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# K9+ETD: Field Tests Show Layered Approach to Explosives Detection Effective on Cruise Lines and in Ports

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Seaports, cruise lines and the cargo lines need fast, accurate explosives screening methods to meet heightened security requirements. A new layered strategy combining two preferred technologies—detector dogs and explosives trace detection (ETD)—yields a highly efficient and reliable solution that takes advantage of the complementary strengths of each. Here we report on the success of tests in a seaport environment using dogs to screen for explosives and sensitive ETD instrumentation to confirm and identify the substances detected. These tests confirmed that K9+ETD technology can efficiently detect and identify a range of explosives that pose a security threat.

## A Layered Security Strategy

As potential terrorist targets, the seaport community faces a growing list of government mandated security measures. The Maritime Transportation Security Act, passed in 2002, and the IMO's ISPS Code, effective July 2004, require ships and ports to establish and implement a security strategy that helps prevent and suppress acts of terrorism. This includes measures to prevent the introduction of explosives into port facilities or on board ships, using proven methods of explosives detection.

To be effective, explosives detection systems must demonstrate a high degree of sensitivity, accuracy and reliability, yet also be practical and fast in order to maintain schedules and the efficient flow of goods and passengers. Ideally, they should also have the ability to identify any explosives discovered for immediate, appropriate threat response.

Among all the technologies currently available for explosives detection, two have proven the most effective: canines and explosives trace detection (ETD). X-ray imaging systems, although helpful for finding weapons and possible explosive devices, are not adequate for explosives detection.

While canines and ETD systems work well independently, ports and shipping lines may find that enhancing their explosives screening operations requires more comprehensive testing methods, especially at elevated marine security (MARSEC) levels. In response to this challenge, American Detection Technologies, Inc. (AMDETECH), a detector dog company, and GE Infrastructure Security,

a manufacturer of ETD instruments, have developed and tested a layered security approach that combines the two complementary systems. This K9+ETD approach takes advantage of the canine's ability to detect vapors and rapidly screen large volumes of provisions, cargo and baggage, and uses the sophisticated particle analysis capabilities of ETD to confirm results and identify substances detected.

K9+ETD can help minimize the costly effects of false positives, including the prohibitive expense of closing a port. It can help maintain schedules and spare passengers from unnecessarily alarm. By identifying the type of explosive, it can eliminate the hazardous job of manually inspecting items that have tested positive, and make it clear when to call in the bomb squad. The greater protec-

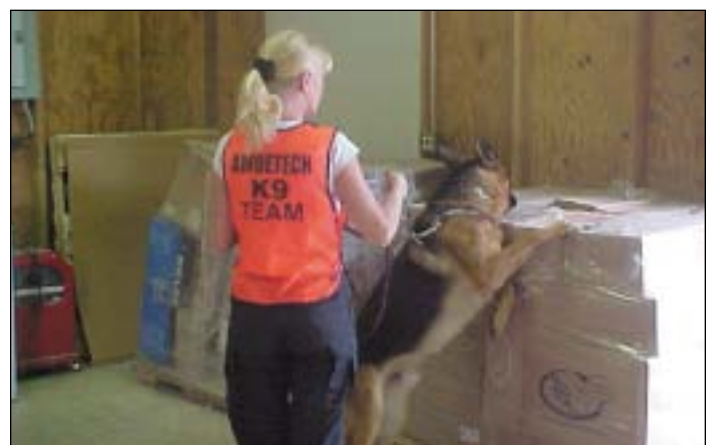


Photo courtesy of American Detection Technologies, Inc.

**Highly trained dogs correctly distinguished between pallets with no explosives and those intentionally contaminated with explosives. Trace detection confirmed dogs' findings and identified specific explosive substances.**

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tion this layered security provides can also make the port or ship a less attractive terrorist target.

This white paper describes a preliminary trial and field tests using a combination of detector dogs supplied by AMDETECH and the Itemiser<sup>3</sup>, a lightweight, easily transported desktop detector made by GE. These tests confirm the accuracy, speed and ease of use of K9+ETD technology for the most effective explosives screening available.

### Detector Dogs for Screening

Airports, seaports, cruise lines, cargo shipping lines, railways, and other transport industries employ detector dog services such as AMDETECH to screen for a wide range of explosives. Auburn University reports that dogs can detect substances in concentrations as low as tens of parts per billion to 500 parts per trillion. Dogs can distinguish a target vapor from even large concentrations of background vapors. They are also highly flexible, and able to adjust to a wide range of climates and environments typical of cruise destinations. Since canines provide a rapid qualitative (yes/no) answer based on vapor analysis, they can screen high volumes of cargo, baggage or other items efficiently.

### Trace Detection for Confirmation and Identification

Organic in nature, explosives constantly emit microscopic particles and vapors. Particles transfer easily to solid surfaces that come in physical contact with a “contaminated”

person or item. Trace detection detects and identifies microscopic (trace) particles that remain on skin, clothing, bags and packages, vehicles and other surfaces from the handling of explosives. The detection of trace amounts may indicate the presence of bulk quantities.

Built for the field, the easy-to-use Itemiser<sup>3</sup> detects the broadest range of explosives, even in dirty, dusty and humid locations. Itemiser<sup>3</sup> operators collect trace samples by wiping surfaces, most likely to have been touched or contaminated, with a special Teflon-coated fiberglass strip called a “sample trap.” The operator then inserts the sample trap into the trace detector, which analyzes the sample in seconds to identify specific target substances. By identifying particles at nanogram (billionths of a gram) levels, trace detection helps detect explosives where other methods, particularly those that rely on visual detection, may fail.

### Preliminary Trial

To establish how the Itemiser<sup>3</sup> and detector dogs complement each other for explosives detection, confirmation and identification, GE and AMDETECH conducted a preliminary trial at AMDETECH’s canine training facility in Loxahatchee, Florida, prior to field testing at a port.

For the first test, technicians placed a block of M112 (composed of C4) into a cardboard box and sealed it with packing tape. They then placed the box in the center of a large pallet and sealed it with plastic wrap as if it were ready to ship. They used the same cotton gloves to handle



*Itemiser<sup>3</sup> desktop unit with pop-up touch screen. Inset photo shows sample trap being inserted in unit.*



*Particle traces are often found at the seams and joints of boxes.*

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the explosives and the packaging. They let the package sit for 24 hours to allow the explosive to “soak.”

After 24 hours, detector dogs were brought in and they alerted for explosives. A technician then wiped the plastic wrapping with sample traps and tested them in the Itemiser<sup>3</sup>. The instrument correctly identified the M112.

Next, technicians contaminated boxes with traces of the explosives listed below. Note that detection of these explosives meets or exceeds any and all current Law Enforcement Standards or Private Sector Training Standards.

- C-4 Bulk (91% RDX, 9% Plasticizer)
- C-4 M112 Block
- Composition B (60% RDX, 40% TNT)
- Sheet Explosives, PETN Based
- A-5 (98.5% RDX, 1.5% Saitric Acid)
- Cast Booster, RD-X/TNT/RDX/HMX
- Dynamite, Unigel
- Water Gel, SEC Detagel
- TNT Granular
- Pyrodex Powder
- Smokeless Powder
- Black Powder

Again, the dogs successfully alerted for explosives, and the Itemiser<sup>3</sup> correctly identified each substances.

### **Field Test at a Cruise Ship Warehouse**

AMDETECH, with assistance from GE, field-tested K9+EDT at a cruise ship storage warehouse at the port of Miami. The Itemiser<sup>3</sup> was used in conjunction with the canine explosives search team (one handler and two canines, which searched items scheduled to be loaded into the ships’ holds or, in some cases, entering the ship via the gangway).

Testing was unannounced and conducted at random at the work site for about 20 days over a period of nine weeks. Random samples were taken from hundreds of items that were either uncontaminated or intentionally contaminated with different quantities of the explosives listed above.

Technicians tested a variety of objects, including luggage, vehicles, skin, paper, soil, furniture, rubber tires, plastic articles, and frozen items. The Itemiser<sup>3</sup> was found to complement the canine team successfully in confirming the presence or absence of contamination.

### **Conclusion: Complementary Technologies Offer Security Edge**

Many assume that canine teams and trace instruments are competitive technologies. To the contrary, these tests confirm the practical value of their cooperative use to upgrade cruise line security. The dogs’ ability to sniff vapors provides a fast, efficient means of searching cargo, food stores, passengers, and virtually anything that is loaded or unloaded. Trace detection is a highly sensitive, reliable method of confirming the presence of particles and identifying the type and concentration of explosives. Together, K9+ETD introduces a layered strategy for explosives screening and identification that combines vapor and particle detection to deliver high throughput with greater certainty.

In addition, the Itemiser<sup>3</sup> has the ability to test simultaneously for narcotics, as well as explosives—an advantage in uncovering terrorist activities.

The fast identification of explosives can help prevent costly port shutdowns due to false positives or the detection of fireworks. As with medical diagnostics that rely on a different lab technology to confirm positive results, use of dual technologies increases detection accuracy and confidence.

By adopting this layered approach, the shipping community—including seaports, cruise lines, and cargo ships—can close vulnerabilities and help deter terrorist attacks.

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