

THE FORMATION OF THE EASTERN PIT WALL STOILENSKY IN DIFFICULT ENGINEERING-GEOLOGICAL CONDITIONS

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Annotation

The article considers the peculiarities of formation of the Eastern Board career OJSC Stoilensky GOK in technogenic array of overburden dump "Strelica" and offers engineering and technical measures that will ensure the stability of slopes ledges formed by the Board and safety of conducting mountain works on this site.

Keywords

Eastern Board career, engineering-geological us-conditions, a factor of stability, berm width security, the height of the slope of the escarpment, the angle of the slope, physico-mechanical properties of technogen-governmental rocks, back calculation method the strength properties of rocks.

JSC "Stoilensky GOK" in the last 10 years is constantly increasing-shaft performance career by not oxidized ferriferous quartzites, which in 2013 amounted to 42 million tons. Increasing productivity Kari-EPA caused the necessity of the development of front of mining operations in a career in the Eastern direction, which previously was filled external dump "Strelica", complex-ing rocks loose overburden, when mining of which for the last 10 years have seen a 6 collapses slopes of ledges. Occurred deformation caused the necessity to consider the issue on provision of stability of slopes of ledges Board career, which is formed are in difficult engineering-geological conditions. To justify the us-stable geometrical parameters of the slopes of the ledges and the pit will is needed to determine the physical and mechanical properties of technogenic rock dump "Strelica" given the recent collapse. The development of deformations ledges, formed in the body of the blade "Strela-Central Asia" was held mine surveying, observation and sensing landslide sites before and after the completion of the active phase deformations, which allowed to determine the location and configuration of the sliding surfaces (destruction) in techno-gene array dump.

Determination of physical-mechanical properties of technogenic rock dump "Strelica" was carried out grapho-analytical method based on the use of graphic dependencies conditional height of the slope angle on a clone of the slope and conditional width of the prism possible collapse [1]. Results of inverse calculations with confidence probability of 0.95 were identified-Lena strength properties of technogenic rock: the grip=0,039 MPa and the angle of internal friction $\Phi=19,5^\circ$ at a density $\rho=1,8 \text{ kg/m}^3$.

Strength properties of technogenic rock dump, obtained by the use of reattaching the grapho-analytical method, have good convergence with the results from the tatami laboratory tests on shift, made at different times institutional tutami JSC "VIOGEM", OAO "NII KMA" and OAO Tsentrproruda".

Currently, the working out of the blade "Strelica" is made in accordance with the schedule of development front of Stripping operations over the soft overburden on the Eastern edge of the quarry.

Technogenic massif of the blade "Strelica" and based on engineering-geological, hydro-geological and geomorphological conditions refer-ences to the III category of complexity and are characterized by the following features.

1. In the North-Eastern direction, the power of technogenic massif dump in the area of the beam "Strelica" increases due to decrease in absolute from-labels thalweg beams with (+175) to (+150 m).
2. The shear technogenic massif of the blade is quasi-homogeneous.
3. The base of the pile layered, are the Quaternary loam (mostly), and clays. Quaternary sediments underlain Melo-Marly stratum.
4. Thickness of Quaternary deposits cut beam "Strelica". Melo-loamy deposits on the slopes of the beam and its thalweg blocked redeposited Quaternary loam with thickness of 0,5-1,5 m
5. The shear thickness of Quaternary deposits base of the blade, is quasi-homogeneous.
6. Shear strength Melo-marl rocks (pillar) more strength to shift Quaternary rocks.

In connection with the above engineering-geological features in geo-mechanical calculations in assessing the sustainability of the ledges and the pit formed in the rocks of the blade "Strelica", adopted featured in the determination of strategic directions way for homogeneous and quasi-homogeneous arrays. When using this method:

- coefficient of resistance (three ring) slopes of the slopes of the Eastern side of Karera was defmed as the ratio of the sum holding to the amount of change-suggesting forces acting on settlement troglodimmerites the sliding surfaces;
- the shifting and restraining forces acting on settlement the sliding surfaces, was determined by method of algebraic addition forces;
- execution of geomechanical calculations used values for indicators of physical-mechanical properties of technogenic rock Eastern pit wall, formed in the body of the blade "Strelica"based on the results tats falling of the ledges.

Assessment of the degree of stability of slopes of cliffs and Eastern pit wall JSC "Stoilensky GOK", formed in the body of the blade "Strelica produce something, stayed by checking the performance of inequality

$$n_n \leq n_p,$$

where n_n etc respectively normative and calculated coefficients of stock sustainability of the object (ledge, Board career).

For working ledges of the pit $n_n = 1,2$, benches outside the pit wall, composed of clay rocks, $n_n = 1,5$, if the term of standing up to 5 years and $n_n = 2,0$ when the term standing for more than 5 years [2].

For outside of the pit, made weak sandy-argillaceous rocks, when the term standing for more than 10 years $n_n = 1,3$. Choose the security settings of the slopes of the Eastern pit wall at the techno-gene array dump "Strelica" is made on the PC using the programme "OtkosKRUG" in following setting objectives: to determine the angles on a clone of slopes ledges, Board career and width of the berms security set-governmental heights and normative factors of sustainability, taking into account Phi-Zico-mechanical properties of technogenic rock dump.

Based on the results of the calculations defined permissible angles of inclination of the slopes at their height from 10 to 40 m and Board career and blade at an altitude of up to 70 m and the set of normative values of the three ring.

The results of calculations made it possible to build charts dependent industries elevation slopes N and diagrams of dependence of the width of the berms security B from the angle of the slopes α for regulatory factor services of tasciotti (Fig. 1, 2).

Currently, working ledges quarry formed in technogenic massif of the blade "Strelica", at an altitude of 20 to 30 meters sustainable (normative factor $n_H=1,2$) at the angles of inclination of slopes from 52 to 37 degrees, respectively (see Fig. 1).

Board career at limit circuit in technogenic massif dump "To-face" height 40-70 m will have not less than three ring normative ($n_H=1,3$) at the angles of slope 25-29 degrees. In such conditions, Board career on the marginal Comte-re proposed to form ledges in height 15 m, with angles of inclination of their's leadership-owls 29 degrees, when regulatory factor of stability of the ledges on extreme circuit $n_H=2,0$.

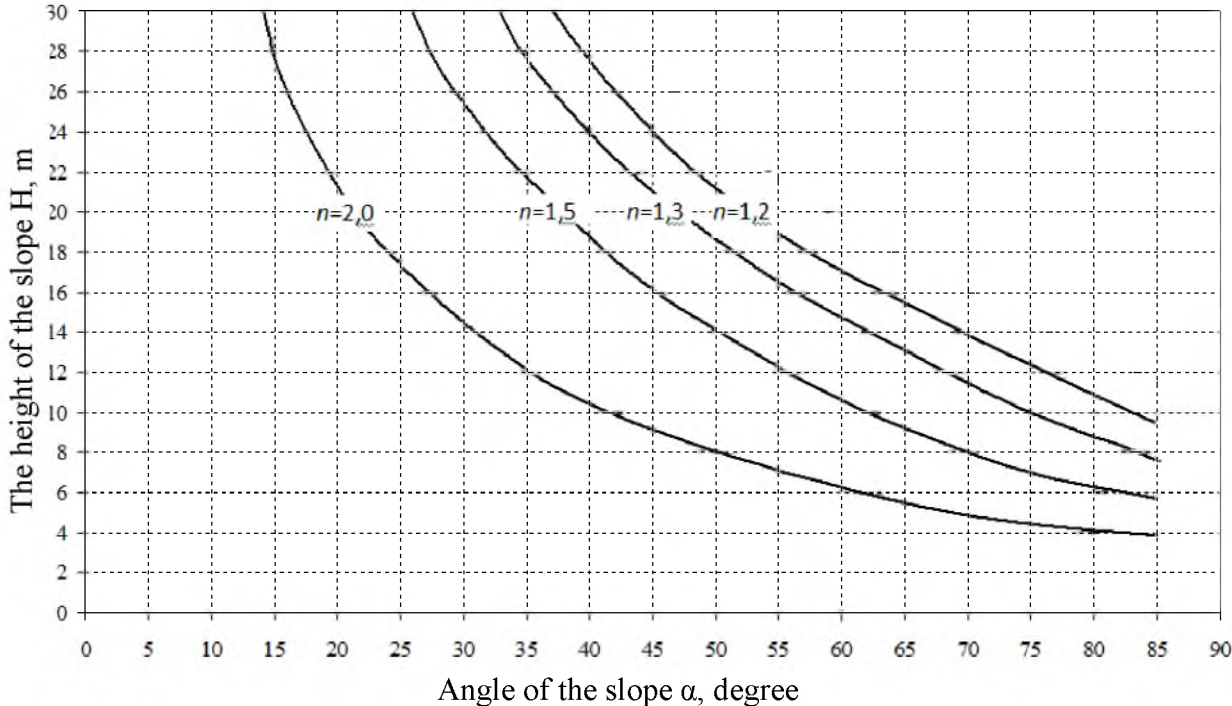


Fig. 1: Graphs of the height of the slope N from the angle of the slope α for different values for the factor of stability

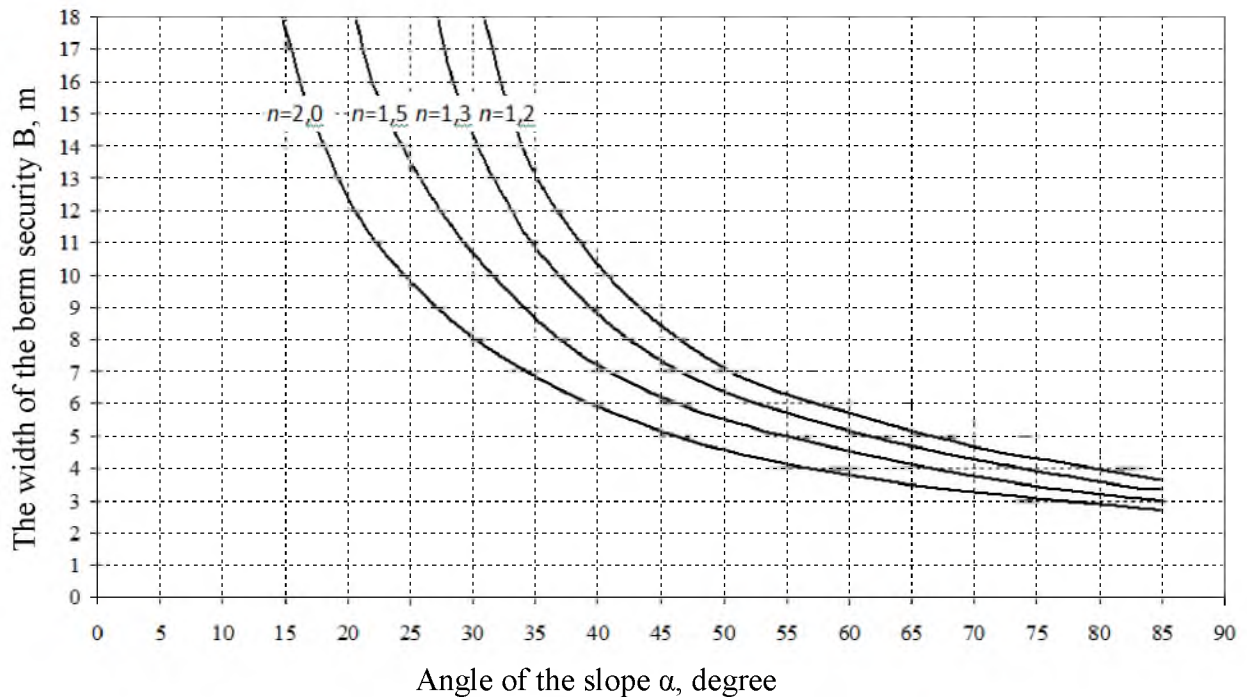


Fig. 2: The diagrams of dependence of the width of the berm security B from the angle of the slope α for different values for the factor of stability

Previously formed rotary complex KU-800 work ledge at the height of 30 m, where the accident happened and collapse, it is recommended to split into 2 podstup height 15 m. Stability of working ledge at the height of 15 m and regulatory factor of stability of $n_n=1,2$ provided at an angle of inclination of the slope of the escarpment $\alpha=66$ degrees or berm width security $B=5,2$ m (see Fig. 2).

The implementation of the recommendations in the formation of the Eastern side of the quarry, OJSC Stoilensky GOK in technogenic rock dump "Strelica" will allow to receive social benefits associated with improved safety of mining operations, as well as economic impacts in the avoidance of financial losses in the event of an accident, the cause of which may be the collapse of slopes ledges.

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