The new IRSN passive dosemeter using the RPL technique

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Abstract

The Institute for Radiological Protection and Nuclear Safety (IRSN) is the French public organisation in charge of research and expertise into nuclear safety and radiation protection. IRSN provides also services in these areas like dosimetric survey for 150,000 workers liable to be exposed to ionising radiation.

At present whole-body dosemeters provided by the IRSN laboratory for photons and beta-particles are based on photographic films. In order to anticipate likely supplying decrease and to improve the service, IRSN has decided to replace photographic films by dosemeters based on the radio-photoluminescence (RPL) technology, supplied by the Japanese Company Chiyoda Technol.

RPL was chosen after a thorough comparison with other available passive techniques (thermoluminecent dosemeters: TLD, and optically stimulated luminescence: OSL). Constraints due to large-scale production of dosemeters (packaging, shipping, etc.) were taken into account as well.

Irradiation tests for five different dosemeters, based on the 3 available techniques (TLD, OSL, RPL) were performed. The main results of these tests are presented (energy, dose and angular response, detection threshold, etc.) together with main technical characteristics of the new RPL dosemeter (range in energy and dose, homogeneity, reproducibility, re-reading, information about radiation type from reading, etc.).

This dosemeter is expected to give significative improvements in the IRSN laboratory's provision of service thanks to better dosimetric performances and because it offers the possibility to get information to analyse over-exposure circumstances.

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