

Aungsumalin Intang 2010: Measuring and Assessment of Reference Gamma Scattering in Secondary Standard Dosimetry Laboratory (SSDL) with Imaging Plate Detection System. Master of Science (Applied Radiation and Isotopes), Major Field: Applied Radiation and Isotopes, Department of Applied Radiation and Isotopes. Thesis Advisor: Assistant Professor Wanwisa Sudprasert, Ph.D. 64 pages.

Secondary Standard Laboratory (SSDL) of Office of Atoms for Peace (OAP) is a standard laboratory in ionizing radiation at national and international level. SSDL plays an important role in maintaining and transferring the reference value to users both governmental and private sectors through out the country via survey meter and pocket dosimeter calibration services. Therefore the measurement of radiation levels as reference values is necessary for calibration service. This research aimed to measure and assess the reference gamma scattering from ^{137}Cs source of OB85 irradiator in 4.5×10 m SSDL room by imaging plate detection system. The imaging plate was first calibrated with reference standard to identify the calibration factor, and then the gamma scattering in SSDL was measured. The level of gamma scattering was assessed and confirmed by the well-calibrated pocket dosimeter.

The result revealed that the calibration factor for an imaging plate model BAS-MS2040 was $0.094 \text{ mR}\cdot\text{mm}^2\cdot\text{PSL}^{-1}$. The gamma scattering levels at 1 – 6 meters from irradiator with 1 meter height were found to be approximately 63 - 80 mR/h with the expanded uncertainty of 7% at 95 confidence level. The chart of scattering level while operation of OB85 was established. The scattering level within 1 meter from source compared to the radiation field was approximately 1.8% which is in accordance with ISO 4037. The characteristic of radiation field of OB85 gamma irradiator was a conical shape with the width of 0.4, 1.04, 1.50, 1.90 and 2.42 meters at 1, 2, 3, 4 and 5 meter from the OB85, respectively. The scattering levels measured by imaging plate were found to be similar to those measured by pocket dosimeter, with only 6% difference. It can be concluded that the gamma scattering levels in SSDL room measured by imaging plate can effectively be used as reference levels for calibration of survey meter and pocket dosimeter, accordingly supporting the radiation protection program of OAP.

Student's signature

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