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Role of Seismic Microzoning in Tailing Dump Designing

Mining and smelting complexes are the most important element in the economy of Ukraine. The ore-dressing generates huge quantity of gangues – tailings requiring storage. Seismic microzoning of construction and operation sites of tailing dumps is performed for the purpose of quantitative assessment of local conditions impact on the study of variability of ground motion parameters during the earthquake in seismic hazardous zones. Primarily influence of surface soils structure and properties composed of anthropogenic low-velocity soils (tailings) and terrain features are investigated. Besides, variations of environment conditions associated with construction and operation of the tailing dumps should be taken into account in the future.

While studying seismic microzoning of construction and operation of the tailing dumps sites the following questions are considered:

- studying the structure and seismic properties of the surface soils;
- constructing seismological model of the analysed object;
- impact assessment of structural features and seismic behavior of the surface;
- studying a medium geometry influence on a seismic amplitude;
- forecasting probable changes in engineering-geological environment and landscape areas while building-up existing tailing dumps and further assessment of these changes influence on a seismic intensity increase.

The first two questions assume digital modeling of the main geological elements of the studied area geometry and the study of the ground velocity-properties using field and borehole seismology methods. Firstly, the information allows estimating strengthening impact of local conditions on the seismic loads. Similar surveys are based on the analysis of an average shear-wave velocity V_s^{30} in the upper 30 meters. Secondly, it is possible to create more complicated models to apply calculation methods for detailing obtained amplification parameters.

In this study calculations are made as follows:

1. One-dimensional horizontally layered soil deposits models are used for estimating the effect of low-velocity sedimentary rocks mass. This is acceptable in parallel layered sedimentary boundaries.

2. More complicated two-dimensional models are used for evaluating the effect of anthropogenic topography specified by construction and operation of the tailing dumps.

Thus, for Kryvyi Rih tailing dump sites the earthquake vibration amplification might double which is caused by anthropogenic low-velocity soils and anthropogenic topography. This fact must be considered while designing tailing dumps.