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#5-151 Evaluation of Starlite Survey Meter Against Spectroscopy Measurements in CANDU Neutron Fields

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Raylab Starlite neutron survey meter was evaluated in CANDU neutron fields, against Nested Neutron Spectrometer (NNS) and a current official CANDU neutron survey meter Canberra's NP-100, also known as Snoopy. The NNS is a cylindrical neutron spectrometer, based on Bonner sphere principles, while Starlite is a novice, multidetector, light neutron survey meter, designed and manufactured by Italian company Raylab. The purpose of the spectroscopy measurements was to assess neutron energy spectra in terms of energy dependent neutron fluence rates and to evaluate integrated operational dosimetric quantity, neutron ambient dose equivalent (H*(10)). Furthermore, quantities such as neutron fluence averaged mean energy and neutron ambient dose equivalent averaged mean energy were calculated for each measured spectrum, indicating the softness of CANDU neutron fields. Starlite neutron survey meter has unique polyhedral shape and contains 30 thermal neutron solid state detectors, arranged symmetrically along 3 orthogonal axes and surrounded by a diamond shape high density polyethylene (HDPE) moderator. The polyhedral shape of the HDPE moderator provides an isotropic response, while reducing the overall body weight. The Starlite meter is relatively light, weighing only 4 kg, which gives a great advantage when performing daily surveys inside nuclear power plants. The measurements took place at the Bruce Power CANDU plant, around primary heat transport pumps (PHT) and in front of the entrance door of the D2O moderator rooms. In total, 14 spectroscopy measurements at different positions were taken, using two NNS units, while ambient dose equivalent surveys of all those positions were conducted using Starlite and Snoopy meters. In addition, measurements were taken at the Bruce Power Am/Be calibration track room, exposing Starlite to a very energetic neutron fields from Am/Be source. The fluence averaged mean energies of CANDU fields were found to be between 70 and 200 keV, while the average energy of neutrons from Am/Be source is around 4.5 MeV. In all these fields, Starlite performed very well, when compared to NNS and Snoopy, having the ambient dose equivalent response close to 1. Both Starlite's superior performance and its good ergonomic properties qualify this instrument to be a new official neutron survey meter for CANDU power reactor fleet.

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