Contribution ID: **257** Type: **Oral (Non-Student) / orale (non-étudiant)**

# Efficacy of Boron-Coated Straws for replacing 3He-based Neutron Detectors

*Friday 20 June 2014 09:30 (15 minutes)*

Boron-coated straw detectors have been proposed for detection of contraband nuclear material, via neutron detection, at border crossings and ports of entry. Gas proportional counters filled with He-3 are the "gold standard"for detection of thermal neutrons. He-3 has a large cross-section (5330 barns) for the capture of thermal neutrons, while remaining insensitive to the detection of gamma rays. He-3 detectors are typically simple and robust in design, and they are useful for a wide range of applications, including border security technology for monitoring of special nuclear materials. Due to an increased demand for He-3 for security applications, and a very limited supply of He-3, it has become imperative to develop alternative technology for the detection of neutrons. A commercially available technology that can serve as a viable replacement for He-3 detectors are boron-lined proportional counters. This presentation will examine measurements conducted in controlled environments at Atomic Energy of Canada Ltd., to quantify the neutron detection efficiency, as well as the gamma insensitivity, of a boron-lined neutron detector. The gamma insensitivity measures the ratio of the detector count rate to the incident gamma photon rate. These measurements are compared against those for a He-3 proportional counter in identical environments. The boron-lined detector consists of 1 m long 1"diameter bundles of 7 boron-lined straws. Each 1"diameter bundle provides count rates just over 5 times less than that for a 1 m long 2"diameter He-3 tube pressurized at 40 psi. At 10 mR/hr gamma exposure, the measured gamma insensitivity of the boron –lined detector, at 1.2 × 10ˆ-8, is superior to that of the He-3 detector, at 1.4 × 10ˆ-7.

**Author:** VAN DER ENDE, Bryan (A)

**Co-author:** BENTOUMI, ghaouti

**Presenter:** VAN DER ENDE, Bryan (A)

**Session Classification:** (F1-4) Nuclear Safety -DNP-DIAP / Sureté nucléaire - DPN-DPIA

**Track Classification:** Industrial and Applied Physics / Physique industrielle et appliquée (DIAP-DPIA)