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Sustainability assessment of Estonian oil shale mining using advanced technology

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Various processes in the mining industry often become dominated by the most dangerous technological and geotechnical factors, which can pose a hazard to people and their work, stop the production, cause economic damage to the enterprise and the environment. Nowadays using new equipment, the extraction of a mineral resource is accompanied by many technological processes each of which has distinctive conditions and its own disturbance on the mining environment. This study assessed existing and new mining methods that are compatible with sustainability. Sustainability assessment is a comprehensive, integrated and far-sighted approach to decision making, and its basic demand is that all significant undertakings must make a positive contribution to sustainability. The Estonian oil shale mining industry needs to change its practices by developing and implementing new technology and excavation methods that are compatible with the principles of sustainability. Sustainability assessment of oil shale mining includes enhancing ground surface stability, decreasing losses of the mineral resource, and implementing safe and environmentally friendly advanced technology. Selective mining with backfilling permits reduction of rock mass volumes during loading, transportation and enrichment processes, decreasing the loss of mineral resources and helping to avoid collapses and subsidence of the ground surface. These methods also help to restore, in a certain measure, filtration, and other hydro-dynamical and aero-dynamical properties of the geological environment. Moreover, backfilling with limestone, which is one of the by-products of oil shale mining, will help to avoid waste rock generation on the ground surface and decrease environmental pollution. The need to provide favourable conditions for the enterprise in conformity with technological and ecological safety drives the necessity of sustainability assessment.