

Published by Empress Catherine II
Saint Petersburg Mining University

SINCE 1907

JOURNAL OF MINING INSTITUTE



CHEMICAL SAFETY DAY

№ 7 • 2024

PMI.SPMI.RU

FEDERAL STATE BUDGETARY EDUCATIONAL
INSTITUTION OF HIGHER EDUCATION
EMPRESS CATHERINE II
ST. PETERSBURG MINING UNIVERSITY

CHEMICAL SAFETY DAY

DIGEST

JOURNAL OF MINING INSTITUTE

№ 7

St. Petersburg
2024

Abstract

For the first time, the Day of the Fight for Human Rights against Chemical Hazards was celebrated on April 28, 1997 at the initiative of a number of Russian environmentalists in memory of the tragic events in Novocheboksarsk. Later on, this day began to be celebrated as Chemical Safety Day. The purpose of this date is to analyze human interaction with dangerous and useful “chemistry” pursuing an important national task – to make the lives of people and nature chemically safe. When implementing any projects aimed at improving the quality of life, it is necessary to consider the expert assessment of the impact of chemical pollution on the environment

© Empress Catherine II
Saint Petersburg Mining University, 2024

Mitrofanova G.V., Chernousenko E.V., Artemev A.V., Pospelova Y.P., Smirnova N.A., Barmin I.S. Study of the properties and action of polyelectrolytes in the treatment of the dressing plant’s discharges. Journal of Mining Institute. 2024. Vol. 265, p. 95-103. EDN: CVUHNQ. <https://pmi.spmi.ru/pmi/article/view/16049>



Abstract. The organization of intrafactory water circulation at mining and processing enterprises, when production wastes and discharges are not sent to an external tailings dump, is an urgent environmental and economic task. Returning even a part of water into the technological process after preliminary treatment will significantly reduce the volume of polluted water discharged into tailings, which will reduce energy costs for waste transportation and the negative environmental impact. One of the wastes sent to the tailings during the ore dressing wastes from the Kovdor deposit to the tailings dump is the discharge of thickeners for the preparation of apatite flotation feed. In order to choose the effective discharge cleaning regime, the authors have evaluated the action of polyacrylamide flocculants. It has been discovered that the apatite and calcite particles interact more effectively with the anionic flocculant. This fact determines its advantage for the treatment of suspended particles. The influence of the residual concentration of a flocculant on the apatite flotation, where a part of the returned treated water goes, has been assessed. Compared to flotation with recycled water, there is a decrease of P₂O₅ extraction into apatite concentrate of equal quality. In order to obtain the required enrichment indicators on the treated water, it is necessary to adjust the collector (tall oil fatty acids) and depressor (liquid glass) costs.

Gupalov V.S. Priority parameters of physical processes in a rock mass when determining the safety of radioactive waste disposal. Journal of Mining Institute. 2020. Vol. 241, p. 118-124. DOI: 10.31897/PMI.2020.1.118



Abstract. Consideration of geodynamic, hydrogeochemical, erosion and other quantitative characteristics describing evolutionary processes in a rock mass is carried out when choosing a geological formation for the disposal of radioactive waste. However, the role of various process parameters is not equal for safety ensuring and additional percentages of measurement accuracy are far from always being of fundamental importance. This makes it necessary to identify various types of indicators of the geological environment that determine the safety of radioactive waste disposal for their detailed study in the conditions of the burial site. An approach is proposed to determine the priority indicators of physical processes in the rock mass that determine the safety of disposal of various types of radioactive waste and require increased attention (accuracy, frequency of measurements) when determining in-situ conditions. To identify such factors, we used



© Forpost North-West / Pavel Dolganov

the sensitivity analysis method that is a system change in the limits of variable values during security modeling in order to assess their impact on the final result and determine the role of various physical processes in ensuring safety. It is shown that the safety of isolation depends on various factors when burying “natural”, “short-lived”, and “long-lived” groups of nuclides. The factors that greatly affect safety when disposing of radioactive waste of these types are highlighted. The list of parameters of the geological environment that characterize the priority mechanisms of localization of various types of radionuclide contamination during burial and requiring the most detailed determination in full-scale conditions is defined.

Pashkevich M.A., Petrova T.A., Rudzisha E. Lignin sludge application for forest land reclamation: feasibility assessment. Journal of Mining Institute. 2019. Vol. 235. p. 106-112. DOI: 10.31897/PMI.2019.1.106



Abstract. The article analyses waste generation of pulp and paper industry in North-Western Russia. The environmental impact of waste storage facilities of the pulp and paper mill was assessed, the need for utilization of lignin sludge was justified. In North-Western Russia, 1.21 million hectares of disturbed areas are in need for reclamation; they are abandoned quarries and lands alienated for pipeline and road construction. The suitability of lignin sludge for preparation of artificial fertile soils for reclamation purposes is estimated. For this purpose, experiments were carried out to create an artificial mixture with different ratios of lignin sludge and soil, to detect the maldevelopment of several plant species grown on various compositions of lignin sludge and soils. It was revealed that lignin sludge as an organic additive to soils is not toxic to vegetation and living organisms, allowing improving fertility of artificial soils.

Salamov A.M., Mammadov V.A., Khalilova H.K. Study of the Anthropogenic Impact on the Change of Geoecological Conditions of the Khojahasan Lake, Azerbaijan. Journal of Mining Institute. 2019. Vol. 239, p. 603-610. DOI: 10.31897/PMI.2019.5.603



Abstract. The paper considers the results of geoecological and geophysical studies conducted in the Khojahasan Lake basin in the Western part of Baku. The main purpose of the work was to study the anthropogenic impact on geoecological conditions of the lake. To assess the development of exogenous geological processes in the coastal zone of the lake and their impact on the environment, geophysical studies were carried out by the vertical electric sounding (VES). From 1990 to 2014, the physical and chemical characteristics of water and sediments were studied in a representative section of the lake. Metal concentrations, including such toxic elements as Cu, Zn, Cd, Sr, Ba, Pb, Cr, and Ni, were determined in the trace element composition of bottom sediments. It was revealed that since the mid-XIX century and especially since the second half of the XX century the high rate of population growth and urbanization in the territory of the Absheron Peninsula (in the Republic of Azerbaijan the name Apsheron was changed to Absheron) led to intensive use of natural resources and increased anthropogenic load on the environment. Technogenesis actively violates the natural cycle of matter and energy in lakes (limnogenesis), along with other natural media, as lake basins are located in lowlands and often accumulate industrial, municipal, agricultural, and other discharges. Pollutants accumulated in the lake basin affect hydrobiochemical conditions, transform quantitative and qualitative indicators of the aquatic environment and bottom sediments. Factors affecting the lake landscape are genetically different, unequal in the degree and nature of the impact, as well as induration.

Sarapulova G.I. Environmental geochemical assessment of technogenic soils. Journal of Mining Institute. 2018. Vol. 234, p. 658-662. DOI: 10.31897/PMI.2018.6.658



Abstract. The purpose of this study was to obtain diagnostic features and criteria for the distribution of heavy metals in technogenically altered soils in the area of industrial facilities, depending on their altered geochemical properties, which make it possible to fix chemical elements in landscapes (the formation of geochemical barriers). On the basis of the geoecological assessment, disturbance of the soil buffer properties, which is reflected in the ionic composition change, alkalization, pH increase, and sulfate-chloride salinization have been revealed. This forms the heavy metals alkaline barrier. For example, in case of Cu, Pb, Zn, and Ni, it contributes to their accumulation and subsequent concentration in the soil layer due to the exchange interactions between chemical elements and Na^+ , K^+ , Ca^{2+} cations. Soil saturation with sulphates also increases the probability of metals demobilization in the soil layer. It has been shown that intra-sectional soil migration of oil products (one of the most common pollutants of industrial areas) and chemical elements occurs at a depth of 30-50 cm, where the oil products based on a clay sorption layer form a technogenic barrier. The direct correlation between the oil content in the soil and the amount of toxic sulphate and chloride salts was found. The set of identified factors forms technogenic geochemical barriers in the industrial production area, on which pollutants and chemical elements, including heavy metals, are demobilized. The revealed effects are the rationale for creating artificial geochemical barriers on the migration path of both pollutants and valuable components with the aim of their subsequent extraction from the soil when developing an appropriate extraction method.

Valiev N.G., Shorin A.G. Pedagogical experiment of the first rector of the Ural state mining institute P.P. Von Weymarn as an effort to reform the higher education institution in 1917-1920. Journal of Mining Institute. 2017. Vol. 228, p. 616-623. DOI: 10.25515/PMI.2017.6.616



Abstract. Based on sources recently discovered and included in the database of scientific publications, the article analyzes the pedagogical activity of the scientist-chemist, the first rector and founder of the Ural Mining Institute in Ekaterinburg Petr Petrovich von Weymarn, whose name is now almost forgotten. The article shows that this activity can be evaluated as a pedagogical experiment on reformation of the higher education institution system, which could have been adopted in Russia if Bolsheviks lost the Civil War. Pedagogical activity of von Weymarn has a theoretical basis that he developed under the influence of Wilhelm Ostwald, the Nobel Prize winner in chemistry and the idealist philosopher, as well as the example of the Petrograd (Petersburg) Mining Institute, which for von Weymarn was not only an alma mater but an example of a reformist attitudes toward the scientific and pedagogical process in higher education. The article gives a detailed analysis of the currently available philosophical and pedagogical essays of P.P. von Weymarn, known as “Essays on the Energy of Culture”, as well as the practical application of these theoretical works on the basis of the Ural Mining Institute in Ekaterinburg and in Vladivostok. With the advent of Soviet power, von Weymarn’s pedagogical experiment was forcibly interrupted, and he became “persona non-grata” in the Soviet Union, but now his name is being restored. Unfortunately, he is known either as a chemist or as the founder and first rector of the current Ural State Mining University, but not as a teacher who offered his view of reforming the higher school system. This article fills this gap, revealing not only the work of von Weymarn, but also describing the difficult period of changing the old scientific school system, which could have taken a completely different development path.

Dubovikov O.A. Scientific heritage of academician Nikolay Semenovich Kurnakov. Journal of Mining Institute. 2015. Vol. 215, p. 65-74 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5185>



Abstract. Once N.V. Lipin, a professor of mathematics at the Leningrad Mining Institute, told N.S. Kurnakov that M.V. Lomonosov had complained about his lack of familiarity with mathematics. The outstanding scientist replied “That’s absolutely true, and I have already told you about it: we all need mathematics, and the more chemistry develops, the more it needs a mathematical justification”. According to one scenario of the international nongovernmental organization, the Club of Rome, there will be a three-fold decrease in the world’s raw materials resources and multifold volume reduction in industrial production by the middle of the 21st century. Another scenario claims that raw materials will reduce only by one third, and the volume of industrial production will remain at the level of the beginning of the century. Not only the first scenario, but also the second one forecasts industrial stagnation. It is unacceptable for dynamic and sustainable development of the technological civilization. Intensively developing economies in China, India, Brazil and Russia defy the forecast of the Club of Rome, as it has not taken into account the possibility of scientific and technological progress in reducing energy consumption and using alternative sources, as well as the increased technological potential of the humanity. Due to depletion of the main sources of energy (oil and gas), many experts link the future of the world’s power industry with the possible use of solid energy resources. From the environmental point of view solid fuel gasification technology is the most preferable. As the calorific value of producer gas is relatively low in comparison with natural gas, some research of possible use of producer gas (as an alternative to natural gas which is available not in all regions) at Russian industrial enterprises has been conducted.

Cherkai Z.N. Occupational safety and health professional. Journal of Mining Institute. 2014. Vol. 207, p. 159-163 (in Russian). <https://pmi.spmi.ru/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.

Lebedev V.A., Piskunov V.M. Improving the efficiency of immobilization of radioactive waste. Journal of Mining Institute. 2013. Vol. 203, p. 59-62 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5606>



Abstract. On the basis of experimental research developed a method for immobilization of problematic radioactive waste in the compound of magnesium binding to the degree of inclusion of dried radioactive salts, 37 % (based on the technology of cement concrete can not enter more than 7 % of the salts of the still bottoms), and the quality of the compound corresponds to the specifications and technical documentation requirements.

Karlovich I.A., Karlovich I.E., Karlovich A.I. The life cycle of products and goods from the operation to return to nature. Journal of Mining Institute. 2013. Vol. 203, p. 42-45 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5602>



Abstract. The method is based assessment of the life cycle of products and products based on their consumer qualities. Fatigue cycles act as a processing chain return of matter and energy in nature. It is proposed to provide two streams of matter back into the wild: lithogenic and man-made materials. When the flows of consumption and waste streams in the man-made substances in circulation for the year balanced.

Gusev A.I. Biogeochemical indicators of the technogenic pollution ecosystems by mining enterprises of Rudny and Mountain Altai. Journal of Mining Institute. 2013. Vol. 203, p. 155-159 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5628>



Abstract. Technogenic pollution of ecosystems causing by activity mining enterprises of Rudny and Mountain Altai revealed on basis biogeochemical indicators. Content of hard metals analyzed in different plants in mining enterprises that it absorb selectively from soil and air environment. Composition of hard metals in plants determine by composition of ores on the deposits. Anomalous content of Hg in the plant of Sinukhinskoe ore district link with process of cyanidation for selection of gold on the gold-extraction factory.



01 FZ 1161. Chloride of potassium.
Verkhnekamskoe field, the Perm territory.
Item belongs to the Mining Museum

Dzhandubaeva F.M. Assessment hydropower facilities on the environment. Journal of Mining Institute. 2013. Vol. 203. p. 18-21 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5596>



Abstract. Ecological justification of design decisions related to the use of water resources for hydropower deployment of recently acquired particular urgency in connection with the failure of development section of the draft Impact Assessment (EIA). Under the existing regulatory and legal acts of the EIA documents to substantiate investment is sufficiently extensive material that is not fully respected and worked out. The article presents the shortcomings in assessing the impact of the proposed activity on the environment, identified on the basis of analysis of the project materials to deploy hydropower facilities on the mountain rivers.

Korelskii D.S., Chukaeva M.A. Estimation of the condition of the soil-vegetative complexes having stress at atmospheric impact. Journal of Mining Institute. 2013. Vol. 203, p. 174-177 (in Russian). <https://pmi.spmi.ru/pmi/article/view/5632>



Abstract. The main research objective was monitoring and assessment of terricolous and plant cover condition in forest ecosystems influenced by industrial pollution by the Severonickel Industrial Plant, which impact zone covers 1.4 thousand sq. km. During an expedition to the Murmansk Region samples of upper soil layers and plants were taken in areas directly affected by atmospheric impact from OAO Severonickel both at various distances from the plant and in background territories. This will help to determine the overall degree of soil contamination at various distances from the plant as well as distribution of heavy metals accumulated in various soil layers and a complex estimation of adverse impact on soil cover and various plant species.

Sokolov A.I. Air and gas as terms in the Russian chemical terminology of the XVIII – early XIX centuries. Journal of Mining Institute. 2011. Vol. 193, p. 79-82 (in Russian). <https://pmi.spmi.ru/pmi/article/view/6230>



Abstract. The usage of the terms air and gas among the other denominations signifying “aeriform fluids” in the Russian original and translated chemical literature of the XVIII – early XIX centuries is analyzed.

Rebeshchenkova I.G. Humanitarization of the ecological education as a function of the ecological expert training system. Journal of Mining Institute. 2010. Vol. 187, p. 213-216 (in Russian). <https://pmi.spmi.ru/pmi/article/view/6656>



Abstract. Ecological crisis is the essential part of the total crisis of the modern civilization. It is the consequence of the number of the causes, including dehumanization of society, moral decadence, loss of need in the beauty and so on. These processes are the special danger for the young generation. For the neutralization of the negative processes it is necessary to combine the ecological education with the ecological training, is engaged in its humanitarisation. In this connection we have the task of the creation of the ecological preparation system of the specialists. Saint Petersburg State Mining Institute is the first institute in Russia, in which are introduced the disciplines of the ecological profile and in which is accumulated the considerable experiment in the education of the engineers-ecologists, is created the scientific base and the skilled workers, is extended the spectrum of the directions and the disciplines – is laid of the stable foundation for the proposed system of the ecological education. The natural-science and engineering blocks of this foundation with the necessity must be cemented with the block of the social and humanistic disciplines, including ecoethics, ecoesthetics, ecopsychology, ecophilosophy, ecohistory, ecopolitology, ecoethnology, etc.

Petrov D.S. Regularities of reaction of aquatic communities to technogenic impact. Journal of Mining Institute. 2009. Vol. 180, p. 47-50 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7090>



Abstract. The analysis of possible variants of hydroecosystems change at various types anthropogenous successions is lead. Dependences normalized well-being functions of water community from resulting level of the technogenic influence defined by parameter Y are established. The equation describing water communities reaction on that type of technogenic influence, which most typical for the large industrial enterprises (including – the enterprises of a mountain-metallurgical complex) is offered.

Parshina M.V. Influence of processes of hypergenic metamorphization of technogenic massifs on the degree of their environmental danger for the environment. Journal of Mining Institute. 2009. Vol. 180, p. 33-35 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7087>



Abstract. The author studied different technogenic massifs of various geneses containing sulphide sulphur and the research results have shown that under the influence of natural and man-caused factors mineral waste is subjected to weathering processes and transformation into new crystalchemical phases, which facilitates dispersion of toxic elements and their migration with ground waters. Studies help to establish that acid rock drainage formation and migration of pollutants is determined by physical and chemical metamorphization processes in infiltration waters. Ecological hazards from sulphide-bearing rock massifs are most adequately estimated with application of the acid indexing express-method.

Pashkevich M.A., Korelskiy D.S. Development of effective methods of reclamation of highly toxic technogenic massifs of enterprises of mineral and raw materials complex. Journal of Mining Institute. 2009. Vol. 180, p. 43-46 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7089>



Abstract. The paper presents result of monitoring toxic technogenic massifs of the OJSC “Mikhaolovskiy GOK” Company and the LLC “Severonickel” Company. Their technogenic influence on various environmental components is assessed. New reliable environmentally-safe and economically efficient ways of technogenic massif reclamation are suggested based on formation of protective screens made of polymer materials sintered with the massif rocks. An optimal screen formation technology is selected as the result of research carried out in test areas.

Sokolov A.I. Proper names and their derivatives in chemical terminology. Journal of Mining Institute. 2008. Vol. 175, p. 224-225 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7434>



Abstract. The article deals with proper names and their derivates in the Russian chemical terminology where they are used to denote chemical elements, substances and compounds, physical and chemical constants, quantities and units, chemical processes and instruments.

Petrov D.S., Ionova M.Y. Features of the assessment of the impact of mining and industrial enterprises on water ecosystems. Journal of Mining Institute. 2007. Vol. 172. p. 210-213 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7651>



Abstract. The article deals with the methods of assessing the environmental hazard of wastewater from mining enterprises. It is proved that the only reliable approach to the assessment of anthropogenic impact on biological systems is the use of both biological and non-biological environmental parameters, and the mandatory consideration of their interdependence is crucial. As an example of the environmental impact of a mining enterprise on aquatic ecosystems, an ecological study of the Luga River section in the zone of influence of PG Phosphorit, located in Leningrad region, was used.

Kaledin O., Gryuner M. New technologies and materials for isolation of unconsolidated contour zone in salt rock disposal of toxic wastes. Journal of Mining Institute. 2007. Vol. 170 (2), p. 100-103 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7724>



Abstract. One of the safe and effective ways of isolation of toxic wastes at their underground disposal is their burial in specially designed structures in deep-seated non-porous geological formations, in particular in sodium chloride massifs. This article describes innovative technologies and new materials used for isolation of the decompacted boundary zone of underground toxic waste disposal sites constructed in saline rocks.

Panteleeva Y.G. Environmentally dangerous elements and minerals in raw materials, products and wastes of the OAO Karelsky okatysh (Kostomuksha). Journal of Mining Institute. 2007. Vol. 170 (1), p. 37-39 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7776>



Abstract. The paper is based on experience of carrying out ecological and geochemical research in impact areas of the “Karelsky Okatysh” plant and directly in production workshops. Mineral composition of ores is estimated quantitatively. Dynamics of ore delivery to the plant in 2005 is studied. Environmentally hazardous types of ores are revealed. Environmentally hazardous minerals are determined and levels of toxic element accumulation in these minerals are estimated. High concentration of several toxic heavy elements was revealed in dust accumulations of electrostatic cleaners in the pellet production workshop. Comparison of polluting element contents in the second and the third cleaners with the first roasting kiln and all the three kilns is given. Contents of a number of toxic elements exceed the Clarke level of the earth’s crust as well as maximum permissible concentration.

Vasiltsova V.M., Olenin D.S. Environmental Risk Management. Journal of Mining Institute. 2007. Vol. 170 (1), p. 187-189 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7814>



Abstract. Today it is possible to assess the efficiency of economic activity of an industrial enterprise only by applying management tools that take into account environmental parameters. The presented concept of the integrated study of environmental risks covers the management procedure, starting from the pre-investment stage and ending with the shutdown or reorientation of production, on the one hand, and the multi-stage process of identification, assessment, management, monitoring and control of risks on the other hand.

Protosenya A.G., Karasev M.A. Underground disposal of radioactive waste in clay formations. Journal of Mining Institute. 2007. Vol. 172, p. 57-65 (in Russian). <https://pmi.spmi.ru/pmi/article/view/7619>



Abstract. Classification of radioactive waste by the degree of its activity is given. Basic requirements to the construction site of radioactive waste repository or burial site are specified. Possible constructive solutions of underground repositories are briefly considered and a detailed description of the spiral structure of RAW repository is given. The influence of temperature and radiation on physical and mechanical properties of concrete and clay is estimated. The character of temperature field distribution around the underground RAW repository in time is obtained. The stress-strain state of the support was evaluated and loads on the support were found under the combined action of temperature and rock pressure, taking into account changes in the physical and mechanical properties of concrete and clay.

Eldina E.V. Environmental monitoring of the Krasny Bor toxic waste disposal site. Journal of Mining Institute. 2006. Vol. 167 (1), p. 64-66 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8065>



Abstract. Intensive development of industry leads to an increase in the amount of various wastes, from household garbage to radioactive and chemical wastes. Storage of these wastes leads to the emergence of environmentally unfavorable territories – technogenic arrays, affecting directly the natural environment and humans. The purpose of the work is to study the migration of polluting components from the territory of the Krasny Bor waste disposal site, as well as the choice of a set of environmental protection measures.

Korelskii D.S. Monitoring of soil and vegetation cover in the zone of impact of OAO Boksitogorsky Alumina. Journal of Mining Institute. 2006. Vol. 167 (1), p. 70-73 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8067>



Abstract. In the course of practical research in the zone of influence of the metallurgical industry enterprise “Boksitogorsk alumina” in Boksitogorsk the sizes of the real zone of negative influence of the enterprise were obtained. They practically on a row exceed those obtained by theoretical calculations according to the OND-86 methodology, universally applied for calculation of atmospheric air pollution in the Russian Federation. Many residential, agricultural and forestry lands are located in the zone of negative impact of the enterprise. This substantiates the necessity to conduct engineering and environmental studies in the impact zones of large enterprises of the mineral and raw materials complex.

Parshina M.V. Environmental and geochemical features of slag dumps transformation in the acidification zone. Journal of Mining Institute. 2006. Vol. 167 (1), p. 90-93 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8073>



Abstract. The conducted studies prove the necessity to increase the hazard class of waste from the pyrometallurgical processing of Severonickel enterprise due to erosion and hypergenic processes, which cause water pollution with toxic metals and sharp decrease in pH level. Formation of acidic waters leads to transformation of the composition of cover sediments, surface and ground waters, as well as to increase of migration ability of polluting elements. Criterion dependences of transformation of mineral and chemical composition of mining and metallurgical wastes are established. The ways to reduce the technogenic load on the soil and vegetation cover and natural waters in the acidification zones are proposed: construction of a geochemical barrier for old, already stockpiled waste and change of the enterprise technology at the stage of slag formation and transportation.

Pashkevich M.A., Parshina M.V. Assessment of the negative impact of acidic water on the components of the natural environment in the impact zone of OAO Severonickel. Journal of Mining Institute. 2005. Vol. 165, p. 135-137 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8272>



Abstract. The main sources of acidic water formation are industrial effluents, slag dump effluents and gas emissions containing nitrogen oxides and sulfur dioxide. Taking into account hypergenic and erosion processes, it is necessary to increase the hazard class of these wastes.

The results of laboratory analyses of waste samples causing negative acid impact are presented.



*05 THS 7 7 Cathode nickel.
Severonickel integrated plant.
Item belongs to the Mining Museum.*

Karastelev B.Y., Dobrzhanskii V.G., Dmitrieva E.E. Investigation of kinetics of liquid phase oxidation of toxic compounds (a number of herbicides). Journal of Mining Institute. 2005. Vol. 166, p. 52-54 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8155>



Abstract. Research was carried out with herbicide imitates – carboxylic acids. The research showed that the method of liquid-phase oxidation is effective for herbicide utilization and can be used as a method of neutralization of these toxic wastes. The balance of expended and received heat on the whole path of water from the entrance to the plant to the exit from it is calculated. A schematic diagram of the unit is proposed.

Nikitin I.I., Kalinin V.V., Sterlenko A.Y., Kozlovtsseva L.N. Features of environmental substantiation of design decisions for objects located on territories with environmental restrictions. Journal of Mining Institute. 2005. Vol. 164, p. 118-121 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8330>



Abstract. The necessity to change the practice of approvals and environmental ex-pertection in the preparation of environmental sections of pre-project and project documentation, the expediency of revising the existing procedure of environmental expertise of pre-project and project documentation, the use of positive experience of industrial safety expertise, revision of the methodology for calculating the norms of MPE and MPD was substantiated.

Pashkevich N.V., Pashkevich M.A., Petrova T.A. Environmental and economic assessment of the negative impact of mining and metallurgical waste on air and land. Journal of Mining Institute. 2004. Vol. 158, p. 69-71 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8790>



Abstract. The analysis of technogenic impact of waste of mineral complex on atmospheric air and land was carried out. It was established that the environmental and economic risk of negative impact is determined by the probability of environmental and economic damage. The probability of damage from land pollution in the zone of impact of technogenic massifs was analyzed. The research work was supported by the American Foundation for Civilian Research and Development.

Kosovtsev V.V. Environmental business and the prospects for its development in Russia. Journal of Mining Institute. 2004. Vol. 159 (1), p. 182-184 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8755>



Abstract. The prospects of development of environmental entrepreneurship in Russia are considered. It is argued that environmental business is formed as an independent branch of the national economy simultaneously with the formation of a new market of intermediary environmental services. The definition of the concept of “environmental business” is given, its forms and types are considered. It is concluded that at the present stage of environmental entrepreneurship needs to develop a legislative framework, the creation of a pricing system for environmental services and tariffs. The task of state regulation is to apply the mechanism to stimulate private environmental business in order to save resources, protect the environment and environmental safety.

Nesterenko E.G., Ivanova O.S. Results of quantitative analysis of the synergy of environmental factors in their combined effects. Journal of Mining Institute. 2004. Vol. 159 (1), p. 54-56 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8714>



Abstract. The summation and isobolic methods of assessing the impact of factors of different nature on environmental components are considered. Despite the simplicity of the summation formula, which is included in many normative documents, we came to the conclusion that it is more appropriate to apply the isobolic model.

Smirnova D.N. Environmental security of the region: the concept and content. Journal of Mining Institute. 2004. Vol. 159 (1), p. 95-97 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8727>



Abstract. Theoretical aspects of ecological security of the region are described. The most important factors of anthropogenic impacts on biosphere resources are considered. Based on the study of scientific literature are given definitions of such concepts as nature management, rational and irrational use of nature, environmental security. The technogenic and biospheric concepts of ecological safety according to which the system of measures to protect the environment is defined, are considered. The main directions of measures to ensure environmental security in the region are described, and the system of actions that need to be taken to ensure a sustainable state of environmental protection is considered.

Eldina E.V. Ways to recycle and dispose of toxic industrial waste. Journal of Mining Institute. 2004. Vol. 159 (1), p. 40-42 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8710>



Abstract. Intensive growth and development of industry leads to the formation and accumulation of a variety of wastes. As a result of movement and storage of these wastes there is a formation of technogenic massifs.

The impact of technogenic massifs on the natural environment is global due to, firstly, the ubiquitous spread of the massifs, and secondly, the poor quality of safety systems, protective and reclamation activities carried out in the areas of their location. The evaluation and analysis of the main ways of industrial waste processing was carried out. On the example of enterprise Krasny Bor landfill the technologies of neutralization and utilization of toxic wastes are considered, their positive and negative sides are revealed.

Adamson B.I. Research on environmentally friendly chemical current sources. Journal of Mining Institute. 2004. Vol. 158, p. 202-204 (in Russian). <https://pmi.spmi.ru/pmi/article/view/8834>



Abstract. The reduction of the corrosion rate of the zinc anode of the chemical current source (CPS) through the use of inhibitors effectively replacing mercury was investigated. The greatest effect was obtained when alloying zinc alloy with Pb and Cd in combination with an organic inhibitor introduced into the electrolyte.

Ostroushko A.A., Udilov A.E., Minyaev V.I., Makarov A.M., Deinezhenko V.I. Thermal and electrocatalytic devices to protect the atmosphere from toxic emissions. Journal of Mining Institute. 2003. Vol. 154, p. 91-93 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9164>



Abstract. The compositions with high catalytic activity consisting of a carrier (foam material), an intermediate oxide layer, and a complex oxide catalytic coating were studied. On the basis of compositions of optimized compositions, thermocatalytic devices for neutralization

of complex toxic substances in gases for the chemical industry, transport and heat power engineering were created. An electrocatalytic device for continuous dehydration of natural gas with electrolytic regeneration was developed, patented and successfully tested. The device enables uninterrupted operation of internal combustion engines using more environmentally friendly fuel in all climatic conditions.

Pavlov V.N. Assessment of damage from hazardous emissions at open-pit mining operations during the operation of diesel mining and transportation equipment. Journal of Mining Institute. 2003. Vol. 155 (2), p. 120-122 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9026>



Abstract. Due to the unsatisfactory environmental situation in the areas of mining complexes, special attention should be paid to environmental safety when selecting equipment. The results of the calculation of the transportation complex on the example of Udachny open pit of ALROSA's diamond mining company are presented. A quantitative assessment of damage associated with equipment downtime is made. A total of five different options have been considered, four of which use different ways to reduce the harmful effects from the operation of diesel dump trucks. The most economical variant, which allows to reduce not only harmful impact, but also the cost of transportation of rock mass, is determined.

Roslyakov P.V., Zakirov I.A., Ionkin I.L., Egorova L.E., Karankevich E.N. System of continuous control (monitoring) and regulation of harmful gaseous emissions of TPP into the atmosphere. Journal of Mining Institute. 2003. Vol. 154, p. 94-96 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9165>



Abstract. Monitoring of harmful industrial emissions is one of the main tools for determining the environmental characteristics of industrial facilities. Therefore, organization of systems for continuous monitoring of hazardous emissions (CMHE) of TPPs into the atmosphere is one of the priority tasks of the energy strategy of Russia. The subject of development is the system of continuous monitoring and regulation of TPPs harmful emissions into the atmosphere with flue gases. A CMHE consists of automatic measuring complex for instrumental estimation of specific and gross emissions of harmful substances and information-computing complex, including hardware and software for information processing and providing various service functions. Using the system of continuous monitoring and regulation of emissions will reduce the negative impact of TPPs on the environment, as well as increase the efficiency of power equipment operation.

Sereda M.A. Condition monitoring and management of environmentally hazardous facilities in mining and mineral processing. Journal of Mining Institute. 2003. Vol. 154, p. 96-99 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9166>



Abstract. The system of integrated environmental monitoring of objects of high environmental risk in the exploration and operation of oil and gas wells is proposed. Outlined the methodological basis of observation, assessment and control over the state of the natural environment components in the impact zone of oil production enterprises. It was revealed that for reliable determination of the level

of environmental hazard of oil and gas industry facilities requires a detailed study of the state of the landscape before the construction of wells and the characteristics of the processes that create a technogenic load on the environment. In order to prevent and eliminate the consequences of the negative impact of oil and gas industry facilities a number of new technological solutions are proposed at different stages of the field operation (for example, at the stages of prospecting, exploration and development of hard-to-reach deposits to reduce the technogenic load of cluster horizontal wells with a waste of up to 500 m from the vertical). In cases of emergencies we offer technologies for localization of oil spills, processing of oil-contaminated water and soils, recultivation of disturbed areas, utilization of toxic oily waste.

Petrova T.A. System of quantitative analysis, assessment and rationing of combined technogenic impacts on water bodies. Journal of Mining Institute. 2003. Vol. 155 (2), p. 73-76 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9011>



Abstract. The system of assessment and rationing of multifactorial anthropogenic impacts on water bodies based on bioindication is proposed. Macrozoobenthos, as the most sensitive community, is used as a bioindicator. An original method of singling out the species having a real indicator value has been developed, informative quantitative characteristics of this community have been established. The conditions for maintaining community stability to the impact have been defined and formalized, a universal quantitative measure of combined impact has been given. The main regularities of community response to combined anthropogenic impacts were identified and described. Identified conditions of two typical catastrophes of communities in the gradient of combined impacts. Accordingly, the approach to rationing of anthropogenic impacts for hydro-ecosystems with varying degrees of background anthropogenic load is given.

Lisienko V.G., Druzhinina O.G., Dolgii R.M., Morozova V.A. Assessment of environmental damage to the population from atmospheric emissions of the enterprise by the method of risk assessment, taking into account environmental and epidemiological data in the conjugate system of plant-city. Journal of Mining Institute. 2003. Vol. 154, p. 87-89 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9162>



Abstract. The problems of assessing environmental damage to the population from atmospheric emissions of the enterprise according to the method of end-to-end environmental analysis are considered. Unit risks per unit of concentration of a harmful substance for the most hazardous substances in the atmosphere are calculated. The results of calculation of environmental damage for the city of Pervouralsk (Sverdlovsk region) and Severouralsk copper smelter (SUMZ) in the coupled system plant-city by the improved methodology of through environmental analysis with risk assessment, taking into account environmental and epidemiological data, and by the draft new methodology of calculation of environmental fines proposed by the Russian Government are presented.



MGS 704 24 1. Chrysotile asbestos, Bazhenovo, the middle Urals. Item belongs to the Mining Museum.

Shuiskii V.F., Petrov D.S., Petrova T.A., Maksimova T.V., Ivanova O.S. Quantification, normalization and regulation of multifactorial anthropogenic impacts on freshwater ecosystems. Journal of Mining Institute. 2003. Vol. 154, p. 115-118 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9173>



Abstract. Methods for quantitative study, assessment, rationing and selection of measures for regulation of multifactorial anthropogenic impacts on ecosystems of freshwater reservoirs and watercourses have been developed. Reaction of biota to influence is estimated by a condition of macrozoobenthos as the most sensitive bioindicator, and the influence itself is estimated by the special indicator taking into account effect of interaction of factors. The regulation of multifactorial impact is based on identifying its maximum permissible level, which does not cause irreversible changes in macrozoobenthos. Regulation of the impact is aimed at reducing it to the maximum permissible combinations of interacting factors to achieve a safe level of their joint biotic effect.

Steblev Y.I. Monitoring computer control of wastewater. Journal of Mining Institute. 2003. Vol. 154, p. 106-108 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9169>



Abstract. The basic elements of the experimental setup for computer monitoring of wastewater by degree of integral contamination have been developed. It is shown that the use of electric capacitive computer tomography makes it possible to perform local electrical sensing of the flow cross section, to realize separate assessment of organic and mineral contamination of waste water and thereby localize the source of pollution.

Maslennikova I.S., Soroko V.E. Management of environmental safety in the field of reproduction of natural resources and their integrated use. Journal of Mining Institute. 2002. Vol. 151, p. 162-165 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9452>



Abstract. The analysis of ecosystems interaction and correlations between anthropogenic disturbances and quality parameters of natural systems. On the example of peat-bog mezzo-ecosystems of Western Siberia region proposed a method to restore their productivity by rotation of various terrestrial ecosystems. The technology of reclamation of disturbed territories with the use of amino complex compounds derived from industrial waste has been developed for the integrated use of resources of peatland ecosystems in the functioning of resource extraction industries. The recommendations on the use of aminocomplexes for decontamination and lithification of domestic and industrial wastes, sludge, bottom sediments containing toxic compounds are given. The methodology of complex use of resources for resource processing industries is developed, including a statistical analysis of material and energy flows, a systematic method of forecasting and control of chemical and technological processes accompanying the functioning of industrial production, as well as their environmental and economic optimization. Applied solutions for integrated processing of resources of peat-bog ecosystems and the rational use of the main commercial products: activated carbon, feed additives, carbon dioxide and water vapor are presented.

Shuiskii V.F., Petrov D.S. Technique for quantitative assessment of multifactorial anthropogenic impacts on freshwater ecosystems. Journal of Mining Institute. 2002. Vol. 152, p. 111-113 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9343>



Abstract. Currently, various methods are used to assess anthropogenic changes in the environment, which have a number of drawbacks. A method for assessing anthropogenic impacts on watercourses that uses quantitative patterns of biota response to a multifactorial load is proposed. The main bioindicator of multicomponent impacts is macrozoobenthos. Quantitative effect of interaction of factors is accurately transferred by original isobolic model. The method allows to solve the following problems: to estimate precisely the state of biota, to single out the main limiting factors, to take into account their interaction correctly, as well as to forecast the general effect of impact reduction from the developed nature protection measures. The method has been tested in the study of various technogenic impacts on freshwater reservoirs in Russia.

Shapiev S.T., Elimkhanov D.Z., Znamenskii V.S. The concept of active integrated environmental monitoring of mercury. Journal of Mining Institute. 2001. Vol. 149 (5), p. 127-128 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9601>



Abstract. Studies of environmental pollution by one of the most dangerous toxic substances – quicksilver – can be performed with high accuracy on the basis of microelectronics, computing facilities and measuring devices organized as a unified information-measuring system of active integrated environmental monitoring. The paper considers the requirements that must be satisfied by the hardware implementation, the concept of equipment operation and system architecture, which provide filling the Internet computer network with information service.

Kiprianov A.I., Vikulin A.V., Pranovich A.V. Decontamination of industrial effluents of chemical plants from organochlorine compounds using sound chemistry. Journal of Mining Institute. 2001. Vol. 149 (5), p. 24-26 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9564>



Abstract. The object of research is industrial effluents of chemical enterprises containing organochlorine compounds; the aim of the research is to develop a scientific basis and method of neutralization of highly toxic organochlorine compounds in the effluents of chemical enterprises, the impact of ultrasound. Sonolysis of H_2O , H_2O_2 , CCl_4 , etc. in a liquid-phase medium produces radical particles of H, OH, Cl, CCl_3 , etc., which initiate oxidation reactions of chloroaromatic substances – lignin fragments (oligomers, smoke, phenols and other compounds) contained in industrial effluents to carbonic and hydroxycarboxylic acids with transition of elimination chlorine into solution as chloride-anion. Wastewater from bleaching facilities of pulp companies, and effluents from pyrolysis plants containing organochlorine compounds after treatment in an industrial generator of ultrasound at a frequency of 20-22 kHz and up to 400 kHz for 10-15 minutes become suitable for further processing at the stage of biological treatment. After treatment in the field of ultrasonic vibrations at the stage of biological treatment wastewater can be returned to a closed cycle of water use in this production.

Kuleshov A.A., Serebryannikov O.D., Novikov L.A. Determination of the amount of harmful emissions during the operation of diesel transport equipment in quarries. Journal of Mining Institute. 1995. Vol. 142, p. 153-159 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9866>



Abstract. Methodological approaches to determining the volume of harmful substances in the exhaust gases of diesel vehicles in quarries are outlined. The statistical method and the method of direct measurements on test benches or in a quarry are considered. It is based on the dependence of the volume of harmful emissions on the amount of fuel burned under various diesel load conditions. Comparative results of calculations of harmful emissions using various methods are presented.

Kuleshov A.A. Reducing mine atmosphere pollution during the operation of self-propelled equipment // Journal of Mining Institute. 1995. Vol. 142, p. 160-164 (in Russian). <https://pmi.spmi.ru/pmi/article/view/9867>



Abstract. Effective ways to reduce atmospheric pollution by exhaust gases are the use of anti-smoke additives, the creation of low-toxic diesel engines, the use of water additives in the form of a steam-air mixture to fuel, and new types of exhaust gas neutralizers. The analysis showed that all the methods are being improved. Not everywhere, the electrically driven self-propelled vehicles can replace diesel vehicles.

Lomtadze V.D. Protection of the geological environment during the development of mineral deposits // Journal of Mining Institute. 1984. Vol. 100, p. 3-16 (in Russian). <https://pmi.spmi.ru/pmi/article/view/10665>



Abstract. Each territory on the Earth with its relief, geological formations, processes and phenomena represents the geological environment of human life and activity. Briefly, the geological environment is the geological conditions surrounding us.

Kiryukhin V.A. State and objectives of hydrochemical research in connection with the protection of fresh groundwater from pollution. Journal of Mining Institute. 1980. Vol. 80, p. 3-8 (in Russian). <https://pmi.spmi.ru/pmi/article/view/11023>



Abstract. The needs of the humanity in fresh water are growing every year, and so are the demands for water used; the standards for permissible concentrations of toxic substances are being tightened, the number of components by which its practical significance is assessed is increasing.

Scientific edition

CHEMICAL SAFETY DAY

Digest

JOURNAL OF MINING INSTITUTE

№ 7 • 2024

Editor *S.V. Sinyavina*

Digester *P.V. Kotova*

DTP specialist *S.A. Lysenko*

Photos are submitted by the Mining Museum
and Forpost North-West online media
(photographer *P.V. Dolganov*)

Publishing House
of Empress Catherine II
Saint Petersburg Mining University
<https://pmi.spmi.ru>

The Mining Museum
<https://museum.spmi.ru>



Anyone wishing to issue a scientific digest is welcome
to Publishing House of Saint Petersburg Mining University
(email: pmi@spmi.ru)