SOLUTIONS FOR TODAY AND TOMORROW

HOMELAND SECURITY AT SANDIA

Sandia National Laboratories

EXPERTISE MATCHED TO THE CHALLENGES

Defending against weapons of mass destruction

Sandia creates robust technologies and integrates them into operational strategies to help the nation prevent and respond to attacks involving weapons of mass destruction (WMD). Our work includes:

- Applying decades of expertise to assess risks and understand threats
- Developing technologies that enable rapid and precise detection of radiological, nuclear, chemical, and biological WMD
- Building integrated, networked detection systems for protecting critical facilities and events of national importance

Protecting our borders and securing transportation

Stopping WMD and terrorists before they penetrate our borders is the best way of securing our homeland. However, security measures added at borders must preserve the flow of commerce critical to our nation's economic health. Sandia's layered approach includes:

- Playing a strong role in international programs to deploy technologies and systems "upstream" to intercept clandestine transport of undesirable people and materials and to monitor shipping containers from point of origin to port of entry
- Conducting research on 3D facial recognition algorithms to help border inspectors perform efficient, nonintrusive surveillance
- Developing comprehensive simulations of border crossing operations to allow assessment of new technologies and operating procedures before introducing them into the actual environment

Protecting the nation's physical and information infrastructures

The critical elements of our infrastructure—electricity, transportation, emergency response, water, and financial systems—are increasingly interdependent. Working primarily through the Department of Homeland Security's National Infrastructure Simulation and Analysis Center (NISAC)—operated jointly by Sandia and Los Alamos national laboratories—Sandia helps infrastructure owners and policymakers understand and prevent infrastructure failures by:

- Creating detailed knowledge of infrastructure disruptions and interdependencies that can be applied to planning, investment, and emergency management
- Advancing cyber security tools to counter new online threats
- Performing "red team" assessments that help cyber system owners strengthen vulnerabilities to resist attacks

Mitigating attacks

Adapting knowledge acquired over decades of protecting our nation's nuclear weapons stockpile, Sandia has developed an array of methods and technologies for mitigating attacks on our homeland. Examples include:

- Providing simulation-based training tools to help officials better prepare for attacks by understanding how decisions help or hinder a response strategy
- Creating training and vulnerability assessments for local and national organizations—including hosting training of 1,200 personnel in advanced bomb-disablement technology
- Building teams of expert personnel who can rapidly deploy worldwide to provide technical assistance in the event of a WMD incident

Americans cherish their freedom and security and hope to preserve these values for their children and grandchildren. As worldwide terrorism strikes close to home, that hope has become both more elusive—and more urgently sought after.

Sandia National Laboratories, a science and technology laboratory with an industrial heritage, is honored to support the Department of Homeland Security in meeting the security challenges of a new century. Through our longstanding stewardship of the nation's nuclear weapons stockpile, Sandia has developed strong capabilities and experience that apply directly to the homeland security mission. In supporting this mission, we partner with others—the civilian response community, other laboratories, universities, and industry—to research, develop, and demonstrate advanced systems and technologies.

EXCEPTIONAL SERVICE IN THE NATIONAL INTEREST

Sandia combines a deep understanding of the security issues related to a variety of threats—nuclear, radiological, chemical, biological, explosives, and cyber—with a legacy of successfully engineering scientific concepts into effective systems to provide our agency sponsors and industrial partners exceptional service.

Commitment to mission: We recognize that our capabilities and expertise belong to the nation. Consequently, Sandia has an unwavering commitment to the mission of our government sponsors. In executing work on their behalf, we've developed knowledge and capabilities that we apply to solving some of the most difficult problems our nation faces.

Better solutions through partnering: Melding diverse expertise is often the best path to an optimal solution. Sandia fosters a culture of partnering, both internally through cross-disciplinary teams and externally through strategic partnerships with industry, academia, other national laboratories, and the end users of our products.

A focus on real-world needs: Sandia's industrial heritage has taught us to design our technologies for manufacturability and application within an operational context. As a result, we have the most successful track record among national laboratories for technology transfer and commercialization.

Answers for today and tomorrow: Our knowledge of the problem space gives us the background to respond to today's challenges. Equally important, Sandia's multidisciplinary teams, steeped in decades of thinking about nuclear deterrence, have the perspective needed to anticipate emerging threats and initiate the research that can lead to tomorrow's solutions.

Examples of our Solutions

Commitment to mission

Deep resources for detecting threats

The crucial need to protect the nation from a radiological or nuclear attack is driving an intense effort to create detection systems. Sandia has made strong contributions, drawing on our extensive knowledge of nuclear threats and experience providing technical support for arms control treaty verification.

One key project is a field test at commercial ports of radiation detectors equipped with Sandia's SMART isotope identification algorithms. Mounted on a fixed portal or in mobile carts, SMART devices detect and identify gamma and neutron signatures of materials hidden within trucks or shipping containers.

The field test is confirming SMART's ability to accurately identify signatures from harmful materials while avoiding costly false alarms. It also provides an ideal opportunity to work with Customs personnel to develop procedures for operating SMART with minimal disruption to commercial activities.

Better solutions through partnering

Working with industry to enhance explosives detection

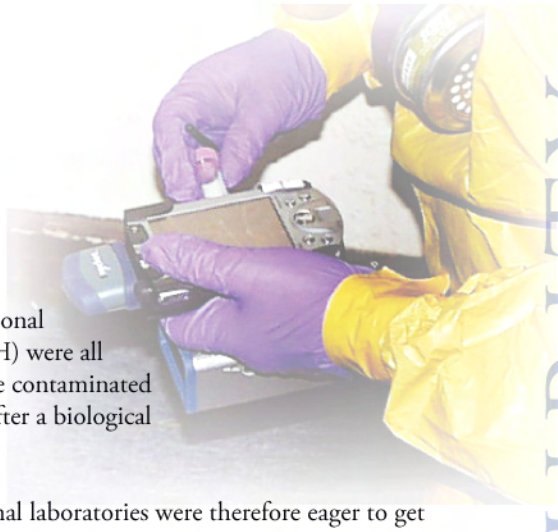
During a three-month test conducted by the Transportation Security Administration (TSA) in 2005, airline passengers at a security checkpoint at New York's John F. Kennedy International Airport were screened for faint traces of explosives by the Sentinel, a walk-through personnel portal developed by Sandia and licensed to Smiths Detection.

When passengers step into the Sentinel, puffs of air dislodge particles from their hair, skin, and clothing, and an air sample is collected and analyzed. If traces of an explosive chemical are found, an alarm alerts TSA inspectors, who then take appropriate action.

Based on successful tests, TSA announced it would purchase 25 Sentinels from Smiths Detection. Further, TSA plans to add more machines by January 2006 to provide fast, accurate explosives detection capabilities at the nation's busiest airports.

A focus on real-world needs

Practical tools for restoration



After restoring buildings following the 2001 anthrax letter attacks, hazardous material teams from the National Institute for Occupational Safety and Health (NIOSH) were all too familiar with the time and effort required to make contaminated buildings safe again. Yet reopening facilities quickly after a biological attack is key to economic and psychological recovery.

Developers at Sandia and Lawrence Livermore national laboratories were therefore eager to get feedback from NIOSH on BROOM, a system that makes it easier to collect and process the many samples needed for successful facility restoration. BROOM comprises software to guide sample collection, PDAs to record data about samples, and wireless communication to speed that data to a central database for processing.

In a three-day field test at Sandia, NIOSH crews donned full hazmat gear to test BROOM in a realistic sampling exercise. While offering ideas to improve the product, the crews were very impressed and hoped to further evaluate BROOM in future sampling operations. Sandia also examined the effectiveness of sampling techniques, generating results that prompted NIOSH to change a portion of their sampling protocols.

Answers for today and tomorrow

Portable protection against chemical and biological threats

More than 10 years ago, Sandia realized that by melding our expertise in numerous areas, we could not only advance our understanding of science, but also create novel technologies that could help people in new ways. We tested this concept by challenging ourselves to bring engineering, materials science, and microfluidics together to create new tools for detecting and analyzing chemical and biological agents.

The result was MicroChemLab™—fast-acting chemical and biological detectors that fit in the palm of a hand. When successfully commercialized, the technology will provide first responders a powerful, rapid tool for determining whether a chemical or biological attack has occurred.

The technology is also at the heart of a system being developed with industry to continuously monitor water supplies for safety and purity. Further, our researchers are migrating the technology into rapid medical diagnostic tools that could help public health officials quickly triage people for treatment after a biological attack.

Sandia National Laboratories

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LEARN MORE

Our homeland security specialists are eager to share their solutions with partners in government and industry. We invite you to learn more about Sandia's homeland security activities by visiting our website at

http://homelandsecurity.sandia.gov

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