

## **Benzo(a)pyrene accumulation in soils of technogenic emission zone by subcritical water extraction method**

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The purpose of research is the assessment of main marker of polycyclic aromatic hydrocarbons contamination, benzo[a]pyrene (BaP) content in soils of emission zone of the power complex plant in soils with use of ecologically clean and effective subcritical water extraction method.

Studies were conducted on the soils of monitoring plots subjected to Novocherkassk Power Plant emissions from burning coal. In 2000, monitoring plots were established at different distances from the NPS (1.0–20.0 km). Soil samples for the determination of soil properties and the contents of BaP were taken from a depth of 0–20 cm. The soil cover in the region under study consisted of ordinary chernozems, meadow-chernozemic soils, and alluvial meadow soils. This soil revealed the following physical and chemical properties: Corg–3.1-5.0%, pH–7.3-7.6, ECE–31.2-47.6 mmol(+)/100g; CaCO<sub>3</sub>–0.2-1.0%, the content of physical clay – 51-67% and clay – 3-37%.

BaP extraction from soils was carried out by a subcritical water extraction method. Subcritical water extraction of BaP from soil samples was conducted in a specially developed extraction cartridge made of stainless steel and equipped with screw-on caps at both ends. It was also equipped with a manometer that included a valve for pressure release to maintain an internal pressure of 100 atm. The extraction cartridge containing a sample and water was placed into an oven connected to a temperature regulator under temperature 250°C and pressure 60 atm. The BaP concentration in the acetonitrile extract was determined by HPLC. The efficiency of BaP extraction from soil was determined using a matrix spike.

The main accumulation of pollutant in 20 cm layer of soils is noted directly in affected zone on the plots situated at 1.2, 1.6, 5.0, 8.0 km from emission source in the direction of prevailing winds. The maximum quantity of a pollutant was founded in the soil of the plot located mostly close to a source of pollution in the direction of prevailing winds. Value from 2012 to 2013 reached to 316.5 mkg/kg in 5 cm soil layer and 217.8 mkg/kg in 5-20 cm soil layer that exceeded the BaP maximum concentration limit level in the soil up to 15 times. The maximum limited concentration of BaP in soil is 20 mkg/kg according Russian Federation legislation.

Thus, a method of BaP determination in soils has been approved as based upon the subcritical water extraction under the optimum conditions. The efficiency of the given method involves the use of subcritical water as an environmentally friendly solvent, a shorter time for environmental analysis. BaP distribution and accumulation tendencies were investigated during the 2 years of monitoring researches in studied soils. The main factor of technogenic influence on the soil the investigated area are toxic emissions of a power complex plant from burning coal. Despite the environmental activities of in the enterprise, the impact of emissions on the environment location nearby today is still primary.

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