

# i3 Integrated Security Services – Explosives Detection



**If an explosive or chemical compound is present, we WILL see it...quickly, accurately, and safely.**

## Elemental ID:

Integration Innovation, Inc. (i3), along with our partner Dent International Research (DIR), are conducting bleeding-edge neutron generator / gamma ray explosives detection research and analysis for the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) Night Vision and Electronic Sensors Directorate (NVESD) at Fort Belvoir.

Our focus is on accurate, safe and very rapid identification of explosive constituents at the elemental level – Elemental ID.

There is no X-ray or computed tomography (CT) inspection system, currently on the market, that can achieve positive verification with detailed identification of explosives constituents, by element and quantity. Neutrons are scattered by low atomic mass number elements (hydrogen, carbon, oxygen and nitrogen) much more strongly than the elements absorb x-rays, providing CCD imaging of explosives in real time. Neutrons permit imaging of materials **not possible** with x-rays.

Neutron radiography allows for rapid imaging of luggage / cargo contents. i3 and DIR are developing two low-cost, light-weight, high-flux neutron sources that can be used to perform 100% inspection of electronic devices, carry-on / checked luggage and air cargo.

• **Isotropic Neutron Generator** – working prototype of a compact, high-flux, system through a world-wide, exclusive agreement with Lawrence Berkeley National Laboratory ( $10^{11}$  neutrons/sec deuterium-deuterium (D-D) and  $10^{13}$  neutrons/sec deuterium-tritium (D-T).

• **Anisotropic Neutron Generator** – patented neutron generator capable of generating a spin-polarized, beam of neutrons that can achieve highly-targeted explosives detection at significant stand-off distances.

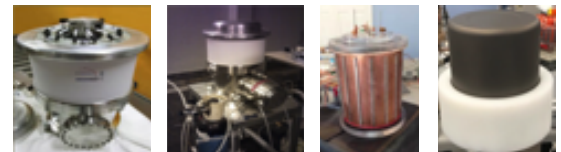
US Government agencies are faced with a myriad of traditional and improvised explosive threats. The potential proliferation and use of explosive and chemical compounds by our adversaries continue to be a major concern. Elemental ID sees both types of compounds at the atomic level...quickly, accurately and safely. Elemental ID does not disrupt the flow of transportation and commerce.

A static picture of shape and density is **NOT** good enough. Elemental ID can give TSA the ability to identify every material that goes on a plane. The US Government, allied governments, US and foreign agencies, airlines and the global flying public **ALL** benefit from 100% inspection of electronics, carry-on / checked luggage and air cargo. The Elemental ID benefits include:

• <b>Certainty</b>	threat materials are easy to see and ID	• <b>Speed</b>	<1 second to scan an electronic device, piece of luggage or air cargo
• <b>Safety</b>	properly shielded in accordance with Nuclear Regulatory Commission (NRC) radiation exposure limits (10 CFR Part 20 – Standards for Protection Against Radiation)	• <b>Flow</b>	our objective systems fits within the TSA Security and Inspection infrastructure

## Subject Matter Expertise:

- Explosives and Hazardous Devices
- Forensic Exploitation
- Major Crime Scene Management
- Explosive Detection
- Threat Assessments and Domain Awareness
- Leading complex teams and investigations
- Integration of Intelligence and Operations
- Partnership Development (International & Domestic)
- Enterprise Program Management
- Law enforcement and First Responder Coordination
- Change Management



2006  
(LBL for general research)

2008  
(LBL for general research)

2016 & 2017  
(GT-99 for radio-isotope production of Tc-99m)

Integration Innovation, Inc.

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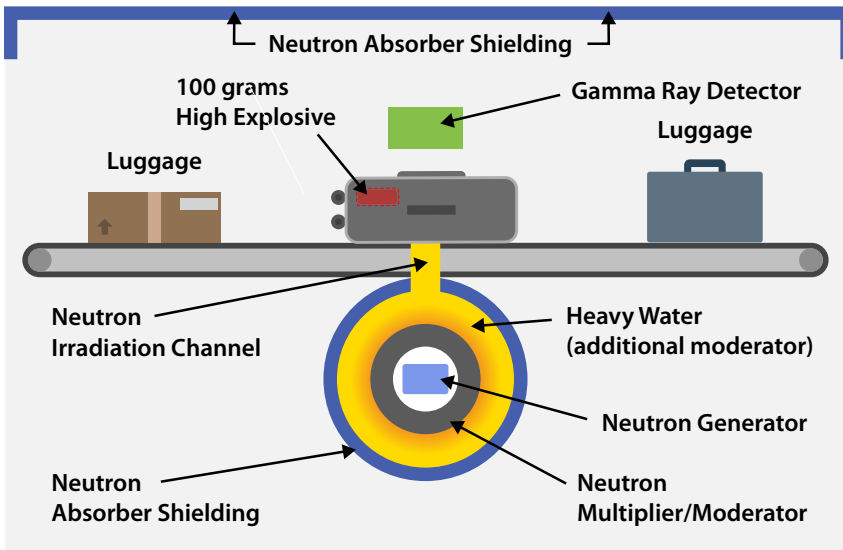


## Detection Capabilities Comparison:

	Current NG/Gamma Capability	Elemental ID Capability	X-Ray / CT Systems
<b>Source</b>	10 <sup>8</sup> n/s DD is typical	10 <sup>11</sup> n/s DD, scalable to 10 <sup>13</sup> DT	high voltage x-ray tube
<b>Detection Range</b>	A few inches	Several feet (isotropic) 10-20 meters (anisotropic neutron beam)	~1 foot
<b>Detection Time</b>	3-6 minutes of "stare" required	100 seconds (DD) <1 second (DT)	< 1 second
<b>Detection Method</b>	Weak gamma ray signal detection in high noise background	Highly moderated neutron flux generates strong signal and low background noise	gray-scale density imaging with no elemental identification. X-ray/CT only resolve shapes and densities.
<b>Threat Picture</b>	Gamma ray detection is strongly limited by background noise that almost totally obscures the threat material	Proprietary background filtering (noise reduction) to clearly identify explosive constituents	Detection output is a colorized, static picture showing density of material

## Objective Operational Detection Configuration

Within the objective Elemental ID system, luggage and cargo are inspected in <1 second. If the system identifies any explosive or chemical threat material, based on gamma ray spectrum data, the suspicious luggage/cargo is separated for further inspection.



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