

PROTECT: Enhanced Technology to Protect Against Chemical and Biological Terrorism

Argonne scientists have devised and deployed a systems-based approach for responding to complex terrorist incidents involving chemical or biological weapons.

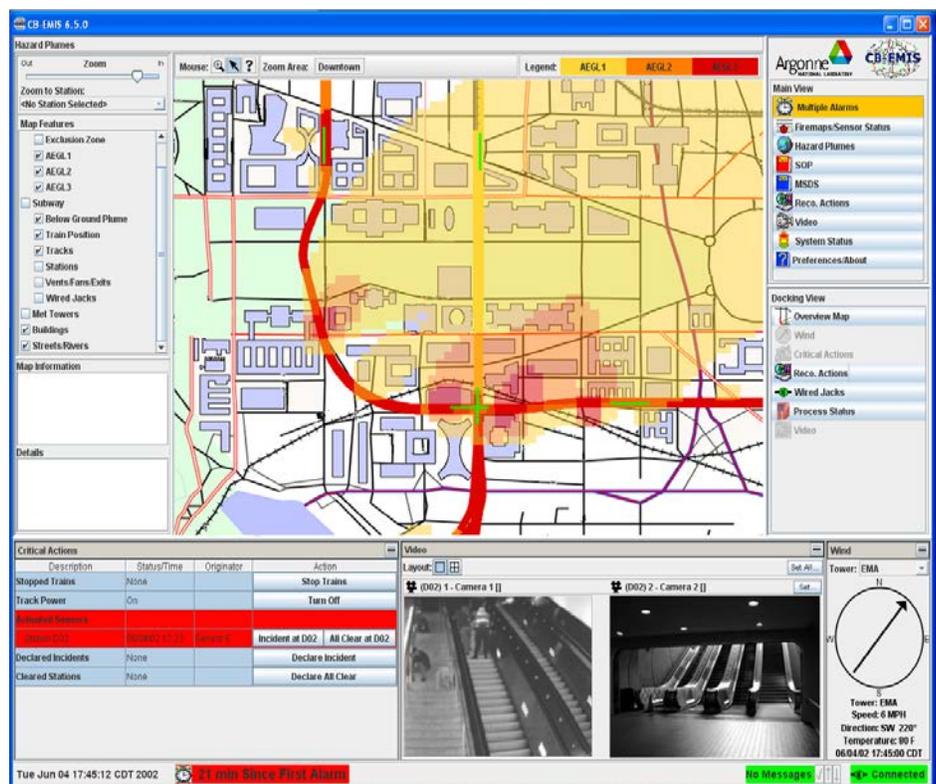
Background and Need

Ever since the 1995 sarin attack in a Tokyo subway, authorities have recognized that large interior structures are vulnerable to chemical and biological attack. Particularly at risk are venues like subways, airports and government office buildings, where people are concentrated in small areas and quick evacuation is difficult; or enclosed buildings such as convention centers or arenas, where the threat may be high when the facility is occupied. In all cases, early detection and rapid response are essential to ensure crowd safety and the saving of lives.

Proper preplanning, along with advanced technology, can provide facility management with an early warning to apply emergency management tools and protocols. As a result, hundreds of lives can be saved in a chemical agent incident and thousands of lives in a biological incident.

The Invention

Scientists at Argonne National Laboratory have created an automated hardware/software system to improve the detection of and reaction to complex terrorist attacks involving chemical agents. The system, called PROTECT (Program for Response Options and Technology Enhancements for Chemical/Biological Terrorism), integrates chemical detectors, closed-circuit TV, dispersion modeling and optimal response protocols



PROTECT emergency responder interface screen showing hazard plume.

PROTECT provides accurate, early detection and verification of a terrorist threat involving a chemical or biological agent in confined spaces within densely populated areas, such as in city buildings and urban transit systems. Alarm and response management capabilities assist infrastructure operators and first responders by pinpointing agent release areas and projected dispersion zones and then recommending appropriate, predetermined response scenarios.

Benefits

Key benefits of PROTECT's comprehensive program include:

Automated surveillance and alarm. Eliminates the need for continuous operator supervision

Customizability. For optimal detection in dense urban infrastructures

Rapid detection. Quickly pinpoints release areas and projected dispersion zones for faster response and containment. During a demonstration at a major metropolitan subway station, PROTECT reduced overall response time from 31 minutes to 5 minutes.

Accuracy. Low false-positive rate backed by closed-circuit television for fast verification

Compatibility. Can be used with many detector types

Applications and Industries

PROTECT can be used in both permanent and temporary installations.

Permanent

Mass transit subway/pedway tunnels

Single- or multimodal transportation facilities (such as airports, train stations and bus terminals)

Lower-level entrances and concourses

High-value buildings and event facilities

Temporary

High-threat events

Remote locations

Developmental Stage

The PROTECT system has been successfully demonstrated in major U.S. metropolitan transit systems and is now being used in other venues. The system's surveillance components have also proven useful in responding to non-terrorist incidents involving fire, smoke, unknown substances and a wide range of criminal activities.

Custom-Designed

Since all applications are unique, each PROTECT installation is custom-designed and includes:

- Scenario analysis
- Air-flow analysis
- Detection and alarm thresholds
- Responder information feed
- Population and system flow control management
- Crisis management strategies and tools
- Decontamination procedures
- Training and exercises

Sample Installation

In a subway application, for instance, PROTECT can track changing chemical concentrations at every detector, individual train movements, and real-time meteorological conditions to calculate the transport and dispersion of a chemical vapor as it moves throughout the subway and up to street level. It can identify potentially hazardous tunnel and station areas and calculate above-ground hazard zones by estimating emission rates to the outdoors from vents, shafts and station entrances.

An information management system integrates data from the chemical detectors, trains, closed-circuit TV cameras and outside meteorological sensors. The information is available to infrastructure operators on control room monitors and to outside first responders via access kiosks connected to computers provided to them during their PROTECT training.

PROTECT recommends predetermined optimal response strategies to support emergency managers and personnel in the event of an attack. These strategies are based on the best scientific information available combined with the best operational procedures employed by each particular transit system. Standard operating procedures for hazardous chemical response using PROTECT are also incorporated into the information management system for quick reference. Procedures for outside responders are also revised to take PROTECT technology into consideration.

Training and exercises are provided to ensure transit or other infrastructure personnel and outside first responders are adequately trained and familiar with the technology and interfaces. Guidebooks, reference cards, and other material are provided for initial training and follow-up use.

Availability/Commercial Readiness

This technology has been exclusively licensed to Smiths Detection.

Patent/Software Information

This technology consists of more than 10 copyrighted pieces of software.

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