

They contain the researches, which were conducted within the project GP – 505, financed by Ministry of Education and Science of Ukraine.

**Key words:** mining, deep mine, system approach, method of analogies, technological transport parameters, surface mining of mineral deposits, technical and economic indicators

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## THE REVIEW ON INTERNATIONAL PRACTICES OF THERMAL ENERGY RECOVERY AT CLOSED MINES

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**Purpose.** Comparative study and efficiency analysis of operating geothermal systems installed in different countries to recover heat from mine water and rocks in post-coalmining areas.

**Methodology.** The research methods included collecting, systematizing and analyzing of actual data on the principles, designs, features, and performance indicators of open and closed geothermal systems operated at closed mines in different countries currently introducing advanced technologies of alternative power generation.

**Findings.** In line with the UN Convention on Climate Change, the world and Ukraine are reducing the share of coal industry, which makes topical introducing

“green” power technologies including those using thermal resources of closed mines. Currently in post-coalmining areas of some countries [1-10] about 30 open non-return and circulation geothermal systems of a capacity up to 4.6 MW are under operation; they cover a good share of local heat demand. Additionally, in flooded mines with a stable water level the closed systems combining coaxial and U-shaped geothermal probes can be installed [11-15]. Despite a lower thermal output the closed systems are more flexible and allow taking advantages of existing post-mining infrastructure such as degassing wells. Further installation of geothermal systems in Ukraine with the total estimated thermal potential of pumped mine water of hundreds MW looks realistic but requires feasibility studies and cost-effectiveness analysis.

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**Key words:** closed mine, mine water, thermal energy, geothermal systems

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## **HYDRODYNAMIC AND GEOMECHANICAL STABILITY OF DUMP TERRITORIES OF MINING AND ELECTRIC POWER ENTERPRISES**

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**Purpose.** Substantiation the criteria of hydrodynamic and geomechanical stability of waste dumps and adjacent territories by results of comprehensive study of technogenic mode patterns.

**Methodology.** The study was carried out through field methods for determining the mechanical properties of rocks, monitoring the hydrodynamic mode of groundwater, geophysical methods for studying the state of dump massifs and adjacent areas, laboratory tests of physical and mechanical and water properties of dump rocks, mathematical modeling of hydrodynamic and geomechanical state of the massif.

**Findings.** Patterns of technogenic groundwater mode developing on rock dump sites are defined.

An assessment of geomechanical stability of waste dumps and their elements is performed under the conditions of wetting. Forecast of risk of negative hydrodynamic and geomechanical processes occurrence due to waste rock dumps construction and exploitation is provided. The impact of waste dump construction and operation on the hydrodynamic and geomechanical condition of technogenic disturbed areas was assessed. Engineering measures to increase the hydrodynamic and geomechanical stability of the disturbed territories were substantiated.

The results include research conducted within projects funded by private mining and energy companies in Ukraine.

**Key words:** waste rock dump, groundwater, hydrodynamic and geomechanical processes, slope stability analysis, mathematical modelling