



***Detection technology is central to countering threats from concealed explosive devices.***

### **The Origin of Fido**

Current military and commercial explosive detection technologies do not have the sensitivity and portability required for many applications. Nomadics' Fido explosives detectors provide specific, real-time detection of explosives in a truly portable, handheld system with industry-leading sensitivity.

In 1996, the Defense Advanced Research Projects Agency (DARPA) sponsored the "Dog's Nose" program to encourage the development of detection technologies that emulate the mine-sensing capabilities of canines. DARPA funded Nomadics and nearly a dozen other organizations to find new ways to detect plastic-cased, low-metal content mines. Traditional metal detectors have difficulty detecting these mines efficiently because the high gain settings required to detect low-metal content mines result in high false alarm rates due to metallic clutter in the battlefield.

Using a unique chemical sensing material invented by collaborators at MIT, Nomadics developed a completely new foundation technology that was immediately successful in detecting the minute amount of explosive vapor emanating from buried land mines. Nomadics was the first company to successfully detect buried land mines using a trace chemical vapor sensor at performance levels comparable to mine detection dogs. Nomadics has built substantially on the success of the DARPA program and now offers a line of explosives detectors known as Fido.



Explosive particulates exhibit a characteristic “stickiness” that can make them difficult to dislodge for sampling. A common method involves wiping targets with pads of material that become contaminated with particles. Another method uses jets of air to dislodge particles from surfaces into air drawn into a sampler. The trapped particles are then desorbed from the sampling medium and analyzed. These techniques only work when the target is accessible and particle contamination exists on the surface wiped by the operator or subjected to the air jet.



## Vapor Detection as a Method

The primary strength of a Fido is its exquisite sensitivity. This sensitivity allows it to detect the vapors emanating from explosive compounds rather than requiring the harvesting of explosive particles. Vapor sampling overcomes some of the challenges associated with particle sampling found in systems based on technology such as Ion Mobility Spectroscopy (IMS), currently the most commonly deployed technology for trace-level detection.

### **The Fido System**

The Nomadics Fido is built around a chemical vapor sensor that detects the actual explosive compounds emanating from explosive devices. Inspired by the ability of dogs to detect explosives, the Fido has been shown to detect explosive vapor at levels as low as a few femtograms. In side-by-side field tests, Nomadics has shown detection performance comparable to that of dogs – the historical “gold standard” for finding concealed explosives.

### **Direct Sampling**

Direct sampling involves placing the sensor in close proximity to a target and drawing analyte directly from ambient air. This technique involves no pre-concentration and provides on-the-spot, real-time detection of explosive vapor. Direct sampling is suitable for applications that focus on specific, identifiable targets including:

- Vehicles
- Personnel
- Suspected IEDs
- Small and medium size cargo
- Baggage
- Suspected explosives caches

### **High Volume Sampling**

The sensor also supports analysis of modified Remote Explosive Scent Tracing (REST) filters. Using the REST method, high volumes of air are drawn across low-cost, disposable filters designed to trap explosive vapors and particles. After collection, the sample is presented to the sensor for analysis. When the presence of explosives on a filter is indicated, the area or object from which the sample was collected is regarded as contaminated with explosives and investigated further. If no explosive is detected in a sample, the target (or area) is deemed safe. This method of sampling greatly improves the rate of interrogation (i.e. targets per unit time).

This basic sampling method has been deployed for over two decades using trained canines as the sensing mechanism to interrogate the filter cartridge. It has been used in South Africa to locate roadside Improvised Explosive Devices (IEDs), weapons caches, and land mines with success over a twenty-year period. A similar method has recently been deployed in Europe for cargo screening applications. By using Fido as the detector in the REST system, canine-comparable performance can be achieved with lower cost and higher reliability.

