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Comprehensive Studies of Ecological Processes in Kryvbas

We have considered the question of the need to perform complex investigations to assess geo-ecological problems of Kryvbas to minimize significant material and financial losses for the region and Ukraine.

Kryvvi Rig Iron Ore Basin (Kryvbas) is located in the zone of influence of the Kryvvi Rig -Kremenchuk inter-block structure zone of the Ukrainian Shield. That is why processes of intensive ore extraction are accompanied with large-scale ecologically dangerous events of geomechanical origin. It leads to the formation of underground cavities, karst formations, landslides, underground water streams, flood zones, and other dangerous phenomena. The extraction of natural resources leads to the imbalance between the rate of growth of the man-caused environmental burden and the development of appropriate environmental measures. Therefore, intensive extraction of raw materials for many decades has caused a number of problems, such as:

- development of endogenous and exogenous geological processes - dips, landslides, flooding of territories and dip of very large territories of the earth;
- violation of natural regimes and composition of groundwater and surface water (contamination of groundwater by sewage tailings and sludge accumulators);
- degradation of fertile lands;
- non-reversal rejection of vast areas of fertile land.

One example of such processes is the dip of the territory near the mine "Yubileina" that is 350x400 meters (Fig.1), and reservoir that loses water as a result of quarrying (Fig.2).



Figure 1 – Space photo of dip the earth above the mine "Jubilee"



Figure 2 – Space photo of the side of the acting quarry with a difference of several years

The above photos show that the problem of studying the consequences of mining and geological conditions for the exploitation of iron ore deposits and identification of faults and decompacted zones of tectonic and lithological character is a very urgent task to be solved for technogenic and environmental safety in Kryvbas.

Field research will be carried out by the already approved methods: electro-exploration methods in modification of audio-magnetotelluric sounding (AMTS), vertical electrical sounding (VES), electroprofiling (EP), and resonance-acoustic profiling (RAP). It is also planned to carry out biolocation survey and seismic exploration using the refracted wave method (RWM). Field research will be done to determine the depth of the groundwater level in terms of violations of groundwater. It will also help to detect objects that affect the process of flooding, to select caverns and landslides, and monitor the dynamics of change.

Carrying out research in the sequence of the planned stages and the proposed complex of geophysical methods will make it possible to assess the possibility and reliability of aerospace surveys for mapping underground man-made voids, karst formations, landslide areas, and dip-shifts, and also predict other exogenous geological processes in inaccessible areas.

In conclusion, it should be noted that without complex studies, the assessment of geocological problems in Kryvyi Rig Iron-ore Basin will not be complete and in the future it will lead to significant additional material and financial losses for both the region and the state as a whole.