Contribution ID: **302** Type: **Poster**

Development of automated system for continuous remote control of radioactivity emitted by nuclear power plants

Tuesday, 13 May 2014 17:15 (1h 30m)

Automated system for radiation control of air space near the nuclear power plant based on using of non-stop remote gamma-spectroscopic control of nuclear power plant radioactive emission (mainly from ventilation pipe) is developed. The task of the system consists in estimation the potential risk of terrain contamination outside the nuclear power area. The system should provide authorities of different level with information concerning radionuclide composition and dose rate, both in the case of normal emission and the emergency one up to level 7 (according to the INES international scale of nuclear events). It is extremely important to detect early stage of any event.

The system hardware consists of spectrometric stations (manufactured in Russia) connected with computer' s net. The station includes the collimated scintillation NaJ (Cs) detector of 63×63 mm size, connected with intellectual MCA. It has been found that for reliable detection of radioactive emission of the nuclear power plant eight stations evenly located at the 500-800 meters distance from the ventilation pipe are sufficiently.

The input information and results of data processing are stores in SQL-data base. The data processing software is based on the original algorithms coded by C# language. It includes processing of scintillation gamma-ray spectra, including evaluation of multiplets. A method for computation of full energy peak efficiency for voluminous atmospheric sources (radioactive gas stream escaping from ventilation pipe) has been developed. The computation uses the dependence of full energy peak efficiency value for arbitrary point as function of distance and angle. The atmospheric stream geometry is set by normal distribution, with parameters dependable on meteorological state of atmosphere.

The computations of full energy peak efficiency for voluminous radioactive atmospheric sources a modeling by the Monte-Carlo method has been used [1]

The original method for radionuclides identification is developed. Both mathematical methods and elements of expert system are used. To increase the identification reliability it is suggested to use different radionuclides libraries optimal to various types of emergency events using fuzzy logic. It is assumed that the developing system will be integrated with system of radiation control of nuclear power station. It will allow assisting decision support center to accept adequate solutions in the case of problems. The successful tests of different parts of the system were carried out at the Kalinin and Kursk nuclear power plants, Russia.

[1] D.S. Grozdov, V.P. Kolotov, Y.E. Lavruhin, N.N. Dogadkin. Computation of full energy peak efficiency for voluminous radioactive atmospheric sources using remote scintillation gamma-ray spectrometry. Abstract presented at RadChem14.

Primary authors: Dr GROZDOV, Dmitry (Vernadsky Institute of Geochemistry and Analytical Chemistry); Prof. KOLOTOV, Vladimir (Vernadsky Institute of Geochemistry and Analytical Chemistry)

Co-authors: Dr DOGADKIN, Nikolay (Vernadsky Institute of Geochemistry and Analytical Chemistry); Dr LAVRUKHIN, Yury (Vernadsky Institute of Geochemistry and Analytical Chemistry)

Presenter: Prof. KOLOTOV, Vladimir (Vernadsky Institute of Geochemistry and Analytical Chemistry)

Session Classification: Poster Session - Radionuclides in the Environment, Radioecology

Track Classification: Radionuclides in the Environment, Radioecology