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PAPER TITLE CPHR-Whole Body Counter Unit. Calibration results.

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ABSTRACT (See instructions overleaf)

A high sensitivity whole body counter has been installed at the Centre for Radiation Protection and Hygiene (CPHR-Cuba).The detectors system consists of a 8"x4" NaI(Tl) and a 3"x3" NaI(Tl) scintillation detectors located in a low background room. The room is made of low intrinsic radioactivity steel plates (less than 1 Bq of $^{60}Co$ per kg of steel), with internal dimensions 2500 mm w by 2500 mm l by 2600 mm h and plate thickness of 162 mm. Internal walls are lined with 3 mm of Pb, 1.8 mm of Sn and 1.5 mm of Cu for background reduction between 10 keV and 3 MeV. The gamma ray spectra are analyzed automatically using a special purpose software package and a personal computer. In order to calibrate the detection system for high energy photon emitters a structure based on the BOMAB phantom which comprise ten elliptical containers was assembled. This structure approximate the physical shape of a human body for 5, 10, 15 years old and an adult person. Phantoms are filled with plastic bags containing radioactive solution of $^{57}Co$, $^{22}Na$, $^{137}Cs$, $^{226}Ra$, $^{134}Cs$, $^{54}Mn$, $^{133}Ba$, $^{60}Co$, $^{40}K$, simulating an uniform distribution. Each photon was measured with NaI(Tl) 8"x4" detector using a tilted chair geometry. Detection efficiency, FWHH and minimum detectable activity as function of energy, for counting time of 30 minutes was calculate for each radionuclide. The calibration factors as a function of weight of the phantoms were calculated too.

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