

CBNW

**CHEMICAL, BIOLOGICAL
& NUCLEAR WARFARE**



MISSION to Syria

COUNTRY FOCUS: RUSSIA, UKRAINE AND THE NUCLEAR OPTION

TRANSITION
The impact of Ebola

WAR ON ALL FRONTS
ISIL and CBRN

TOP TABLE
Gold Standard training

Gary A. Flory reviews progress made by the main biosurveillance programme in the United States

BAR

Raising the

A prime tool for the early detection of a bioterrorist attack is biosurveillance. In the US the cornerstone of our effort is BioWatch, which remains the country's only federally managed, locally operated, nationwide biosurveillance system.

Early detection saves lives. We hear this phrase so often we rarely stop to consider what it really means. We hear it in reference to disease: who wouldn't want the doctor to identify and treat their illness before it spreads? And from fire prevention professionals: it is certainly easier to save a structure that is smouldering than one fully engulfed in fire. And increasingly, we hear the expression in the context of terrorism prevention. Counter-terrorism officials attempt to identify behaviours and communications that can betray the intent of individuals or groups to commit acts of terrorism – before they carry them out.

BioWatch

The BioWatch nationwide biosurveillance system was rolled out in 2003 partially in response to the 2001 anthrax letters attacks. The system consists of a network of air monitoring stations that pull air through filters and trap airborne materials, including potential bioterrorism agents. Each day, air monitoring specialists collect the filters and deliver them to designated BioWatch laboratories for analysis.

At the laboratories, samples undergo the polymerase chain reaction (PCR) process to amplify the DNA of the collected organisms and allow for their analysis. The laboratories look for the presence of about a half-dozen biological agents selected for their potential application as bioweapons. Currently, monitoring stations are being maintained in more than 30 metropolitan areas and are deployed at large special events such as the Super Bowl.

No easy task

Detractors and proponents alike acknowledge that operating an effective biosurveillance network is no easy task. Since its inception, critics have expressed concerns about the system's cost, detection threshold, and the inability to distinguish between dangerous pathogens and closely related, but non-lethal, organisms.

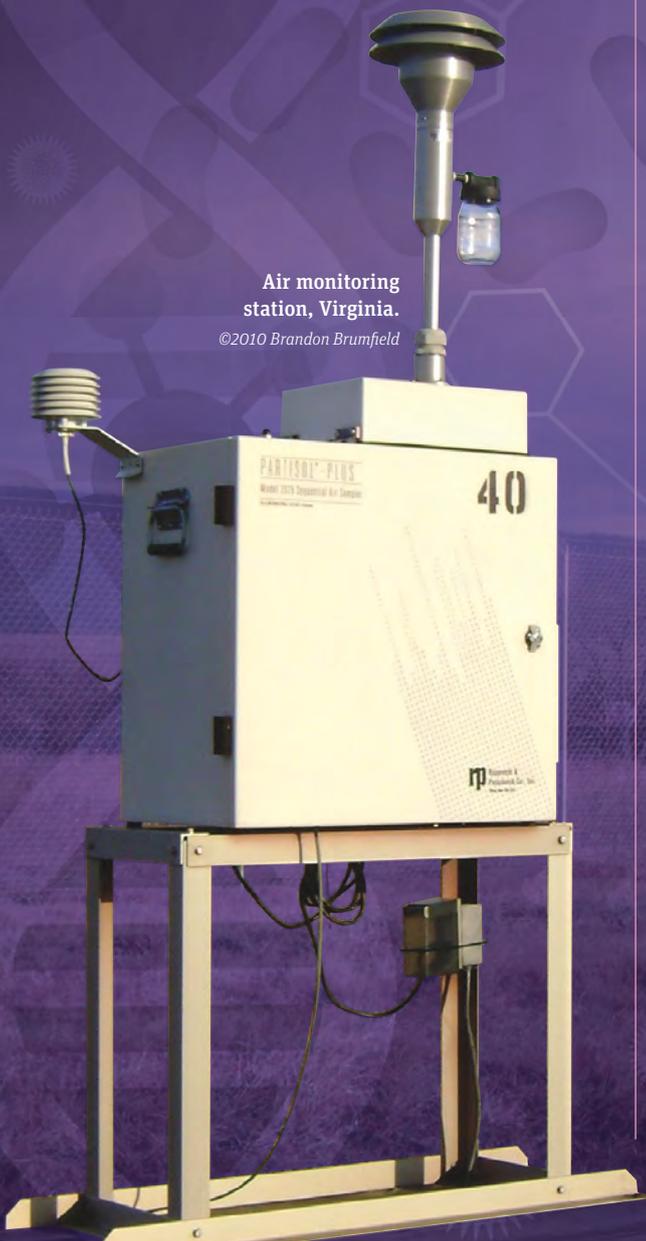
Also of great concern are the consequences of a positive test result not from a bioterrorism attack but from the presence of organisms naturally found in the environment. More recently, criticism has been focused on plans for the acquisition of a new generation of automated air samplers, known as Generation 3. Plans for the Generation 3 system were cancelled in May 2014 following a report by the Government Accountability Office expressing concerns about the acquisition process and cost, and about the durability and sensitivity of the technology. So for now, the programme will continue with the existing Generation 2 samplers.

More than a technology

Before an air monitoring station is added, a jurisdiction must ►

Air monitoring station, Virginia.

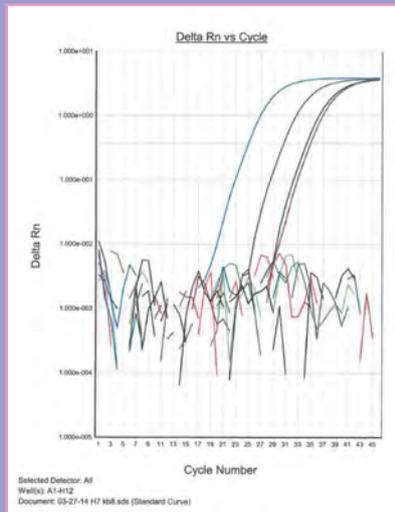
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BIOSURVEILLANCE

Right: A positive test result is shown on a graph following polymerase chain reaction (PCR) analysis.

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Far right: BioWatch partners shown on a chart from a 2015 presentation by Dr. Michael Walter, Detection Branch Chief and BioWatch Program Manager, Department of Homeland Security.

©Dr Michael Walter

develop a detailed plan describing exactly how it will respond to the detection of a biological agent. This process includes the establishment of a BioWatch Advisory Committee to coordinate response and planning activities, and liaise with BioWatch staff. These committees are made up of state and local public health, law enforcement, and environmental health agencies. Ultimately, the local BioWatch Advisory Committees are responsible for developing and implementing a plan describing how they will respond to a positive test result – known as a BioWatch Actionable Result (BAR) – in the lexicon of the programme.

In addition to these planning efforts, part of the jurisdictional readiness process includes extensive training and exercising of the response plans. Besides improving readiness, these activities develop working relationships between federal, state and local partners who may not otherwise interact. The value of these relationships should not be underestimated.

Ensuring BAR accuracy

With potentially thousands of lives at stake, ensuring the accuracy of any BAR is a top priority. The BioWatch Program recently completed a series of independent test and evaluation events that document the sensitivity and efficacy of the BioWatch technology. The testing included all aspects of the detection technology, ranging from measuring the sensitivity and specificity of the PCR assays used in analysis, to documenting aerosol collection sensitivity using killed bioterrorism agents at Dugway Proving Grounds. An operational demonstration conducted at the Naval Surface Warfare Center in Dahlgren, Virginia demonstrated the ability of the BioWatch system to perform under operational conditions using a simulated biological weapon.

According to programme officials, the BioWatch system equalled or surpassed performance expectations in all cases. It is also entering the third full year of its Quality Assurance (QA) Programme that continually measures the performance of laboratory analysis. Along with laboratory operations, the QA programme tracks performance of field operations to ensure that standard operating procedures are followed.

The human-animal interface

Many potential bioterrorism agents originate in animals and have the potential to be transmitted from animals to humans. Health officials are recognizing the importance of zoonotic diseases as a public health concern. In response to this

A polymerase chain reaction (PCR) workstation is set up to analyse biological samples.



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Laboratory technicians prepare samples for analysis (left) and isolate biological samples (right).

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increased understanding, BioWatch stood up the BioWatch Veterinary Workgroup in 2010, bringing together a group of BioWatch stakeholders interested in integrating animal surveillance and veterinary expertise into the programme. The BioWatch Veterinary Workgroup, along with an extended veterinary network established in 2014, allows for coordinated discussion, resource development, and dissemination of information related to BioWatch activities and veterinary preparedness issues.



Internal components of an air monitor include pumps and filter holders.



Biosurveillance vs syndromic surveillance

BioWatch provides the front end of biosurveillance – and complements medical surveillance by working with state and local governments in planning responses to potential bioterrorism incidents. This aims at an efficient, rapid response prior to the onset of symptoms. Environmental and medical surveillance work in combination as neither system is infallible: BioWatch depends on the aerosolized plume of agents passing over it, while syndromic surveillance only identifies disease

BioWatch Partnerships



agents when people become sick and go a physician or hospital. If BioWatch detects something suspicious, it can alert the medical community to look out for cases of a disease associated with bioterrorism.

Other biosurveillance programmes

While the BioWatch program is intended to protect the entire nation, the Department of Defense (DOD) operates its own biosurveillance programme for force protection around fixed facilities. DOD uses two approaches for environmental sampling of aerosolized bioterrorism agents: the Joint Point Biological Detection System, a sensor that automatically collects air samples and identifies biological agents, and the Dry Filter Unit collector, which uses similar technology as BioWatch.

In 2007, the US Congress established the National Biosurveillance Integration Center (NBIC) within the DHS to integrate biosurveillance efforts more effectively. Since then, BioWatch has connected NBIC with the BioWatch Advisory Committees, whose participants are providing feedback to NBIC on products and information for better preparedness. The goal is to improve situational awareness at all levels of government in the event of a potential act of bioterrorism.

NBIC also plays a key role in producing information related to infectious disease of possible state and local interest; it is informed when a BioWatch Actionable result is declared at the state or local level, and participates in the BioWatch National Conference call along with other federal, state and local partners to conduct an assessment and potential public health ramifications of a BAR.

Implementing an effective biosurveillance programme is a vast undertaking with critical functions falling under the jurisdiction of multiple agencies. While no amount of preparation will eliminate the possibility of an attack from a determined enemy, the effective use of technology, combined with enhanced jurisdictional readiness, can save lives. Perhaps in the future, global biosurveillance efforts like those on the Global Health Security Agenda will accelerate our ability to respond and prevent both intentional and natural disease threats. ■

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