EURADOS WG3: Environmental radiation monitoring (2002)

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The objective of this work package is to evaluate routine environmental monitoring systems in Europe and to organize a broad scale intercomparison of environmental monitoring systems in Europe. Based on the experience of a small scale intercomparison of dosimetry systems performed in 1999, the intercomparison should include systems from associated countries in Central and Eastern Europe. The Final Report of the 1999 Intercomparison exercise was recently published as an invited paper on Radiation Protection Dosimetry [**Vol 103, No.3, pp. 197-210 (2003**)]. Reprints of the paper are available from the EURADOS Secretary.

The new intercomparison will contribute to increase harmonization within Europe and also to create more links between scientists working in this field of radiation protection and others responsible for the practical implementation of monitoring measures. The intercomparison was planned to take place at Risø. However, in June 2001, Risø informed the WG3 that it could no longer host the excercise planned for 2002. Shortly after this notice, PTB contacted Risø and made arrangements in order to organize these activities at their site in Braunschweig. The effective co-operation between PTB and Risø allowed the development of new sites for the experiments at PTB. These are called Free Field and Cosmic radiation site and are described hereafter (**see attachments**):

Free field site—An almost flat meadow of about 200 x 50 m^2 is available for the exercise on the PTB premises (with controlled access). Basic facilities for the participants were kindly provided by PTB staff. The field is close to the Chadwick Building at the PTB and arrangements were made to stop some experimental activities inside the building during the measurements. A device to simulate an incident affecting the dose rate was kindly provided by Risø and was set-up by the PTB staff.

Cosmic radiation site—A floating platform was installed on a lake near Braunschweig (16 km). The lake is adequate for the purpose of this intercomparison (3 m deep at the centre, at over 100 m from the nearest shore) and some other aspects are important: swimming is not permitted, access is only possible by a boat managed by the PTB staff and parking is possible at the lakeshore. Electric power is supplied to the platform *via* connection to a generator.

In addition to these two new facilities, different radionuclide sources were acquired by PTB for the intercomparison exercise. The nominal dose rates from the sources are currently being determined for traceability to the PTB standards.

The new facilities and the use of the Underground Laboratory for Dosimetry UDO in conjunction with the experience and procedures developed in the WG3 provide an unique infrastructure for the study of environmental radiation detectors and for the organisation of future harmonisation exercises.

A second run of the intercomparison of dose rate instruments used in National early warning networks was performed at PTB in September 2002. The WG3 ensured the traceability of protocols and facilities to the previous exercise carried out in 1999 and managed to involve operational groups and gamma spectrometry experts.

The WG3 invited countries which had not participated in 1999, especially those which are relevant due to their activity in the nuclear field or their large population. Teams from five European countries attended with their network dose rate instruments: France, Greece, Hungary, Sweden and Switzerland. The WG3 also participated as 'organiser' with dose rate instruments that were already employed in past EURADOS and European intercomparison exercises. In addition, *in situ* gamma spectrometry teams from France, Greece, Spain, Sweden, Switzerland and United Kingdom participated in all planned exercises. Over 20 scientists from eight European countries worked together during the five days of the exercise.

The WG3 agreed to maintain the same exercise program as in 1999 in order to provide traceability and permit easy comparisons between the two exercises. Therefore, the exercise included calibration checks with sealed sources of different radionuclides (^{137}Cs, ^{60}Co, ^{226}Ra), background measurements at terrestrial and cosmic sites, linearity tests at low dose rates (20 to 200 nSv·h^{-1}), photon energy response (60 keV to 1.3 MeV) and inherent background estimates. In addition a simulation of an incident affecting the dose rate was carried out.

All participants with dose rate monitors were asked to provide the organisers with their first results just after each exercise. Spectrometry teams provided results within two months. Consequently, the organisers had collected all the initial results from the participants before the end of 2002.

Overall, a first look at the results confirms that the new facilities are quite adequate for the purpose of the intercomparison. Furthermore, spectrometry results from the platform show that the terrestrial radiation dose rate on the platform is negligible (about 1 nSv·h^{-1}), providing an excellent facility for the study of the cosmic component at ground level. The agreement between dose rate monitors and dose estimates from the *in situ* gamma spectrometry instruments is also remarkable. Finally, promising and interesting results were obtained with the spectrometers at the UDO laboratory.

The editorial work on the papers reporting the 2002 intercomparison exercise is being carried-out during 2003. It is foreseen that at least two papers will be prepared: a first one on the results in terms of dose rate (including spectrometry estimates) and a second paper describing the *in situ* spectrometry experience.

Contact were established with scientists working on the ECCOMAG Project and the MORAL (Mobile Radiological Laboratories) exercise series for preparedness for emergency situations.