

APPLICATION OF THE ANALYTICAL NUCLEAR-PHYSICAL COMPLEX "SOKOL"

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National Science Center "Kharkov Institute of Physics & Technology" (NSC "KIPT") is the largest and the oldest center of physical science in Ukraine. The Institute is active in the field of accelerator physics, development of electron and ion accelerators. There is a large number of unique experimental facilities, including a number of small-sized charged particle accelerators.

One of such small-sized electrostatic accelerators became the basis for the creation of the analytical nuclear-physical complex "Sokol" (ANPC). Employees of the Department of "Analytical Research, Ecology and Radiation Technologies" of the NSC "KIPT" and currently continue to work on its improvement. This is how experimental equipment has been developed, which makes it possible to realize all the basic capabilities of IBA (ion beam analysis) and to solve a wide range of problems in the field of materials science, ecology, biology, medicine.

In particular, one of the topical and interesting topics is the study of the environmental safety of the activities of the NSC "KIPT" itself. Especially in view of the recent launch here of the research nuclear facility "Neutron Source on the Base of Subcritical Assembly With Electron Linear Accelerator Driver" which received a wide scientific and public response.

For these purposes, with the help of ANPC "Sokol", studies of the elemental composition and radioactivity of soils in the zone of influence of the institute were carried out. Soil deposits contamination and at the same time is an easily accessible material for research at any pre-selected network of observation points. The department employees have already accumulated a database based on the results of 20 years of observations. Analysis of the level of environmental hazard was carried out using methods for assessing the risk to human health. Comparison of previously obtained results with subsequent ones will make it possible to assess the environmental safety of the study area in dynamics and control possible changes.

ANPC "Sokol" has the following main parameters:

- energy of accelerated singly charged ions 0.2 ... 2 MeV;
- stability and monoenergeticity of ions 0.04 ... 0.07%;
- beam ion current at the direct output 50 μ A;
- the beam ion current after the analyzer is 20 μ A;
- accelerated ions - hydrogen, helium and other gas ions.

The analysis results are presented by the content of 30 elements: Al, Ba, B, Br, V, Fe, Y, K, Ca, Co, Li, Mg, Mn, Cu, Mo, As, Na, Ni, Rb, Pb, Se, S, Sr, Ti, F, Cl Cr, Zn, Zr.

Accumulation coefficients of elements in the soil relative to the average concentrations for urban areas for several main pollutants are shown in Fig.1.

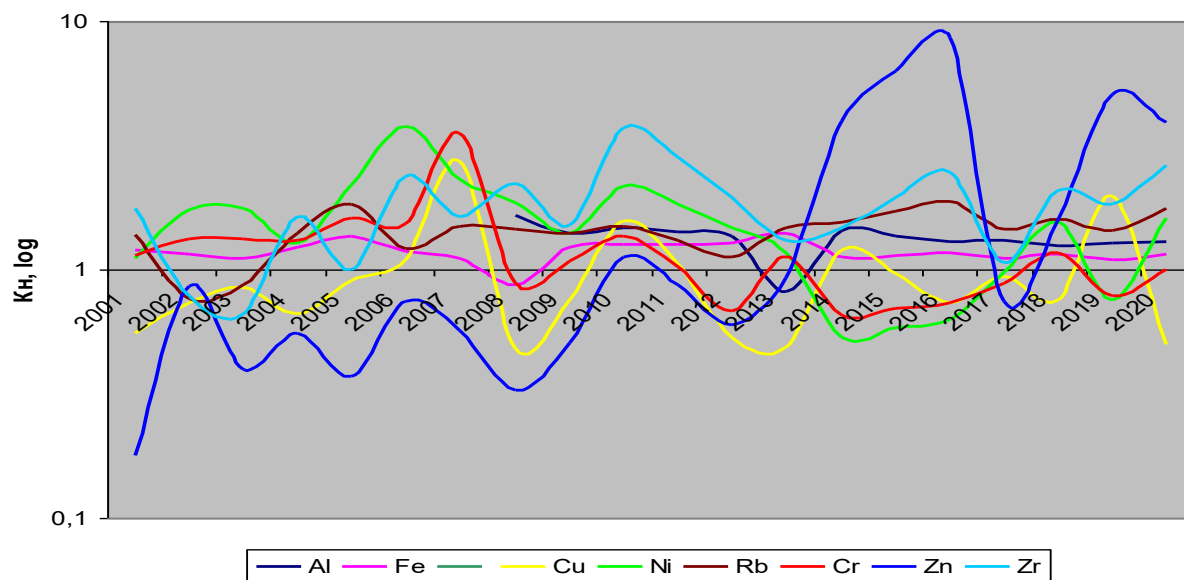


FIG. 1. Accumulation coefficients

The result of the risk assessment indicate the permissible level of soil contamination at the moment, although they show a slight increase over time.