

Technogenesis and the main levels of soil ecosystems' transformation in oil production areas

Sergey Buzmakov

Perm State University, Perm, Russian Federation (buzmakov2012@gmail.com)

The obtained experimental data, the results of field studies and the analysis of references make it possible to describe peculiarities of technogenic transformation of ecosystems.

Experimental data allow to determine the main levels of oil pollution on the basis of changes in biotope properties and reaction of a biota.

Background level. Pollution is absent. Biotope corresponds to natural zonal sequence. The content of oil products is up to 0,11 g/kg.

First level: the dose of pollution is 0,8-1g of oil on 1 kg of soil. Conditions for plants' growth are optimum. Initially plants gain gross weight, and then lose it to the background level. The number of saprotrophes and oil oxidizing microorganisms rises.

Second level: the pollution dose is up to 15 g per 1 kg of soil. The capillary moisture capacity increases reaching the maximum. The number of saprophytes and oil oxidizing microorganisms rises.

Third level: the pollution dose is 15-21g per 1 kg of soil. Capillary capacity of soils decreases to background level. Time of filtration and absorption of moisture is increased.

Fourth level: the pollution dose is 21-32g per 1 kg of soil. Anaerobic and hydrophobic conditions develop. The number of saprophytes and oil oxidizing microorganisms rises.

Fifth level: the dose of pollution is 32 - 50g per 1 kg of soil. Formation of 3,4 benzpyrene increases sharply. The number of saprophytes and oil oxidizing microorganisms is at maximum level.

Sixth level: the dose of pollution is 50 - 91g per 1 kg of soil. Formation of 3,4 benzpyrene is dangerous for biota. Time of absorption and filtration of water through the soil reaches its maximum. The number of saprophytes and oil oxidizing microorganisms decreases, but remains higher than at background level.

Seventh level: the pollution dose is 91-150g per 1 kg of soil. The number of saprophytes and oil oxidizing microorganisms decreases to background level.

Eighth level: the pollution dose is of 150-300 g per 1 kg of soil. The substratum becomes toxic. The number of saprophytes and oil oxidizing microorganisms is lower than at background level.

Ninth level: the dose of pollution is 300 g per 1 kg of soil and above. Substratum is abiogenic.

Field researches show that the influence of oil fields is manifested in the form of intake of emergency oil and emergency salty waters as well as ground water runoff and surface water containing salts and oil products from platforms of oil sites into surrounding land ecosystems, along with their atmospheric pollution. Degradation and recovery process is manifested in formation of a natural- technogenic ecosystem with azonal biotopes.

Around powerful sources of pollution there should be created the manageable natural and technogenic ecosystems facilitating self-restoration of the environment. It is necessary to create a system of accumulating and transit ecosystems which would make it possible to carry out the degradation and dispersion of accumulated pollutants. Implementation of our proposals will result in stabilization of ecological situation.