

A New Reality for First Responders

While it is steeped in tradition, the role of the fire fighter is in constant evolution. Responsibilities are added over time as it becomes clear that more can be done to help if it is done immediately. Fire fighters have inherited the duty of being the “First Responder” because in most cases they are the first on a scene. First Responders put out fires, clean up chemical spills, and save lives by administering medical assistance.

Recently, terrorist attacks against the United States have revealed a new concern for First Responders. The use of biological and chemical weapons became a reality in 2001 when 5 people were killed by a terrorist who sent anthrax in the mail. When people learned that white powder could kill, they were suspicious of any white powder in their environment. Overnight, the First Responder inherited by default a new task - to determine the validity of bioterrorist threats.

The publicity surrounding bio-terrorism, which accompanied the post 9/11 anthrax scares, has subsided somewhat. However, as First Responders across the country well know, the regularity and dramatic impact of these incidents has in no way been totally diminished. Although stories of suspicious letters filled with mysterious powder no longer consume the nightly news, many local fire departments and other First Response organizations are dealing with multiple biological threat incidents on a daily basis. The perpetrators of these threats are well aware of the economic damage they can cause with a simple powder, be it an actual biohazard or merely coffee creamer. The purpose of these threats, the vast majority of which are hoaxes, is to create fear and uncertainty, shut down facilities, induce panic in workers, disrupt services and tie up critical First Response resources.

More than three years after the anthrax attacks, suspicious substance responses are still occurring at an astounding rate. The frequency of incidents tends to peak dramatically during times of global unrest and after other highly publicized threats. Even as the number of calls fluctuates, responders recognize that response to biological threats must be added to their repertoire.

On-Site Testing Provides Decision Making Support

Before the anthrax attacks in 2001, relying on laboratories for testing of potential bioterrorist agents was a plausible solution. However, the widespread nature of the attacks and subsequent hoaxes highlighted the need for on-site testing. Laboratories are ill equipped to handle the tremendous volume of samples, and obtaining results often takes days and even weeks. Lack of on-site information renders First Responders helpless, victims in a panic, and laboratories scrambling to prioritize samples.

Despite the fact that most incidents are hoaxes, First Responders must treat each one as if it is real. The economic damage caused by each incident continues to climb until reliable information verifying the presence of a credible threat is available. The longer it takes to clear an incident, the more severe the economic impact, and the higher the likelihood of “copy cat” incidents generating publicity and press coverage. Of even greater concern is the number and cost of resources consumed in lengthy responses to these incidents.

What is needed is a tool that allows First Responders to rapidly and accurately assess a threat on-site. A reliable screening tool that quickly provides First Responders with information about the validity of a threat would limit the severity of each incident, and empower responders with the ability to make decisions with confidence.

Reliable and Comprehensive On-Site Testing is the Key

Until recently, verification of a threatening substance has been limited to laboratory-based tests. These tests, which attempt to identify specific agents, involve performing a series of time-consuming and expensive analyses at the scene. Furthermore, ‘specific-agent’ tests are only available for a handful of the agents that could be used as biological weapons. The result is that First Responders have been forced to make critical incident-closure decisions based on the limited information provided by these laboratory-based tests.

For First Responders, more information gathered at the scene directly equates to more confident decision making. The primary objective of first response with regard to bio-terrorism is to verify *if* a threat is credible as opposed to identifying *what* a threat might be. A negative test for Anthrax does not verify if a threat is credible; it simply means that the substance in question is not Anthrax. The Centers for Disease Control (CDC) list 13 known bacterial agents that can be used as biological weapons. Unless all of these agents can be detected, a First Responder does not have enough information to confidently verify the credibility of a threat.

Tests are available today that give First Responders more comprehensive information regarding the nature of unknown substances. These tests, known as broad-spectrum screens, allow the user to screen samples for multiple biological agents with one test. An example of a broad-spectrum screen would be a test that can detect the presence or absence of a broad category of biological agents, such as bacteria. A negative result with this type of test categorically rules out bacteria as a potential biological threat, giving the First Responder more comprehensive information with which to make a more confident decision.

In law enforcement, crime scene investigators have been using broad screening tests for decades. At a crime scene where there is a substance that looks like blood, an investigator first runs a test that verifies *if* the substance is blood rather than a test that identifies *whose* blood it might be. The latter is a job more suited for a laboratory.

Similarly, First Responders can use broad-spectrum tests to first determine if a suspicious substance is potential biological threat. If the substance is determined to be a possible biological threat, they can send it to a laboratory to for confirmatory testing and identification.

Testing for Categories of Threats Reduces False Positives

Broad-spectrum screening tests, as they pertain to biological detection, typically detect the presence of something universally found in all biological substances. For instance, one such screen is a protein assay. Protein is found in everything that is biological. Powders like flour, corn starch, coffee creamer, and anthrax spores will all elicit positive results when tested with a protein assay. Unfortunately, protein is also found in many things that are not thought of as biological, like laundry detergent containing enzymes. In addition, protein assays cannot easily be adjusted for sensitivity. So if table salt is touched with bare hands and then run through a protein assay, it may also result in a positive response. While protein assays would alert their users to a broad spectrum of biological threats, they would also illicit positive responses on a large number of non-biological hoaxes.

In order to provide usable information to a First Responder, a broad-spectrum screen needs to be both broad enough to detect all threats, yet discerning enough to rule out most hoaxes. A good example of this is a test for microbial DNA. Screening for microbial DNA would eliminate the high frequency of positive results experienced when screening for biological components like proteins and lipids. The sensitivity of DNA screens can be adjusted, so positive responses are given only when the quantity of microbes present exceeds that which would be considered naturally occurring amounts. All bacteria, bacterial spores, and many viruses contain the same type of DNA, and would be easily detected using a DNA screening test.

In the November issue of *Fire Engineering/WMD Supplement*, special operations expert and 22 year veteran fire fighter Chris Hawley comments on this issue. "Broad spectrum tests alert users to a large number of potential biological agents; it appears that this test has more benefit, as opposed to a test that just indicates the presence of proteins".

Fortunately, such a broad-spectrum screening test is available for First Responders. The Prime Alert™ Biodetection System by GenPrime, Inc. uses a proven fluorescence and DNA-based technology that quickly detects suspicious levels of bacteria, bacterial spores and many viruses with one test. The Prime Alert has a false positive rate of less than 4%. To complete the System, the Prime Alert includes immunoassay test strips for the detection of the deadly toxins Ricin and Botulinum. With the Prime Alert, a First Responder can quickly obtain the critical and comprehensive information needed to decide the next course of action with a high degree of confidence.

In addition, the Prime Alert was extensively validated in 2002 by a Government contracted laboratory, which concluded the following:

"The tests conducted during the study demonstrated that the GenPrime Prime Alert™ kit was effective at detecting the presence of microorganisms including bacteria and/or bacterial spores from powders, and was an easy and rapid assay to conduct. The assay was reproducible with a confidence interval equal to 98% for all the biological and non-biological powders tested."