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A new approach to border protection

RadEye SPRD-ER spectroscopic personal radiation detector

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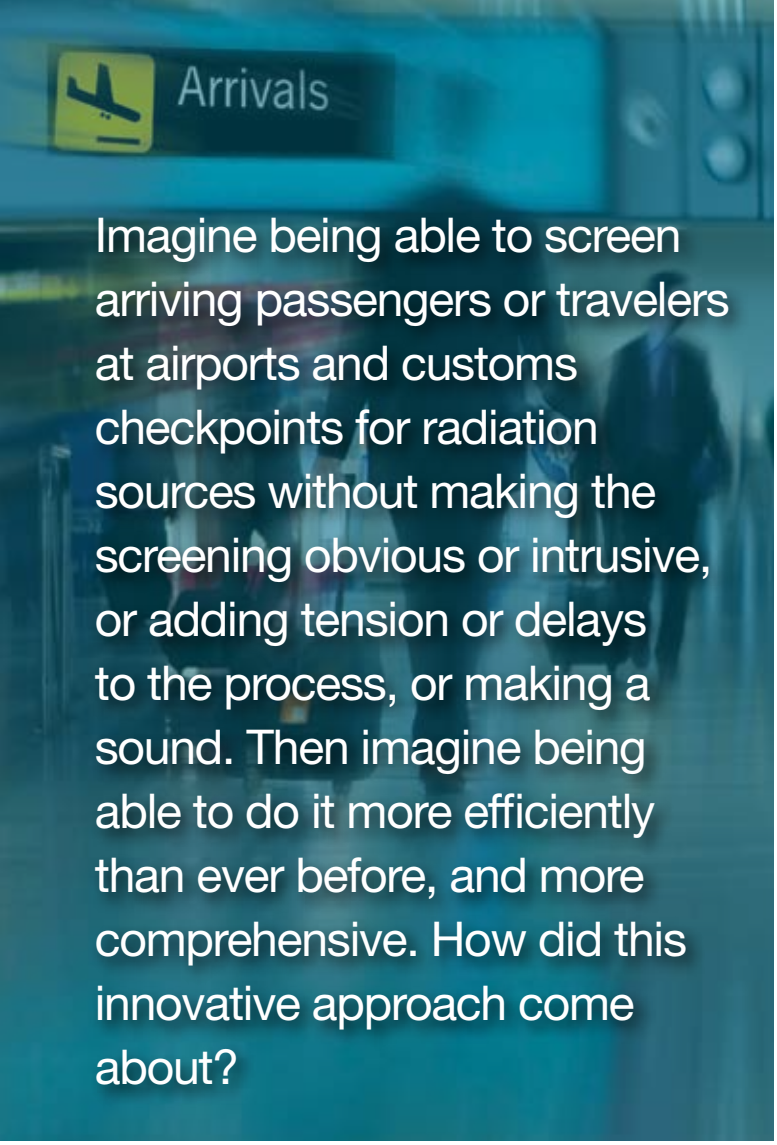

Imagine being able to screen arriving passengers or travelers at airports and customs checkpoints for radiation sources without making the screening obvious or intrusive, or adding tension or delays to the process, or making a sound. Then imagine being able to do it more efficiently than ever before, and more comprehensive. How did this innovative approach come about?

Most customs organizations around the globe in industrialized countries have implemented comprehensive border protection policies, as they should, to detect and control everything from drugs to smuggled contraband goods and more coming into their country. One facet of this is radiation monitoring. Radiation detection devices monitor radiation that might be coming in on a container ship, for example. When the ship arrives in port, cargo containers pass through radiation portal monitors as they are unloaded, and then if they trigger an alarm, they're secondarily inspected by customs officers equipped with what we call a RIID, or Radioisotope Identification Device.

RIIDs are instruments designed to determine the identity of radioactive materials by measuring the energy of the emitted gamma rays. Examples include the Thermo Scientific™ RIIDEye™ X Handheld Radioisotope Identifiers. These devices support users from homeland security operations to contamination monitoring and remediation, generating very fast detection results. These hand-held portable analyzers are used for scanning and checking of large bundles, pallets of products, or rooms full of goods for unseen radioactive elements, using patented Quadratic Compression Conversion (QCC) technology. RIIDEyeX provides the industry's fastest, most accurate real-time gamma source and isotopic identifications.

From cargo containers to people

Now, radiation screening has advanced well beyond shipping containers and pallets to include what is known as passenger screening or individual passenger monitoring. This concept is particularly apt in the UK, for example, an island nation where everything and everyone coming into the country arrives by air or sea, on ships or ferries, or by an undersea tunnel from Europe via cars, trucks, and trains. Just about every mode of transportation carrying people and goods comes into the UK. This makes customs controls and monitoring a complex task, since the UK's unique geography and many seaports requires constant and comprehensive screening of people arriving through customs checkpoints. But screening people walking off a plane is not the same as screening shipping containers. Screening passengers is more personal and can be unsettling unless it can be done in a minimally intrusive way. Scanning people with a hand-held RIID device as they pass through a line is not only less efficient overall, but bound to create alarm and uneasiness; exiting passengers might ask "What am I being scanned for?" or worse, "Does that thing emit waves or radiation? Can it do me harm?" And of course, "Why do they think I need to be investigated like this?"

The solution came with electronics miniaturization and the development of a family of smaller, almost diminutive Personal Radiation Detectors (PRDs) that could be worn on a Customs officer's belt. Approximately the size of a pager, and smaller than a walkie-talkie, these PRDs don't draw attention to themselves yet still perform the essential function of radiation monitoring and detection. They look like other pieces of equipment clipped to an officer's belt.

The Thermo Scientific RadEye family of PRDs are high-sensitivity gamma radiation detection and dose rate measurement tools. The diminutive Thermo Scientific RadEye SPRD-ER personal radiation detector is designed to localize radiation sources and monitor exposure even when entering high dose rate scenarios. The instrument's sensitivity allows for fast discrimination and adjudication of potential threats while its NBR technology reduces false alarms that can distract and be confused with legitimate alarm warnings. NBR is a patented discrimination capability that identifies artificial radiation while minimizing false alarms. Additionally, the instrument is built to withstand extreme temperatures and challenging environments. In the fast-paced high-volume traffic scenario of a Customs checkpoint, for example, officers wear these PRDs on their belts, which go basically unnoticed until they are alarmed by detecting a radiation source, and they can be set to 'silent' alarm that only the officer can be aware of. The RadEye SPRD-ER personal radiation detector has answered the nagging question asked by Customs officials of how to provide less intrusive and yet ultimately better radiation monitoring in a passenger environment.

Avoiding headaches and hassles

Customs officials everywhere want two things that essentially constitute a paradox; the orderly, smooth, efficient flow of people through checkpoints, in appropriate volumes, but also comprehensive screening with no 'escapes'; they don't want to miss anything or let a radiation source pass through without being detected. And it's also true that problems arise when people feel harassed; Customs does not want travelers to feel unduly or undeservedly scrutinized, field complaints or see delays in the process. This led to the realization that the best way to address the problem would be to use multiple small PRD wearable devices that enables officers to screen people while they're just interacting and passing in a normal flow of entry and exit at checkpoints or portals within the countries. In Continental Europe, as well as in the UK, countries are generally smaller in geographic area, so it is possible to pass through a number of borders and checkpoints within a single day's travel. Without a simplified way of accommodating the screening process, travel would become much more delayed and problematic for everyone involved.

The simplicity of the SPRD-ER personal radiation detector and its ease of use meant that not only Customs officers could wear and use it, but also Police officers, Border Patrol officers along the U.S. Southern border, and security personnel, just about anyone. This includes First Responders who might be inadvertently exposed to high dosages of radiation when responding to the crash site of a train, airplane, or other cargo-carrying vehicle. SPRD-ER personal radiation detector provides significant detector sensitivity for search and find, combined with accurate high dose rate radiation measurement. The SPRD-ER personal radiation detector identifies the nature of the discovered material in a manner configurable for and compatible with the user's skills.

Customs teams will use a variety of strategies in detection when using PRDs. For example, there might be a system of temporary checkpoints, where travelers might be routed through a major border crossing within a certain range of the border, then a little further down the road have to additionally pass through temporary checkpoints where agents perform screening as well, distributing the load. Having multiple humans in the chain, all provided with detection devices enables customs teams to be highly effective and very efficient while at the same time moving volumes of people.

SPRD-ER: An innocuous tool

Thermo Scientific PRD instruments are sophisticated enough to indicate if the radiation source is industrial in nature, or if it's medical, for example, such as a person who has just recently had radiation treatment. In this case the officer can exercise discretion based on that knowledge and spare that person needless embarrassment. And even though the devices will indicate an alarm on detection, in most cases the users run these devices in silent mode. They are typically worn on a uniform belt, or can be held in the hand. An officer can be wearing his or her PRD while walking down a corridor or screening people through a line coming off an airplane; it's silent and unobtrusive, and having more than one officer in a given area will create a wider network of coverage capability.

SNM: The real concern

What are customs officers engaged in radiation monitoring looking for? Many radiation sources are by their nature not dangerous. But the primary target really is what's known as Special Nuclear Material (SNM), which can be used for assembling a nuclear weapon. Radioactive isotopes that, in consolidation, could be used by terrorists to make a dirty bomb include Plutonium, Uranium, and Neptunium (Pu, U, Np). That's why it's critical to know the exact isotope

of the radioactive material in order to assess the potential threat. Every isotope has its own signature 'spectrum' that is detected and displayed on the RIID. Also, legitimate radioactive sources must be licensed, and the carrier must have proof in documentation and declare it.

The U.S. Nuclear Regulatory Commission (NRC) divides SNM into three main categories, according to the risk and potential for its direct use in a clandestine fissile explosive or for its use in the production of nuclear material for use in a fissile explosive. These categories are the following, with Category 1 being of highest concern. Category 2 materials, for example, are considered by The International Atomic Energy Agency (IAEA) as being able to cause permanent injury or even death in a person who comes in contact with them.

1. Strategic SNM (SNM);
2. SNM of moderate strategic significance; and
3. SNM of low strategic significance.

Understandably, sources registering indication as Strategic (SNM) materials are red-flag.

At the same time, it's important to establish the ability to differentiate between a person who has had a radiation-involved medical procedure, possibly triggering a detection alarm, and someone who is transporting some device or tool that's got a radiation source in it. The SPRD-ER makes these distinctions; this capability is known as NBR, or Natural Background Radiation discrimination, is designed to save time and prevent false alarms by discriminating between a source of SNM material that might be hidden in a duffel bag, for example, and someone in a crowd who has had radiation treatment in a medical facility.

Airports and border crossings

Airports are a primary focus for radioactive monitoring, in part because they typically see a very high volume of traffic, they are international ports of entry, and vary in physical structure, making them sometimes more difficult to cover. The casual observer might note how every airport looks different when you pass through its international terminal. And yet with border security, the scenario is different; it simply isn't possible to route everyone coming in through a single area or gate. But whether or not the passage is an airport concourse or a border crossing, the small wearable PRDs allow customs officers to mix and mingle. Travelers don't want to have an officer standing at a station and monitoring a security point, or for passengers to feel as though they are coming into or leaving a prison, depending on how you want to look at it. Countries almost universally want the screening to be fast, hassle-free, and efficient, especially in their home countries, where most of the people entering are citizens to begin with.

Innocent mistake – or smuggling attempt?

The flexibility of the SPRD-ER personal radiation detector means that it can be worn on the hip by airline baggage handlers, or in the underground baggage screening process, etc. Another application is vehicle inspection, where the officer might be talking to the driver of an offloading vehicle from a ferry, and while he is chatting the PRD indicates a radiation source. If there's an issue in the vehicle, he gets an alarm, and the officer can just discreetly delay the vehicle for a minute or so while deciding whether or not to screen the vehicle further or to simply let it pass.

There are basically two types of situations with regard to radiation detection. In the first, somebody brings something in that they didn't realize that they needed to register or check, an innocent mistake. Then there are the ones who are trying to deliberately smuggle radioactive material into the country for nefarious purposes. Take for example the Canadian border, a border passing through a lot of remote country, and probably even less closely guarded than the Mexican border. The more remote, the more likely that someone is going to try to smuggle something into the U.S. That's simply because a terrorist, or someone with malicious intent, is rarely going to come through a normal checkpoint, where the odds are much in favor of being caught, but rather attempt to cross a border in a remote area, or come into the country through another adjacent country.

Conclusion

In the world of global passenger travel, particularly in areas with multiple border crossings and international boundaries, the ability to conduct ongoing radiation detection and screening of large volumes of people unobtrusively is very important to ensure high efficiency while at the same time being aware of human sensibilities. The concept of using multiple small PRDs, i.e., the SPRD-ER, carried by personnel in a given area such as an airport ensures more comprehensive and efficient screening coverage for officers focused on protection who must nevertheless deal face to face with the traveling public every day, and supports a public relations role awareness that is essential in international relations in today's ever-shrinking global community.

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