulted in nearby services taking notice. During a return visit to the UK, Chief Krusen delivered an educational seminar hosted by GMFRS which members of other Fire & Rescue Services and other agencies such as the North West Ambulance Hazardous Area Response Team (HART) attended. This awareness training delivered by the FSC’s Chief Krusen has been such a success that other fire services have started monitoring HCN and CO at fire scenes. West Yorkshire FRS and Staffordshire FRS amongst several other Services have all started monitoring projects since attending this event together with the continued support of Crew Commander Lacey.

Smoke inhalation is the single greatest cause of mortality in house fires, with 42% of deaths coming as a result of it. Cyanide is unquestionably a contributing factor. The presence of cyanide in house fire smoke is well established, as it is given off when a variety of household materials incompletely combust, including plastic, wool, wood, and foam in sofas and mattresses.

This incomplete combustion commonly occurs in enclosed spaces, where the fire’s oxygen supply is quickly exhausted.

Cyanide gas stops the cells’ ability to utilise the oxygen carried to them by red blood cells and acts synergistically with carbon monoxide; cyanide stopping the cells using any oxygen that reaches them, and carbon monoxide interfering with the ability of the red blood cells to carry the oxygen in the first place. For this reason, hydrogen cyanide and carbon monoxide are known as ‘Toxic Twins’.

Many first responders in the UK take carbon monoxide to be the only consideration when they arrive to rescue and treat victims from a burning building or vehicle. There is no specific treatment for carbon monoxide poisoning, with oxygen given as part of best supportive care helping to reverse the symptoms. However, there are antidotes available for cyanide poisoning, and treatment should be considered if the victim is showing symptoms of reduced neurological and cognitive function, and/or cardiac irregularities.

From the rapid progress of the atmospheric monitoring project on a regional level, it is becoming clear that it will be through local recognition of the presence of...
HCN in smoke that the seeds of national awareness are sewn. In countries such as France and the US, the emergency services are much more accustomed to treating cyanide poisoning from smoke inhalation. This will become a familiar concept, just as it is abroad, when those involved in rescuing and treating house fire victims witness its presence and effects in practical circumstances.

Familiarity and understanding of the presence of cyanide and how it interacts with carbon monoxide amongst the emergency services will inevitably improve patient safety, as members of the fire services who are aware that smoke inhalation patients have been exposed to dangerous cyanide levels can pass this on to paramedic teams to help inform their treatment.

If you are interested in monitoring cyanide levels at fires your crews attend, please contact Nic Lacey at GMFRS at laceynp@manchester-fire.gov.uk

For more information about the Fire Smoke Coalition please visit www.firesmoke.org

References

Atmospheric monitoring study reveals dangerous levels of cyanide in house fire smoke