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Coal Mines Abandonment in Eastern Ukraine: Environmental Consequences

Restructuring of coal mining industry in Ukraine is aimed at concentration of production in high efficiency coal mining companies, further ensuring their development in accordance with the principles of market economy and liquidation of unprofitable mines. Closure of coal mining enterprises in the east of the country is a burning issue for economic recovery, protection of the environment and safety of people.

The objective of the research is an integrated study of the environmental consequences of a large-scale abandonment of coal mines in Eastern Ukraine. The ecological problems that arise at different stages of liquidation of unprofitable mines influencing the further development and use of adjacent territories involve:

- Changes in hydrogeological regime after shutting-down groundwater pumping, salting of soil. Flooding of built-up areas and agricultural lands.
- Dust and gas pollution.
- Deformation of the earth's surface. Activation of displacement and under flooding processes, changes of soil properties. Penetration of mine gases on the earth's surface, into buildings and other structures.
- Changes in the nature of deformation of the rock massif. The high concentrations of mine gases which are displaced to the surface after stopping the ventilation.

Theoretical studies of the main problems and adverse impact of the elimination of coal mining enterprises and analysis of the ecological situation in areas of rock dumps accumulation were carried out. On the basis of theoretical analysis three issues to be solved in liquidation of mining enterprises were identified: physical liquidation of mines, social protection of dismissed workers, ensuring environmental safety.

We showed that the process of liquidation of coal mining enterprises results in: changes of hydrodynamic conditions of underground waters, formed during long-term coal mining enterprise exploitation; under flooding of the earth surface caused by the elevation of underground water levels; accumulation and displacement of toxic gases in the confined spaces; contamination of underground waters and surface streamflows with muddy waters.

Completed studies will help to form theoretical, practical and information base of the ecological safety level in the process of coal mines liquidation and may be the basis for the development and implementation of highly efficient methods for unprofitable mines closure which involves neutralization of the negative environmental impact as well as environmental hazards prevention.