ENVIRONMENTAL STUDIES ON THE BASE OF INP AS RU RADIOANALYTICAL CENTER

KADIROVA M., KADIROV U.S., MUKHAMEDSHINA N.M., MIRSAGATOVA A.A.
Uzbekistan Academy of Sciences, Institute of Nuclear Physics,
Ulughbek, 100214 Tashkent, Uzbekistan

Uzbekistan has a highly developed industry, with more than a hundred branches, including power engineering, machine-building, metal smelting, the production of chemicals, oil, gas, textiles, and food-processing. Cotton-growing, gold and uranium mining processing are the main branches of the national economy at present. But it is evident that industrial and agricultural progress in human life has resulted in creating environmental risk.

In the Institute of Nuclear Physics of the Academy of Sciences of the Republic of Uzbekistan for environmental risk assessment such nuclear techniques as high sensitive, precision and reliable instrumental neutron activation analysis (INAA) and X-ray radiometric techniques for the determination about 30 of major and minor elements in such environmental samples as leaves and seeds of plants and some region soils with detection limit from 0.0001 mg/kg up to 1 mg/kg have been developed. Sometimes nuclear track techniques used as additional tools for the study of environmental pollution. The software for treatment of microscopic scanned photographic track images by application of digital image processing has been developed. All program modules are made in DELPHI execution environment by using Pascal object-oriented language.

Ever since in frame of the several STCU projects, the Radio analytical Center (RAC) was established in October 2004, for environmental risk assessment the unique equipment of RAC have been used. RAC was equipped with unique: HP Ge-detector with high resolution gamma-spectrometers; Si(Li)-detector with high resolution XRF-spectrometer, including DSA-1000 analyzers and Alpha-beta counter "Solo" of Canberra Industries, Inc. Genie-2000 Spectroscopy System of Canberra spectrometers, represents high-performance and useful spectroscopy software platform. Genie 2000 functions include MCA control, spectral display and manipulation, basic spectrum analysis and reporting. Genie 2000 Basic Spectroscopy and Gamma Analysis Software permitting automatically obtain nuclide identification report with all needed parameters. Any applications of Genie 2000 software have not possibility to calculate analyzed elements concentration.

For automation this step of INAA by using Canberra Genie 2000 Spectroscopy System we developed user's "Environmental risk assessment Application" software. This Application works in interactive environment as a dialogue system with user and allows calculating required nuclides concentration in analyzed samples, separately for long-lived, middle-lived and short-lived nuclides. Using the Nuclide Library Editor and comprehensive standard libraries of Genie package we created three custom libraries, accordingly for long-, middle- and short-lived nuclides. After processing of the next data source the Application returns the user to the menu. From here he can continue data processing, having chosen the following data source, or through menu item EXIT to leave from the Application. Thus, the user has opportunity to calculate various type required nuclides concentration (with sufficient algorithm for long-, middle- and short-lived nuclides) any number of data sources not leaving from the application. In report will be shown comparable examples of some real environmental risk assessment spectra's processing with developed Application by using Graphical Batch Tools, FDS files and REXX script language packaged in Genie 2000 Spectroscopy System.