

# Agilent Technologies LSCA in Homeland Security

For more than 30 years, Agilent Technologies Life Sciences and Chemical Analysis has been a leading provider of tools for the detection, identification, and characterization of chemical and biological compounds. From pharmaceutical analysis to food safety to environmental testing, customers rely on Agilent to help them solve analytical problems with accuracy and precision.

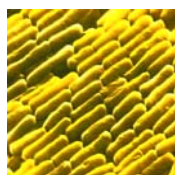
Agilent is applying its proven technologies and methods expertise to the challenges of the homeland security market. Since 1986, the company has supplied the U.S. military with analytical equipment for its chemical demilitarization and chemical weapons stockpile monitoring programs. Agilent instruments played a role in identifying and confirming the anthrax used in the mail attacks of 2001. And in 2002, Agilent donated a fully equipped mobile laboratory for detecting chemical and biological agents to the New York City Police Foundation for use by the New York Police Department. This donation marked the first time that a mobile laboratory had been applied to combat terrorism in the civilian theater.

Agilent solutions play a prominent role in each of the critical analytical steps of a homeland security deployment:

- **Detection and prevention:** Agilent provides chemical and biological detection systems to monitor for agents or agent precursors at key installations or sensitive infrastructure sites.
- **Response and recovery:** Should an event occur, Agilent provides transportable detection systems that can be deployed to the site to identify the nature of the threat and to establish perimeters for responders and civilians.
- **Consequence management and mitigation:** Agilent provides sensitive, confirmatory detection systems to assess the progress of on-going decon-tamination operations and confirm complete remediation of the incident site.
- **Attribution and forensics:** Agilent provides analytical tools that can be used by law enforcement to determine the source or cause of an incident and to enact enhanced security measures.

As a leader in life sciences and chemical analysis, Agilent has extensive experience dealing with the target biological and chemical compounds of the homeland security market. Whether monitoring an industrial compound or its weaponized derivative, the analytical technologies required will be very similar.

Agilent provides analytical systems for three classes of compounds:



**Biological Warfare Agents (BWA):** BWAs are bacteria and viruses used to spread life-threatening diseases. Biological agents are considered more deadly and accessible than their chemical counterparts. Examples include anthrax, plague and smallpox.



**Chemical Warfare Agents (CWA):** CWAs are non-living toxins that are designed to incapacitate or kill a large number of people. They can be delivered in a variety of ways and produce effects ranging from painful blisters to nerve paralysis and death. Examples include sarin, mustard gas and VX.

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**Toxic Industrial Compounds (TIC):** TICs are chemicals designed for commercial use, yet through accidental events or mishandling pose an environmental or public health threat. It is estimated that 800,000 shipments of these compounds are transported throughout the United States each day. Examples include acrylamide and ammonia.

In collaboration with industry and government leaders, Agilent has developed accurate, reliable measurement systems for each type of compound.

## Agilent BWA Solutions

Agilent offers two complementary technologies for detecting BWAs. The first, the MIDI Sherlock Microbial Identification System (MIS) identifies bacteria by matching their unique fatty acid profiles to those in reference libraries. Developed by MIDI, Inc. of Newark, DE in collaboration with the U.S. Army Medical Research Institute of Infectious Diseases, the Sherlock reference libraries consist of more than 2,000 entries and 25,000 analyses of strains obtained from experts and culture collections around the world. This automated system runs exclusively on Agilent gas chromatographs (GC), such as the Agilent 6850 GC system (Figure 2).

The Connecticut Department of Public Health used the Sherlock system to confirm the presence of anthrax bacterium in a 94-year-old woman in the autumn of 2001. As part of a comprehensive identification platform at U.S. Army facilities, this system also helped identify the anthrax contained in letters posted to the US Senate during the same period. As of March 2004, the U.S. Department of Homeland Security was in the final stages of evaluating the system for confirmatory testing of anthrax.

The second approach uses DNA-based measurements using the Agilent 2100 bioanalyzer (Figure 1) and lab-on-a-chip technology. The Agilent 2100 bioanalyzer provides rapid qualitative and quantitative information on DNA, RNA, and proteins in biological samples. The bioanalyzer provides a possible platform for rapid screening and confirmatory detection of infectious agents such as anthrax and smallpox.



**Fig 1. Agilent 2100 bioanalyzer**



**Fig 2. Agilent 6850 GC**

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## Agilent CWA Solutions

Developed in collaboration with the U.S. Army's Chemical Warfare program, the Agilent CWA solution is configured for both continuous, near-real time air monitoring and analysis of liquid samples. Samples are separated into their individual components using gas chromatography then detected. A dual flame photometric detector provides unrivalled detection capability for sulfur and phosphorous containing chemical agents. A second type of detector, called a mass spectral detector (MSD), provides structural confirmation of suspect agents. A typical system configuration is shown in Figure 3.

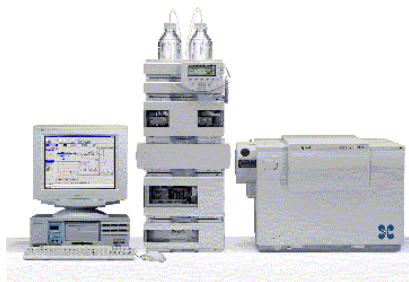
This technology has been utilized extensively in support of the Army's weapons defense, monitoring and demilitarization programs. It has been demonstrated to be effective in the detection and confirmation of nerve agents such as sarin gas and VX as well as for blister agents such as mustard gas and nitrogen mustard.



**Fig 3. Agilent 6890N/5973 GC/MSD**

## Agilent TIC Solutions

Agilent TIC solutions can detect a wide range of organic and inorganic compounds, including pesticides, PCBs, benzene, oil, fuel and phosphorous-containing chemicals. Although no single measurement technique would be able to analyze for all known TICs, Agilent offers several technologies that work together to provide near comprehensive analytical capability. These technologies include gas chromatography/mass spectrometry (GC/MS) for toxic gases and volatile organic chemicals; liquid chromatography/mass spectrometry (LC/MS) for low-volatile organic chemicals; and inductively coupled plasma mass spectrometry (ICP-MS) for toxic metals and metal-containing compounds.



**Fig 4. Agilent 1100 Series LC/MS**



**Fig 5. Agilent 7500 Series ICP-MS**

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## Fixed or Field-Transportable Solutions

Each of these solutions is designed to be fixed or field-transportable. When safe transportation of the suspected agent is possible, Agilent fixed laboratory systems provide robust analyses of dangerous substances within an existing lab.

If rapid response is required or it is physically impossible to bring the suspected agent to the lab, Agilent's field-transportable systems bring the power of the laboratory to the incident site. One type of field-transportable system is the modular/flyaway laboratory (Figure 6), which can be packaged in boxes for transport. This system is designed with the durability to be dropped onto an incident site from a transport airplane.

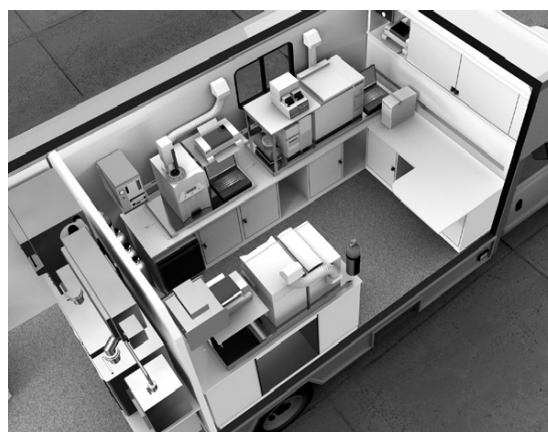


**Fig 6. Agilent Modular Laboratory**

Agilent also offers a mobile laboratory, a fully integrated self-contained “lab on wheels” that provides researchers a protective environment to handle the broadest range of chemical and biological unknowns at the incident site. Developed in conjunction with the U.S. military and ENG Mobile of Concord, CA, the Agilent mobile laboratory contains separate, self-contained areas for sample preparation and sample analysis, and features Agilent systems for analysis of BWA, CWA, and TICs.



**Fig 7. Outside of Agilent Mobile Lab**



**Fig 8. Interior of Agilent Mobile Lab**