



“Gheorghe Asachi” Technical University of Iasi, Romania



EDITORIAL

OCCUPATIONAL HEALTH AND SAFETY IN INDUSTRIES WITH EXPLOSION HAZARD: CURRENT KNOWLEDGE AND RESEARCH

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This special issue of *Environmental Engineering and Management Journal* is devoted to the on-going research on risks generated by the industrial activities with potentially explosive and/or toxic atmospheres, with respect to occupational health and safety, environmental protection, safety of mineral resources and materials, as well as to rescue operations. It includes selected peer-reviewed papers from the Proceedings of the **International Symposium on Occupational Health and Safety (SESAM 2011)**, held during 09 - 11 November 2011, in Sinaia, Romania and organized by the National Institute for Research and Development in Mine Safety and Protection to Explosion – INCD INSEMEX Petroșani (in the close neighbourhood of the mining exploitation of Jiu Valley), with the support and cooperation of the University of Petroșani, Labour Inspection and under the auspices of the Romanian Ministry of Economy, Commerce and Business Environment.

The symposium was supervised by an International Scientific Committee, consisting of the following members: Professor Józef DUBIŃSKI; Dr. Alois ADAMUS; Professor Emeritus Roy M. BUCHAN, Dr. Miroslav TUFEGDZIC Dipl. Phys.; Professor Bahtyar UNVER, together with a National Scientific Committee, which included the following specialists: Constantin LUPU, PhD; Emilian GHICIOI, PhD, Artur George GĂMAN, PhD, Sorin BURIAN – PhD., Eng., Ion TOTH – PhD., Eng., Constantin CIOCOIU, PhD, Professor Emil POP,

whose efforts contributed greatly to the overall success of the scientific event.

The organization of this symposium by INCD INSEMEX Petroșani became a tradition, which is likely to continue since it brings together specialists from the occupational health and safety field, the national economy, state authorities and specialists from the academic environment.

This scientific event supports the research-development and innovation activities, aimed at achieving the following objectives:

- maintaining a close relationship between the scientific research and the industry, both in terms of equipment development and increase of the occupational health and safety level of workers;
- dissemination, promotion and presentation of research results;
- communication of the latest achievements in the topics set forth;
- maintaining contacts and integration of Romanian specialists with the international scientific community activities, as well as the capacities increasing in order to provide original solutions;
- identification and presentation of international cooperation projects in the covered fields.

The organizers planned to combine the theoretical and practical issues of occupational health and safety aspects in a balanced way, since specialists from research institutes, universities, regional labour inspectorates as well as economic agents and practitioners were invited to attend the symposium.

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The topics refer in particular to mining activities carried out in the Jiu Valley, Romania.

The event succeeded to communicate the scientific concerns of researchers, practitioners and specialists from the occupational health and safety field, in a time of concern regarding the decrease of occupational health and safety risks related to workers, the compliance with the health and safety policy, as well as the prevention or decrease of activities which can have a significant impact on the environment, including the environmental performance indicators.

This project is of high relevance since many environments are especially challenging: they can degrade somewhat quickly and could change as mining progresses. Dust and noise are essentially related to rock breaking, while air and light must be supplied artificially in underground mines. Also, the use of explosives, as well as many traditional mining activities discharges harmful gases into the underground environment. Ergonomic vulnerabilities are widespread in mining as workers usually handle heavy equipment and work intensely, often in enclosed spaces and under restrictive conditions. In some cases ergonomic risks, coupled with poor engineering design, contribute to increased safety risks.

In this context, this editorial introduces twenty-three papers, which constitute a representative sample of topics covered during the symposium. Important topics addressed in some papers refer to the application of 3D-Cadvent windows for the analysis and management of underground ventilation systems, as well as the avoidance of unexpected occurrence of methane accumulations related to coal mining which could reach concentrations above the limits permitted by regulations. This is completed by state-of-the art software for the modelling, solving and simulation of underground mining ventilation networks.

Analyses of the working regime and the situation of the most frequently occurring defects in the operation of coal mining combines used in Jiu Valley are adjoining with those regarding the required safety measures and tools for decreasing the cost of working accidents which occur in electrical installations. Another category of studies cover research on the assessment of the ignition probability of low current circuits designed for use in explosive atmospheres, and research on the electrocution hazard in three-phase electrical networks with ground-isolated neutral point. The practices and trends regarding the labour organization at European level are also discussed. Subsequently, an integrated method for internal efficient auditing of occupational health and safety applicable to complex work systems found in the hydroelectric power generation systems is developed.

New methods were also discussed comprehensively, regarding: the assessment of energy limited supply sources, designed for use in potentially explosive atmospheres; the verification of the safety parameters for electrical detonators ignition systems, integrated in special trucks used in mining; the analysis of fireworks and their essential safety requirements which should ensure minimal risk when using, storing or selling such products.

Various types of overvoltage suppressing circuits (with passive components and with active components in different variants) were proposed, developed, verified and experimented. Experimental laboratory tests were used to analyze the maximum surface temperature as a safety parameter for conveyor belts, as well as to determine the electrostatic field generated by light conveyor belts in operation, for a subsequent assessment considering the ignition of the combustible/ flammable substances and the factors which affect the flameproof motor enclosure design, in order to pass the tests in explosive gas mixtures. Also, specific testing methods and standards were applied to study the way in which natural gas migrates throughout the soil when transported through damaged underground distribution pipelines.

Other studies discuss the development of specialized computer software that may be used both as instruments for managing major incidents which occurred in the mining environment, as well as platforms for simulating major accidents by the mining unit dispatchers. The major accidents which may occur during the processing of slime-sludge from mud-setting ponds, as well as the importance of an efficient management for preventing such accidents and for protecting the environmental factors are subjects of debate in several papers. A geographic information system (GIS) of the Jiu Valley coal field has been established so as to assess the development in this area. Gamma spectral analysis was applied to study different soil samples collected from Petrosani, a city located in the Jiu Valley coal field. The results of some studies regarding the landslides produced in the rock dump Bujorascu valley, administrated by the national Society of Lignite Oltenia, and also solutions for improving the stability of waste deposits were provided.

All studies illustrated in this issue are of high scientific and practical value, having the occupational health and safety management in industries with explosion and/or toxic hazard as bonding elements.

The editors would like to thank the reviewers for their help in evaluating the papers included in this issue. Their cooperation was essential for the accomplishment of our project.

Guest editor:

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Constantin Lupu, senior researcher, 2nd degree, PhD in Mines, Petrol and Gas, develops his research activity within The National Institute for Research and Development in Mine Safety and Protection to Explosion – INSEMEX Petroșani, Romania, since 1975, within the Laboratory of Aeration, Methane and Fires. Due to his great leadership and management qualities, he became a team leader within the framework of the Laboratory for Safety of Mineral Resources being subsequently promoted as Head of the Laboratory for Safety of Mineral Resources and then Head of the Rescue Station which operates within the framework of INCD INSEMEX Petrosani. Since 2005 he acts as the General Director of INSEMEX.

Constantin Lupu is member in several national and international Scientific Organizations and national assessment/certification bodies. He published 6 books in Romania as main author or as co-author, 34 research articles in national journals and 9 articles in international journals. Also, he participated within national and international scientific events, such as symposia or conferences held in Romania or abroad, where 95 papers were presented, most of the above mentioned scientific products involving the Occupational Health and Safety field, or other related fields like the safety of mineral resources, the protection to explosion in mining and industrial ventilation. He won several prizes and awards. Constantin Lupu coordinated 92 contracts concerning Research and Development, Innovation and Technical Expertise and was member in research and expert groups which worked within 141 Research and Development, Innovation and Technical contracts. His scientific expertise resulted also in 6 patent applications at the State Office for Inventions and Trademarks (OSIM).

