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THE DEVELOPMENT OF EFFECTIVE GEOMONITORING FOR MINING AREA WITH INDUSTRIAL REVIEW

Introduction

One of the most urgent and rapidly developing fields of knowledge at the modern stage becomes Geoinformatics, which has diverse practical applications in various industries, including in the mining industry. Currently the mining industry doesn't the fundamental industry of innovation development in the effective use of control systems of technological processes [1–3]. This situation leads to the fact that mining companies fail to implement a strategic approach to managerial decision making, and, consequently, to achieve high yield. Moreover, the formation of a complex of geoinformation systems and the development of synergies in the interaction of complex organizational and technical processes is impossible without creation of effective local tools and methods tailored to the mining enterprise and its activities.

The important instrument in this respect is the organization of spatial monitoring (Geomonitoring), and industrial tourism, create recreational areas and destinations specialized in mining and related areas. Geotourism means modern and efficient form of organization of excursions according to the program of acquaintance with the geological and production facilities mining [4–6]. Here is an important prerequisite for the protection of geologically important and unique areas perform compliance assessment, and methods of organization of geotourism as a vector of formation of the values that define modern environmental and social ethics.

Geomonitoring and industrial review for the mining sector

Industrial tourism is the organization of regular excursions to operating or previously operating industrial enterprises and objects. Leaders in industrial tourism are American and Australian companies share of revenues from tourism in some cases can reach 15–20% of the total. This trend has a logical explanation: in the absence of deep the historical legacy for people can and should be set current or upcoming in the near future achievements [7–12]. In Germany and several other European countries the maximum attention

Along with measures to improve the techniques, technology and organization of mining production, introduction of modern information systems are an important but underdeveloped area of activity of mining enterprises with the organization of industrial tours for review.

The use of high-efficiency equipment, measures for the protection of the natural environment, improving safety and production, its overall aesthetic quality, all contribute to the attraction of interest to review. Development of geotourism in turn, has a positive effect on economic growth, social and cultural development of the region, serves as an incentive to attract investment in mining production and upgrading local infrastructure.

Important the reciprocal process with mining companies aimed at recultivation of lands, damaged by mining operations. Simple recultivation (usually forestry) give way to action a broader scale — revitalization that is the conversion of disturbed lands to a form, more convenient for human life. It is expressed in many forms: the establishment of a water recreational areas in the place of residual mining quarry recesses; the device of cross and the ski runs on the spoils; the laying of trails in forest plantations; the installation of viewing platforms, etc.

The effective result of this activity is the increased interest from different groups of people to the mountain production, presenting it in public opinion as the standard of aesthetic and technological process, model of system of ensuring environmental safety.

Key words: mining industry, mining companies, geotourism, environmental protection, geomonitoring

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is paid to the defunct industrial motive: industrial objects of the city be, for example, abandoned coal and salt mines in the Ruhr, a non-functioning objects during the Second world war. Although, of course, are open for tourists and many operating businesses. In Russia and other post-Soviet countries (including Ukraine and Belarus) is widespread and of great interest both to present as a model of post-industrial spatial monitoring and monitoring of existing enterprises [13–16]. Good examples of this situation are the industrial facilities of the Kaliningrad Oblast.

A great interest for excursion, educational, and expert research study represent a flooded former German amber quarry “Walter”, that now the lake and the amber mine “Anna”. Now, the lake is also very popular for the organization of diving with the purpose of studying the topography of the recreation unused geopromyshlenniki object, and also for the searchers, “the Prussian treasure”. Amber plant, located in the village of Amber, got a new life thanks to new investors with the development of industrial tours in the early 2000's, where it was possible to see not only the history of organizational and technical development and the secrets of ancient mining and decorative arts in East Prussia, but also unique achievements and engineering innovations of the Soviet period in the improvement and creation of new technologies of

production; also it highlights current trends and prospects of development of technologies of mining production. In addition, directly close to the plant organized by the newly restructured (in compliance with modern safety requirements) platform for direct visits to existing quarries.

In this example you can also consider the efficient organization of the expert-analytical industrial intelligence of the Soviet period. After adding the territory of the Kaliningrad Oblast within the jurisdiction of the USSR key sites of the production of amber was blown up and flooded, German experts refused to share professional secrets, skills and knowledge for the possibility of resuming production about the remaining areas. To solve there in the guise of a tourist visiting an abandoned industrial facilities arrived Soviet engineering professionals who actively communicate with former employees of German enterprises on issues of interest, explaining that only “personal” interest — most of it was the female audience on both sides; it was obtained about 75–80% of all the necessary organizational and technical information. And then — as a synergistic effect of interaction of geomonitoring processes already followed by engineering innovation. A new development of the amber industry occurred after the Soviet victory in the great Patriotic war — unique deposits of amber joined the Union together with the production of pressed amber and varnishes, and, as was customary in the postwar years, the production was put on the needs of the military industry. The Soviet chemical industry at that time was not able to solve the technological problems of production of “light insulators” for aerospace equipment, so Russian engineers have proposed to use as insulators the rods of pressed amber. Amber was two times lighter than any known at the time of insulator and can withstand up to 50,000 volts to 1 mm. Despite the lack of experience with amber, “insulators mixture No. 1” (the so-called secret space products) were timely made for high-voltage space equipment, and cylinders with a diameter of 25 mm, the isolators like “electrons” made millions of revolutions around the Earth. Was later developed a more affordable polymer material with the same parameters. Including in the Post-Soviet period in 1998 the resins were allocated from Baltic amber to produce unique, heavy-duty, high voltage varnish that can withstand Napalm, and possibly even open your page in the development of innovative products and technologies [17].

According to the authors of this article of modern geotourism in mountain industrial useful to classify the three forms of organization: 1) direct — direct on-site visits industry with planned and organized program of activities; 2) remote — the study of the theoretical and factual information, including data obtained through the use of satellite navigation systems and technologies for Earth remote sensing; 3) combined — a combination of several elements and phases of the two previous forms.

Consider other examples of geotourism in mining. So, the Republic of Khakassia is an important regional entity mining industry, having a sufficient number of cities and areas with potential for tourism. As the most interesting object for the development of geotourism is the city of Chernogorsk. Now for geotourism are of great importance branding of area as a mandatory factor of its effective devel-

opment, which is a symbolic system as a set of popular information about the object. Quite a recognizable brand of the city of is caused by the location of the important enterprise “SUEK-Khakassia” like the coal cut “Chernogorskii”, where coal mining has implemented a number of innovative organizational and technical solutions based on modern automated information systems and implementation methods for advanced control. Implementation of projects in the field of industrial tourism in Abakano-Chernogorsk agglomeration will attract more number of interested investors. Funds received from Turi-raising activities can be directed to the creation of a modern infrastructure, improvement and development of the mining complex [18–20]. A similar mixed commercially successful industrial and cultural tours to promote the popularity of the brand is organized in the industrial area of Soligorsk of Belarus. One of the most profitable is a mixed form of the spatial organization of tourism in ore deposits in Spain, located in close proximity to the world famous historic sites. In addition, there is a large development gains of expert monitoring on the basis of work of professionals with the goal of creating a comprehensive geoinformation systems knowledge. There are Russian examples of organizational and technical solutions for the formation of geoinformation databases.

Latnenskiy deposit of refractory clay is located in the Voronezh region, occupying an area of about 30 square km is object of Voronezh mining group. Creating is a Geomonitoring system is being implemented in stages in the following way: continuous monitoring and examination of entities of a geosite, structuring, and analytical processing of the received data, as well as registration required performance indicators; creating and updating integrated actuality of knowledge bases. Upon completion of mining in individual areas of the field most importance are the processes of recultivation [21]. A model of successful recultivation is used quarry “White Well”. Now on its bottom, formed by the chain of lakes is refined woody vegetation, established sports entertainment and the medical-recreational complex in the thematic concept of canyons, prairies and lakes of “Wild West”. Thus the former quarry got a new life as carriers out mass cultural and sports mission becoming effective, the object of geotourism, as an instrument of attract-ing investments for the development of the now exploited sections of the mining industry in the area.

A good example of effective implementation of projects geotourism at the international level over the last 5 years can be considered modern industrial tours in Kovdor mining and processing plant in the Kola North. Among the objects of study — industrial site of Kovdor GOK and unique quarry “Jelezniy”, the depth of which exceeds 400 m; waste rock dump; quarry dump trucks with a cargo capacity of over 140 tonne, the only one in the Arctic circle blending store iron ore production plant for the processing of apatite-stafelitelite ores. The participants of the excursions are as people in our country and foreign experts, professionals and just wishing [22]. As one of the key objectives of the project is development of scientific and innovative activity in education for the study of the production process and its modernization in the future on the basis of information technologies and robotics.

Conclusion

The overview and researches showed the high potential of geotourism, as an effective incentive for mining companies to modernize mining production, the system of environmental protection, consideration the geotourism as an effective tool to attract investment. In addition, participants of the tours to mining companies remain under strong impression from what they saw, and get a visible idea of the difficult but noble work of miner like getter of mineral raw materials as the source of all industrial production.

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