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The Volume contains works of young researchers - participants of the XVI International Forum-Contest of Students and Young Researchers “Topical Issues of Rational Use of Natural Resources”, which was held at St. Petersburg Mining University on June 17-19, 2020. The Volume can be of great interest for a wide range of researchers, scientists, university lecturers, specialists and managers of industrial enterprises and organisations as well as for businesspeople involved in exploration, prospecting, development and processing of minerals.

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CURRENT STATE AND IMPROVEMENT OF METHODS FOR IDENTIFICATION AND ASSESSMENT OF PROFESSIONAL RISKS AT ENTERPRISES OF THE PETROCHEMICAL COMPLEX OF THE REPUBLIC OF BELARUS

On the basis of the analysis of the global level of occupational injuries, experts of the International Labor Organization come to the conclusion that there are approximately 340 million registered work accidents each year of which 2.3 million are fatal, every minute 4 people die from work-related injuries and diseases About 650 thousand deaths per year are registered in the working area from exposure to hazardous substances alone. The economic damage to society from adverse and hazardous working conditions is up to 4% of world GDP. At the same time, it is well known that one dollar of funds invested in the improvement of working conditions at production site makes a profit of about \$2.6 [1-2].

According to official data of the National Statistical Committee of the Republic of Belarus, the total number of victims of industrial accidents is growing in the organizations of Belneftekhim concern over the last four years of observation. For example, total number of the industrial injures in 2016 – 23 (12 of them with severe outcome), in 2019 – 36 (14 of them with severe outcome, 2 with fatal outcome). The main causes of accidents at work in the organizations of Belneftekhim concern are the same as elsewhere in the Republic of Belarus, namely: violation of labor protection requirements by the victims; personal negligence; unsatisfactory organization of hazardous work; violation of labor protection requirements by other employees. These reasons are the result of low efficiency of functioning of the existing occupational safety management.

Comparative analysis of hazard identification and risk assessment procedures employed by the organizations of Belneftekhim concern revealed the following:

1. Hazard identification is performed by working groups (committees) that are mostly identical by the list of engaged specialists and/or experts. Occasional organizations have set the procedure of obligatory involvement of the employees directly from the workplaces into the list of the expert group (in accordance with ISO 45001-2018);

2. There are no procedures for coordination of the assessments made by several experts of one expert group for compiling a map of hazard identification and risk assessment;

3. Hazard identification is performed for all structural units, professions (positions), working places, types of works, etc. Occasional organizations have set hazard identification procedures for visitors and contractors;

4. The main operating modes in which hazard identification is performed are “Normal” and “Emergency”. The list of types of work that are part of named modes differs in each organization. Occasional organizations have established additional modes of operation;

5. Most organizations haven’t set the procedure of hazard identification directly at the workplaces. Some organizations define this procedure as “Observing the workplace and

controlling the main factors”. Logical methods of hazard identification (“event tree”, “what will happen if?” and others) are employed by only one organization;

6. Hazard identification is performed by organizations using various sets of analyzed factors the basis of which are hazardous and harmful production factors as described in GOST 12.0.003 standards system of labor safety “Workplace hazards. Classification”. Only occasional organizations include additional factors, e.g. personal ones. A number of organizations use hazard identification techniques with minimal (partial) consideration of possible sources of information about hazards and dangerous and harmful factors.

7. Hazard identification procedures are most effective while:

taking into account the maximum possible set of operating modes of the organization, the impact of suppliers, contractors and visitors on the immediate workplaces;

involving the employees directly from the workplaces into the process of hazard identification;

using logical analysis methods (“event tree”, “what will happen if?” and others).

8. The methods of risk assessment (the American method of expert assessments using the Fine-Kinney method) used by the organizations of the concern have significant differences. The specificity of the industry is not taken into account – there is fire and explosion hazard and a significant amount of harmful substances.

9. Some organizations use additional specific detailed criteria for assessing the indicators of the Fine-Kinney method and, as a result, the distribution of factors of the indicators of this method is minimized, its effectiveness, reliability and quality of further risk management are reduced.

10. Some organizations apply additional rigid criteria for assessment the Fain-Kinney method indicators, which, on the one hand, significantly increases the reliability of risk assessment and the effectiveness of risk management process, on the other hand, complicates the risk assessment procedure and making managerial decisions.

11. Some organizations, when calculating the quantitative value of risk, take into account additional adverse factors (hazards), for example, psychological factors of a particular employee.

12. The highest efficiency is demonstrated by risk assessment methods taking into account additional adverse factors (hazards) and risk management levels of “medium” - “very high”.

An established integral departmental method of hazard identification and risk assessment in compliance with the specific peculiarities of the industry was presented in order to provide efficient control and management of hazards (hazardous factors). This established method has the following pre-conditions:

- taking into account the maximum number of hazards affecting the value of the quantitative risk assessment;

- providing the possibility to correlate production factors and accident rate, and taking it into account when assessing risk;

- determining the maximum permissible risk levels that ensure the best efficiency of the method;

- providing the ability to quickly and easily calculate the risk magnitude, the possibility of updating it, taking into account changes in the working environment and personal characteristics of personnel;

- providing a reliable hazard assessment by means of digitalization of input and output data.

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