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## INDUSTRIAL AND LABOUR SAFETY

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## Abstract

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*Industrial and labor safety for enterprises of natural resources sector in Russia is based on maintenance program that provides security of employees' vital interests during work activities as well as accident protection and aftereffects during extraction, transportation, enrichment and processing of natural resources.*

*The digest presents the abstracts of the articles published in Journal of Mining Institute from 2003 to date. The articles are dedicated to different aspects of industrial and labor safety including radiation safety insurance, explosive and energy safety, fire protection, analysis of personal factors, work culture and staff training on preventing accidents and occupational diseases, estimating and optimization of labor protection costs.*

*All the articles emphasize risk assessment and management that should be implemented effectively with help of digital technology and automation which help to reduce the possibility of emergencies.*

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*Tarasova N.P., Egorov A.F., Savitskaya T.V., Smetannikov Yu.V., Dudarov S.P., Varnavsky E.V. Creation of the intelligence system of decision making support for safety management of production of chemicals // Journal of Mining Institute 2003. Vol. 154. P. 250–253. <https://pmi.spmi.ru/index.php/pmi/article/view/9222>*



**Abstract.** For the analysis and operative estimation of emergencies and for safety management of production of chemicals the functional structure of the intelligence system of decision making support has been worked out (DMSS). The mechanisms of DMSS operation in integrated automated systems of safety management of the production of chemicals in case of emergence and development of accidents are submitted for consideration. The structure of organized database of intellectual DMSS is proposed. The models, techniques, algorithms and software systems for the analysis, risk estimation and forecasting aftereffects of accidents in chemical industries have been worked out. The algorithms of analysis, operative evaluation and output of recommendations to a person making decisions in case of emergencies at chemical enterprises with the use of DMSS have also been worked out.

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*Korshunov G.I., Mironenkova N.A., Potapov R.B. Radiation safety of labours (radiation monitoring) in building and underground structure operation // Journal of Mining Institute. 2013. Vol. 206. P. 89–92. <https://pmi.spmi.ru/index.php/pmi/article/view/5444>*



**Abstract.** The paper studies main rules of radiation safety in building and operation of underground structure also methods of formation of a radiation environment.

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*Semenyak S.Yu. Safe shortfiring with use of industrial explosives based on disposed gunpowder // Journal of Mining Institute. 2006. Vol. 167 (1). P. 100–102. <https://pmi.spmi.ru/index.php/pmi/article/view/8076>*



**Abstract.** The paper studies the question of peaceful application of conversion explosives and gunpowder used in mines, shells, torpedoes, aerial bombs, solid and liquid missile fuels, etc. for blasting works. Other aspects of the defence industry product application in national economy are not mentioned. Comparison of the main safety characteristics is carried out for blasting operations with application of conversion explosives e. g. the gelpor, granipor and trotyl. Dependence of the mass fraction of harmful substances in resulting products of gelpor, granipor and trotyl detonation on the temperature of isentropic expansion is studied.

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*Gendler S.G., Nevskaya M.A., Dompal'm E.I., Sivakova N.S. Principles optimization of expenses for the labour protection of the mining enterprises // Journal of Mining Institute. 2009. Vol. 184. P. 27. <https://pmi.spmi.ru/index.php/pmi/article/view/6826>*



**Abstract.** Classification of damage from accidents and crashes is given. Procedure optimization expenses for a labour protection and definition of economically sound risk of accidents and crashes is offered. The estimation of economic efficiency of personnel development serving the self-propelled mining equipments on ore mine «Northern» of industrial complex «Pechenga Nikel» is carried out.

*Gendler S.G., Kochetkova E.A., Dal' N.N. Experience improvement by management of labor protection in the coal industry of Russia on the example of joint stock company 'Vorkutaugol' // Journal of Mining Institute. 2013. Vol. 206. P. 173–176. <https://pmi.spmi.ru/index.php/pmi/article/view/5463>*



**Abstract.** On the example of coal mines of Vorkuta it is shown that in the coal industry of Russia it is necessary to consider as an essential reserve of increase of production safety realization of the organizational actions directed on preventive identification of violations of safety regulations, potentially bringing to accidents, carrying out behavioural security audits, and also involvement of miners in management of occupational safety and health and industrial safety.

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*KKochetkova E.A., Sidorenko A.A., Sementsov V.V. Increasing efficiency and mine resource development on the Prokopevsk-Kisilevsky deposit // Journal of Mining Institute. 2014. Vol. 207. P. 121–124. <https://pmi.spmi.ru/index.php/pmi/article/view/5398>*



**Abstract.** The security issues of the deep mining of Prokopevsk-Kisilevsky deposit the Kuzbass are considered. The analysis of the existing technologies and systems development is executed. The recommendations to improvement of the technical and economic parameters, reducing accidents and injuries of the working off inventories powerful coal steeply inclined seams and steep coal seams were given.

*Sidorenko A.A. Endogenous fire hazard Kuzbass mines // Journal of Mining Institute. 2014. Vol. 207. P. 66–69. <https://pmi.spmi.ru/index.php/pmi/article/view/5383>*



**Abstract.** The analysis of a current state of a problem of emergence of endogenous fires is made at working off of coal layers in mines. Influence of mining-and-geological conditions on efficiency and safety of working off of the layers inclined to selfignition is considered. Need of an integrated approach to a solution of the problem of endogenous fires is shown at working off of stocks in difficult mining-and-geological conditions.

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*Gridina E.B., Pasyнков A.V. Certain periodicity organizational and technical preventive measures, aimed at improving the effective management of safety on coal open pit mining // Journal of Mining Institute. 2014. Vol. 207. P. 106–109. <https://pmi.spmi.ru/index.php/pmi/article/view/5394>*



**Abstract.** Developing preventative preventive measures is one of the key ways to increase the effectiveness of occupational health and safety of miners. Integrated use of probabilistic and expert – analytical methods for analysis of injury, in particular it allows to develop a plan and to determine the frequency of short-term preventive measures.



*TI 80 Man engine or mobile ladder is a mechanism of reciprocating ladders and stationary platforms installed in mines to assist the miners. 1830s. Scale 1:16.*

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*Cherkai Z.N. Occupational safety and health professional // Journal of Mining Institute. 2014. Vol. 207. P. 159–163. <https://pmi.spmi.ru/index.php/pmi/article/view/5407>*



**Abstract.** The comparative data on the number of employees at work in hazardous conditions, the structure of the circumstances and conditions of professional diseases are identified causes of unsatisfactory working conditions.

*Buldakova E.G., Gridina E.B. Analysis of accident and stages of effective safety management system on the example of 'Vorkutaugol' // Journal of Mining Institute. 2014. Vol. 207. P. 95–98. <https://pmi.spmi.ru/index.php/pmi/article/view/5391>*



**Abstract.** The paper analyzes the time periods with significant differences on the level of technology of mining, production volumes in mines of 'Vorkutaugol'. The features of an integrated system of labor protection and industrial safety, realized in the merger.

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*Smirnyakova V.V. About the long-term program on industrial and environmental safety in the coal industry // Journal of Mining Institute. 2014. Vol. 207. P. 155–158. <https://pmi.spmi.ru/index.php/pmi/article/view/5406>*



**Abstract.** The conditions and the main problems of Russian coal industry development have been envisaged, the purposes, problems and realization terms of the long-range programme for industrial and ecological safety in coal branch of industry and also amount of finance and waiting results have been shown in the article.

*Rudenko G.V., Panchenko I.A., Khokhlov S.V., Kostromin O.V. Influence of personal factors on irrelevant actions of officials of mines // Journal of Mining Institute. 2014. Vol. 207. P. 134–137. <https://pmi.spmi.ru/index.php/pmi/article/view/5401>*



**Abstract.** In the article the method of definition of personal factors of inadequate actions which lead to traumatism cases at the mountain enterprise is opened. For definition of personal factors the data received at poll of experts are used.



*GG 112-71.  
Banded coal. Donets coalfields.*



*Abramovich B.N., Sychev Y.A. Problems of ensuring energy security for enterprises from the mineral resources sector // Journal of Mining Institute. 2016. Vol. 217. P. 132. <https://pmi.spmi.ru/index.php/pmi/article/view/5091>*



**Abstract.** A complex of technical means and decisions for ensuring adequate level power safety at mineral resources enterprises has been developed, including voltage mode control method, power quality improvement method, method of ensuring dynamic stability for electricity-generating equipment, method of enhancing power supply reliability, distributive network structure control method, and method of combined use of alternative and renewable energy sources. The necessity of ensuring power safety for the objects of the mineral resources sector, from the technical point of view – with the application of modern achievements and developments in the area of electrical complexes and systems has been proved.

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*Cherkai Z.N., Kovshov S.V. Expert assessment of industrial safety in Russian mineral-resources complex territorial units // Journal of Mining Institute. 2016. Vol. 219. P. 477. <https://pmi.spmi.ru/index.php/pmi/article/view/5135>*



**Abstract.** The article describes the methodological approaches to the expert assessment of the occupational health and safety both in individual enterprises and in the individual territorial units. The advantages and disadvantages of the existing methods of injuries and occupational diseases analysis are represented.

In the article a new methodological apparatus, based on the account of sectoral and spatial and territorial factors is offered. The results of the analysis of sectoral and regional distribution of industrial accidents and occupational diseases are represented. The presence of a significant imbalance between the studied parameters in the mining industry: it accounts for 5.9 % of all reported accidents, with 29 % of cases of occupational diseases. For a more accurate assessment of industrial safety expert status provided the use of factors of production troubles the industry and the individual territorial units. It was found that the greatest value of the proposed coefficients correspond to the mining industry and the Kemerovo region.

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*Rudakov M.L. 'Zero accident' corporate programmes as an element of strategic planning in the field of occupational safety and health at coal mining enterprises. Journal of Mining Institute. 2016. Vol. 219. P. 465–471. DOI: 10.18454/PMI.2016.3.465*



**Abstract.** The paper deals with analytical survey on the status of working conditions and occupational safety and health (OSH) issues at coal mining enterprises of the Russian Federation, European Union and Australia. Absolute and relative figures of occupational fatal injury rate are analyzed, as well as dynamics of accident and injury rate at the coal mining enterprises in the context of a better understanding of the factors that contribute to successes with implementing a 'Zero Accident Vision' in coal companies. Importance to possess information about stress-strain condition of the rock mass (at a design stage) and its changes in process of multiple seam mining is shown. General recommendations on successful implementa-

tion of the very concept in Russian companies are elaborated on the grounds of good practices gained. The list of information resources on this topic is given.

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*Klimova I.V. Instructional maps of safe working methods and practices for separate types of operations conducted in the oil mine // Journal of Mining Institute. 2017. Vol. 225. P. 354–359. DOI: 10.18454/PMI.2017.3.354*



**Abstract.** Instructing personnel in the issues of labor protection and industrial safety at hazardous facilities is one of the main tasks that face the employer; the quality with which this procedure is organized and carried out defines not only company's indicators but the mere possibility of its normal functioning. The paper contains a detailed overview of the typical content of standard documentation, which is currently used when conducting operations in the oil mines of Yarega high-viscosity oil deposit. Distinct features and unique nature of this oil field require special measures to guarantee safety of personnel and all facilities in general. The author proposes and reviews an additional type of operating guidelines – instructional map of safe working methods and practices. It is more illustrative than existing documentation (charts of inclined shaft development, labor protection regulations), which allows to upgrade the process of instructing personnel in the oil mines, to improve the quality of instructions and to reduce the risk of emergencies, accidents, industrial injuries. The author reviews the structure of suggested instructional map, offers a detailed arrangement diagram for the main thematic sections of the map, as well as their content. Instructional maps are regarded as a type of operating

guidelines that include: description and characteristics of equipment, instruments and appliances; general safety requirements; content and execution sequence of operational elements with their graphical images; distribution of responsibilities with an indication of their priority in case the operations are conducted by several workers; specific safety requirements for equipment, materials, instruments, safety clothes and footwear, personal protective gear etc. (prohibitions, warnings). Advantages and disadvantages of proposed instructional maps of safe working methods and practices are highlighted.

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*Chemezov E.N. Industrial safety principles in coal mining // Journal of Mining Institute. 2019. Vol. 240. P. 649–653. DOI: 10.31897/PMI.2019.6.649*



**Abstract.** The article provides a description of injuries in coal mining enterprises in Russia. The high injury rate causes the need of developing new effective ways and means of improving safety at mining enterprises. Recently in Russia there has been a tendency for a slight decrease in fatal injuries, which indicates some progress in prevention of industrial accidents. At the same time, the problem of improving the working conditions of coal miners, reducing the level of injuries and occupational diseases in this industry remains a very urgent task. Ensuring safe operation and industrial health and safety is not only reasonable economic policy but one of the constitutional human rights. At Russian coal mining enterprises, they take measures to reduce injuries, the supervisory authorities and employees of the enterprises carry out certain work to comply with safety requirements. However, sig-



nificant success has not yet been achieved. Despite the fatal injuries and accidents, the issue of industrial mining safety is not becoming a top priority. Occupational safety measures are often financed on a 'left-over' principle, and therefore remain not implemented. Many managers do not pay enough attention to safety issues and have little control over the planned activities in this area. The article analyzes the causes of injuries and proposes the key directions for creating normal working conditions in coal mining enterprises.

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*Filimonov V.A., Gorina L.N. Development of an occupational safety management system based on the process approach // Journal of Mining Institute. 2019. Vol. 235. P. 113–122. DOI: 10.31897/PMI.2019.1.113*



**Abstract.** The article discusses the relevance and possibility of using the process approach in the development and implementation of occupational safety management systems based on GOST 12.0.230-2007, which is the main document in this area for all industrial enterprises and organisations of the Russian Federation. The system of occupational safety management in the organisation is considered taking into account all its internal communications and input-output parameters. It is shown that the process approach used in the design of the occupational safety management system in the organisation, allows categorising the list of works (processes), participants, resources (responsible, performers, documents, etc.), the control and correction processes. The methodological substantiation of the process approach to the design of the occupational safety management system in the organisation is given, the basic issues

of its applicability are considered. A context diagram of the process of an occupational safety management system is drawn in the IDEF0 graphical notation by means of the SADT structural analysis technology. The decomposition of the context diagram to the required levels of detail is presented and the balance factor of the models is calculated.

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*Kretschmann J., Plien M., Nguyen T.H.N., Rudakov M.L. Effective capacity building by empowerment teaching in the field of occupational safety and health management in mining // Journal of Mining Institute, 2020. Vol. 242. P. 248–256. DOI: 10.31897/PMI.2020.2.248*



**Abstract.** The paper is dealing with a developed concept named Empowerment Teaching, which is based on practical teaching experience gained in various mining universities. It is demonstrated that this concept can be used to increase the effectiveness of knowledge transfer to mining countries in the world, as well as to overcome cultural barriers between lecturers and their students. The two models of participatory training, which are proposed to be named “physical” and “emotional” models, are portrayed. The authors are convinced that participatory training methods can be an ideal answer to a challenge associated with workers’ competencies in mining, namely – the potential of highly motivated and well-educated young academics is often diminished by a lack of ability to apply their knowledge. A special emphasis is made on the possible application of empowerment teaching for educational and training activities in the field of occupational safety and health (OSH), which is a matter of utmost importance for the mining industry. Several benchmarking initia-

tives in the field of OSH (“safety culture”, zero-accident vision) are underlined to be encouraged and promoted by means of new teaching methods. The examples of successful international co-operation among universities are given, as well.

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*Glebova E.V., Volokhina A.T., Vikhrov A.E. Assessment of the efficiency of occupational safety culture management in fuel and energy companies // Journal of Mining Institute. 2023. Vol. 259. P. 68-78. DOI: 10.31897/PMI.2023.12 <https://pmi.spmi.ru/index.php/pmi/article/view/15928>*



**Abstract.** The results of development, testing and implementation of the process of occupational safety culture management in a fuel and energy company including the assessment of current state, assessment of deviation, formation of control action and its implementation are presented. Using the methods of mathematical analysis, the components of occupational safety culture and criteria for their evaluation were developed. As a control action, a procedure for conducting behavioural safety audit was elaborated and implemented. Proceeding from the results of analysing average ratings of safety culture components among the employees prior to and after the introduction of behavioural safety audit, it was concluded that there was a statistically significant increase in the average values of 12 out of 16 ratings of safety culture components. Analysis of the results of 1,011 audits showed the absence of an “alarm area” at the enterprise. Introduction of the developed process management model promotes an increase in the efficiency of attaining a high level of occupational safety culture in fuel and energy companies.



*TI 191 Self-dumping car installed on two four-wheel trucks (Russia, mid-20 century) and a shovel excavator M-IV Э (TI 176 )in the apatite pit. (USSR. 1940. Scale 1:20).  
The model of first Soviet excavator.*

*Scientific edition*

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