

Portable Isotopic Neutron Spectroscopy System

An INL-designed PINS system examines a rusted munition for explosive and chemical signatures.



Medical doctors use X-rays to see bone and tissue structure inside the body. Mechanics use computer-based diagnostic tools and borescopes to view internal engine components. And increasingly, U.S. soldiers rely on an Idaho National Laboratory (INL) technology to examine suspected chemical munitions and containers.

The Portable Isotopic Neutron Spectroscopy (PINS) system is a neutron-based assessment device that can safely sense the chemicals inside thick steel containers and quickly determine if the contents are hazardous. With the aid of a small neutron source, PINS saturates suspected containers with neutrons. This process creates gamma rays – tiny but powerful electromagnetic

radiation waves – that carry signatures of the material inside. The gamma-ray spectrum is analyzed by PINS custom software that determines the chemical mixture or compound inside. The results of the analysis are displayed to an operator usually within 100 to 1,000 seconds. And since PINS doesn't require the container to be opened, safety is greatly enhanced.

A typical PINS system includes a small californium-252 radioactive source, a high-purity germanium gamma-ray detector, a stand with moderator and shielding, a digital signal-processing multichannel analyzer, and a laptop computer. The computer analyzes the spectrum and serves as the control panel.

Since 1992, PINS has been extensively tested and used

worldwide to detect chemical warfare agents, explosives, chemical obscuring smoke, and practice fills.

Quick Facts

- PINS is a neutron-based nondestructive evaluation tool.
- PINS can identify nerve agents such as sarin gas and blister agents such as mustard gas, explosives, and hazardous chemicals.
- It has been deployed at 50+ domestic sites and 40 sites overseas, including locations in Iraq.
- PINS is used by the armed forces of the United States, Australia, Canada, Egypt, Japan, and the United Kingdom.
- This patented INL technology is commercially available.

The Energy of Innovation



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