Thermoluminescent Dosimetry in Environmental Monitoring

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New high sensitivity thermoluminescent (TLD) systems can be particularly useful for environmental monitoring. In a previous study, such thermoluminescence systems passed a US performance test criteria but showed an unexpected amount of fading that called for further investigations. Therefore a three-country international intercomparison was organized to investigate the fading under field conditions for the various TLD systems.

The protocol of the intercomparison was based on cross calibration and an exchange of dosemeters between the participating labs. Two measurement cycles were carried out during different seasons to study the possible influence of spring and winter climatic conditions.

High sensitivity 7LiF:Mg,Cu,P detectors produced in China and the US, Al2O3:C produced in Russia, and standard TLD-700 were tested under field conditions.

Dosimeters were simultaneously deployed at two outdoor locations in each country. In Croatia as well as in Hungary one site was in the area of research institutes with various nuclear facilities. In Hungary the other was in a village garden, while in Croatia it was a meteorological station. In the US the locations chosen were a residential area, and a US. Department of Energy national laboratory radiation waste storage area that had an elevated, non isotropic radiation field. For the fading test, pre-irradiated dosemeters were deployed together with unirradiated field dosemeters at all locations.

The results showed that the agreement between dosimetric systems with the new high sensitivity detectors was good. The large fading obtained in an earlier study with the same systems under laboratory controlled extreme temperature and humidity conditions was not observed in "normal" environmental conditions at various sites during spring season.

Results of the winter test conditions will be compared to those from the spring season.