COMPLEX EVALUATION OF TECHNOGENIC SOIL POLLUTION IN THE CONTROL AREA OF BELARUSIAN NUCLEAR POWER PLANT

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Direct intake of harmful substances from the soil in a human body is limited and most often happens through other environments contacts with the soil. So, intake of pollutants in a human body happens in the ways: the soil-plant-person, the soil-plant-animal-person, the soil-water-person, the soil-atmospheric air-person. Complex assessment of soils conditions which will consider all possible pollutants in this territory and also the mediated contact of the person and the soil is offered.

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Assessment of soils impurity is carried out by comparison of maintenance polluting elements and substances in the studied soils with their background contents and with the established standards (maximum allowable concentration).

The hygienic danger of pollutants depends on soil conditions, creation of the unified norms of maximum allowable concentration meets considerable difficulties. Not accidentally, maximum allowable concentrations only a little more than one hundred substances are established now.

In Republic of Belarus according to the Sanitary Rules and Norms 2.1.7.1287-03 "Sanitary and epidemiologic requirements to quality of the soil" the chemical research of soils includes the standard and expanded list of indicators.

However soils are also subject to microbiological and radioactive pollution which, as a rule, estimate separately. Now in Republic of Belarus is developed complex assessment of a surface water pollution which at the same time considers chemical and radiological pollution. Similar to her we offer complex assessment of soils pollution which will consider priority pollutants in the chosen territory.

The complex indicator represents the sum of influence of all potential soil pollutants:

$$Kc = \frac{1}{n} \cdot \sum_{i=1}^{n} (K_0 + K)_i, \tag{1}$$

Kc – complex indicator of an ecological condition of soils;
n – amount of pollutants;
K_0 – an indicator of background pollution for i -pollutant;
To – an indicator of technogenic pollution for i -pollutant;
i – index of pollutant.

And values of the index i is appropriated for each pollutant as follows:
i=1 - heavy metals,
i=2 – radionuclides,
i=3 – bacteriological pollution,
i=4 – pesticides,
i=5 – organic pollutant (for example, phosphorus), etc.

Pollution indicators (background and technogenic) estimate as follows:

$$K_0 = \frac{c_{back}}{MAC}, \qquad K = \frac{c_{fact}}{MAC} \tag{2}$$

c_{back} – background concentration,
c_{fact} – actual concentration,
MAC – maximum allowable concentration.

Thus, the value of one indicator in ideal conditions (only a background) Kc≤1, in the presence of technogenic pollution its value will be higher than 1. Besides the value of an indicator will never fall below background value, so assessment of safety won't be underestimated.

The complex indicator of ecological soils conditions is offered for control of a soils conditions in the normal mode. It has to consider a contribution of all pollution sources which are available in this territory including the Belarusian NPP. Its implementation is planned in the comprehensive program of monitoring of the Belarusian NPP.