MODES_SNM

Van-mounted Mobile Radiation/Nuclear Material Detection System

Features

- Mobile detection system, combining primary and secondary inspection.
- Rapidly relocatable to detect and identify:
  - Nuclear material such as plutonium and uranium
  - Illicit radioactive sources outside of regulatory control
  - Contaminated cargo (steel, consumer goods)
  - Respond tactically to intelligence
- System is modular and mission configurable, every module being man-portable.
- User-friendly, intuitive interface, accessible from smart phone/notebook via WLAN.

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MODES_SNM is the first system in the world to combine fast and thermal neutron detection, and as a result can detect fission sources (such as plutonium) more accurately and precisely by distinguishing their radiation signature from natural backgrounds. The technology is sensitive to shielded nuclear material (such as nuclear material surrounded by explosives). Furthermore, it does not use ^{3}He.

MODES_SNM system is mission configurable, allowing for additional man-portable detector modules to be added to achieve enhanced sensitivity. The system is designed to fulfill the requirements set by the International Atomic Energy Agency (IAEA) for a Portable Radiation Scanner.

Dimensions and weight

The baseline detection system consists of five neutron and two gamma modules, a computer and electronics module and a UPS battery (ensuring 8 h autonomy). The overall weight of a single module is within a 25 kg limit (i.e., 'man-portable') with the exception of the box that hosts electronics and computer (32 kg). Total weight of the measurement setup is 200 kg. A neutron module contains two neutron detectors and has dimensions of 1250x250x170 mm^3, while a gamma module has dimensions of 1000x300x170 mm^3 and contains one gamma detector.
The baseline system fits into a common van (i.e. Fiat Ducati, Mercedes Sprinter) but is also configurable for a car or SUV.

Performance

Key performance values of the MODES_SNM system				
Alarm rates				
Gamma detection				
	Dose rate	Speed	Alarms/Trials	Postive identification within 60 s (static)
^{60}Co	50 nSv/h	8 km/h	30/30	10/10
^{133}Ba	10 nSv/h	8 km/h	30/30	10/10
^{241}Am	50 nSv/h	1.8 km/h	30/30	10/10
The number of false alarms was measured to be lower than 1 in 60 minutes continuous operation at a mobile source facility.				
Neutron detection				
The IAEA requirement of generating a neutron alarm for a ^{252}Cf source emitting 1.2×10^4 neutrons/s and moving with a speed of 0.5 m/s (1.8 km/h) at a distance of closest approach between the source and a portable radiation system of one meter is fulfilled. The probability of detection (PD) for such a ^{252}Cf source configuration is 99.8% with a false alarm rate considerably lower than 1 per 60 minutes operation.				
AmBe source, 1 cm lead + 1 cm iron + 8 cm polyethylene shielding: Identification 5/5 (source strength 2×10^5 n/s, source placed 40 cm from container).				
WGPu (61%)*, 1 cm lead + 1 cm iron + 8 cm polyethylene shielding: Identification 5/5.				
WGPu (93%)*, 1 cm lead shielding: Identification 5/5.				

*composition and strength can be provided upon request

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