

**Seminar 3 – Radiation Protection, Environment and EP & R – Session 2**

Chaired by B. Cvetkovic (PSI) / F. Rocchi (ENEA)

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13:45 - 14:30 | No. 305

**Sarcophagus Safety Status Database (SSSDB) - Selected Aspects**

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The information system “Sarcophagus Safety Status Database (SSSDB)” has been developed since 2006 within the framework of several projects financed by the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) as an ongoing contribution to the management of the consequences of the Chernobyl accident by Ukraine. By providing a collection and verification of all available information, SSSDB serves as a reliable and objective information basis to assess the current safety status of the sarcophagus and the radiological condition of the exclusion zone. In this way, transformation of the Chernobyl site into an ecological safe condition is supported. Especially, changes induced by the implementation of the New Safe Confinement (NSC) will also be captured by the SSSDB. Therefore, future protection and dismantling measures may be substantiated by the data.

Currently, particular attention of data analysis is directed towards the radiation situation of the Shelter Object, such as the status of fuel containing materials, radioactively contaminated water and radioactive aerosols inside the Shelter Object, and radioactive wastes. The overall status of nuclear and radiation safety of the Shelter Object within NSC conditions can be monitored using the measurement equipment installed in several boreholes for observation of the fuel containing masses inside the sarcophagus. These monitoring systems provide sensors for dose rate, heat flux, temperature and neutron flux.

Other current issues are concerned with radiation and hydro ecological monitoring of the situation in the exclusion zone under conditions of technogenic work as well as the assessment of the radiological consequences of forest fires.

In this contribution the current status of the Chernobyl site is reflected by pointing out selected aspects from the database.

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14:30 - 15:00 | No. 306

**New software for airborne radiation monitoring applications – AGAMA**

*M. Ohera (SÚRO), L. Gryc (SÚRO) and I. Češpírová (SÚRO)*

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In the event of a radiation accident, contamination of a smaller or larger area is assumed. For small areas, it is sufficient to measure using ground "point" measuring devices, possibly taking samples with subsequent determination of radionuclides in the laboratory. However, in the case of more extensive contamination, it is appropriate to perform the mapping using aerial spectrometry. Although this method is less accurate than ground measurements, it is quite sufficient for the purpose of monitoring the contamination of a large area. For these cases, SÚRO has an IRIS device - Integrated Radiation Information System. The device consists of four NaI(Tl) crystals, each with a volume of 4 liters, which provide sufficient efficiency. In order to maintain the operability of the entire system, regular exercises must be performed. This is done in cooperation with the army or police of the Czech Republic.

The output can be, for example, maps that represent dose rates or areas with higher levels of certain radionuclides. Data processing is performed using software that is able to work with large data files. For this reason, new software - AGAMA (Airborne GAMmaspectrometry Analysis) - has been developed which also includes the international format (ERS) for data transfer.

The AGAMA software was designed for emergency radiation monitoring and intensive orphan chasing, however its application can be also found in geophysics for determining potassium, uranium and thorium concentrations in soil. The core of AGAMA software package is LSQ method (least square method) using the response functions for K, U-series, Th-series, Cs-137, Cs-134, Ru-103, I-131 based on Monte Carlo calculations. Air dose rates in nGy/h calculated from full spectrum and recalculated to 1m above the ground plus the air dose rates calculated from the activities based on the extended window method are also provided. The minimum detectable activities (MDA) based on the Currie method and newly also on the ISO IEC 11929-2010 recommendation are involved for all nuclides used in the LSQ method. Modular AGAMA system gives opportunities to apply other sizes and types of detectors (for example, plastic detector, HPGe, LaBr detectors, etc.) in future.

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15:00 - 15:30 | No. 307

**Current and Perspective Methods of Evaluation of Activity Equivalent in Spent Nuclear Fuel Reprocessing**

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The principle of activity equivalence is widely used for evaluation of quantity of radioactive waste and other products that form in a process of spent nuclear fuel reprocessing so that they are equivalent to SNF in terms of radiational exposure. However, no unified approach for determination of activity equivalence criteria has been established in world practice yet. This report presents main scientific approaches for determination of above-mentioned criteria in the Russian Federation and examples of such approaches application. Besides, this report shows some perspective ways to determine an activity and volume equivalent of SNF and products of SNF reprocessing.