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DEVELOPMENT THE MODEL OF ASSESSMENT THE OH&S RISKS FOR THE WORK PLACE DRILLER IN THE PROCESS OF GEOLOGICAL EXPLORATORY DRILLING

Abstract

This work gives a model of OH&S risk assessment for the workplace driller in the process of implementation the geological exploratory works. Model of OH&S risk assessment for the workplace driller is based on ISO 31010 Standard and fulfilling the requirements of OHSAS 18001 and legal regulations. In this case, a partially adjusted and optimized Kinny method was used. Model of OH&S risk assessment provides a reasonable basis for development and implementation the system of occupational health and safety management in accordance with BS OHSAS 18001: 2008, since it is practically applied and tested in the organizations dealing with geological exploratory drilling, such as "Geops Balkan Drilling Services" Ltd., Drillex International Ltd., International Drilling Service Ltd. and Stara Planina Resources Ltd.

Keywords: OH&S risk, driller, geology, exploratory drilling

1 INTRODUCTION

Safety and health at work is a very important part of work at every employer - regardless the type of activity of the employer. By the systematic approach to the safety and health at work, the importance of prevention in all phases of work is given. Assessment of OH&S risk tends to control the risk in order to eliminate the dangers and hazards of injury, occupational diseases and illnesses related to work and to establish the system of occupational health and safety at work (OHSAS). Achieving the quality in management the system of health and safety at work is impossible without complying with the basic legal requirements of assessment the OH&S risks.

Organization whose activity is geological exploratory drilling is expected to be confronted with significant OH&S risks. If

OH&S risks are not adequately assessed and placed under the control, they may affect in a negative way the achievement of organization objectives. The goals of organization can refer to a range of activities, from strategic initiatives through to operations and can be reflected in the non-compliances with the regulations and other requirements. Considering that the technological process of exploratory drilling, consisted of operations involving a significant number of hazardous materials to the potential OH&S risks, may be even greater.

Management of OH&S risk involves the application of logical and systematic methods for identifying, analyzing and assessment the OH&S risks during the process of exploratory drillings, monitoring and review of risks to the aim of effective and efficient

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management of integrated quality management systems (ISO 9001), environmental protection (ISO 14001) and occupational health and safety at work (OHSAS 18001).

The aim of this research is to evaluate the OH&S risks in the process of geological exploratory drilling with finding the answers to the following basic questions:

- What can happen in the process of exploratory drilling and why (hazard identification)?
- What are the probabilities of danger and hazards?
- Can it be managed by the assessed OH&S risks and whether it requires further treatment of reduction the OH&S risks?
- How to make the planning of measures to protect the health and safety at work that may affect the probability reduction of danger and hazard occurrence?

In accordance with determined aim of research, the following research hypothesis is set:

- a) Based on a systemic approach it is possible to make a positive identification, risk analysis and assessment of OH&S risks and to establish the mechanisms to control the assessed OH&S risks.

Based on the identification of problems, set objective and hypotheses of research, the following research tasks have resulted, namely:

- 1) to perform a system analysis, and define the model and methods of assessment the OH&S risks;
- 2) to identify the hazards, determine the probability of occurrence and potential consequences;
- 3) to assess the OH&S risks for a specific job position;
- 4) to define a Plan of measures to control the increased OH&S risks.

In order to fulfill the tasks of research and achieving the objective of testing the proposed hypotheses of research, the known methods are used are that have contributed to improving the methodology of research, namely:

- 1) descriptive method (method of observation and description) through the analysis of available data;
- 2) method of analysis the theory and practice;
- 3) method of general system theory or systematic approaches and system analysis;
- 4) method of the process modeling, and development the flow charts.

2 THEORETICAL APPROACH, SELECTED METHODOLOGICAL APPROACH AND METHODS OF ASSESSMENT THE OH&S RISKS

2.1 Theoretical approach to assessment the OH&S risks

To meet the requirements of the Standard OHSAS 18001 as well as the requirements of legislation, it is necessary for all hazards and dangers that occur and/or may be occurred at the workplace **driller in the process of exploratory drillings** to carry out the assessment of OH&S risks. For the purpose of effective and efficient assessment of OH&S risks, it is necessary to use the appropriate method that will provide the proactive, but not reactive assessment results [10]. The effectiveness and efficiency of the OH&S system can not be only achieved by assessment the OH&S risks, but it is necessary that after the assessment of OH&S risks of organizations, to provide conditions that the results of the assessment OH&S risks are taken into account in establishing the OH&S management system and to define the management plan with increased OH&S risks.

In the world and in the Republic of Serbia, the most widely used tool for establishment, maintenance and upgrading the occupational health and safety at work system is the Standard OHSAS 18001. OH&S system is a structured process for overcoming the OH&S risks. The aforementioned standard has precisely provided the requirements of some key elements of occupational health

and safety at work, such as: identifying the hazards and dangers that may arise where the compulsory taking into account the behavior and abilities of employees, management, communication, cooperation and consulting with employees.

To manage with OH&S risks means finding one acceptable combination that allows actions to improve safety and health at work and elimination of all dangers and hazards that lead into question the optimal functioning of OH&S system. Management of OH&S risks can be achieved with assumptions that include the following:

- timely identification of all dangers and hazards;
- making a list of dangers and hazards that affect the OH&S system;
- analysis of previous data on consequences of injuries at work, occupational diseases and diseases related to work;
- analysis of individual dangers and hazards and their grouping by similarity;
- analysis of interdependence the individual dangers and hazards and their potential consequences;

- assessment of OH&S risks for the established list of dangers and hazards;
- establishment an environment that fosters a tradition of teamwork;
- development of methods and techniques for assessment and management the OH&S risks;
- establishment an optimal level of safety at work;
- adoption of goals, plans and programs for management of assessed OH&S risks.

For effective control OH&S risks risks, it is necessary to know to manage the information, based on which the conclusions and decisions are made, i.e. it is necessary to pay attention to the quality of information which is contained in the Act on assessment the OH&S risks.

Assessment of OH&S risks risks in the business process is in no case a constant, but a dynamic value that changes from moment to moment. Every time some elements of dangers and hazards is changed, the level of OH&S risks is also changed. There is a standard that defines the process of risk assessment ISO 31010: 2010 [8].

Figure 1 Block diagram of assessment process the OH&S risks [8], [12]

2.2 Selected method of assessment the OH&S risks

The Kinny method is one of the methods by which it is possible to assess the OH&S risks. OH&S risks change over time in three basic categories, which are analyzed by the Kinny method, as follows:

- probability of dangers and hazards;
- severity of consequences that may result from the occurrence of dangers and hazards;
- frequency of incidence the dangers and hazards.

Based on identification of danger at the workplace and working environment and statistical data processing about dangerous events (occupational injuries), hazardous materials and critical points of the process, the assessment of OH&S can be done.

The process of hazard and danger identification and evaluation the impact can achieve the following:

- to identify all dangers and hazards that may impact the workplace and working environment;
- to analyze the impacts of hazards and dangers at the workplace and working environment;
- to establish an evaluation system of any dangers and hazards;
- to determine the significance of any dangers and hazards.

Parameters of analysis are numerically evaluated, and the final assessment of OH&S risks at the workplace and work en

vironment is expressed numerically. The default setting of the Kinny method in assessment the risks at the workplace and work environment is essentially simple and easy to understand. The essence of the method consists in realization the following activities:

- a) determining the all potential dangers and hazards that are/or may incur as the result of work process;
- b) determining the possible causes of each danger and hazard;
- c) analysis of each danger and hazard in order to determine using the analytical methods:
 - probability of occurrence the potential danger and hazard;
 - serious consequences which employee suffers in occurrence of danger and hazard ;
 - frequency of danger and hazard occurrence.
- d) evaluating the level of risk is made by the product of three factors:
 - probability of dangers and hazards - V;
 - serious consequences due to occurrence of dangers and hazards - P;
 - frequency of occurrence the dangers and hazards - U;

Evaluation of the risk **R** is done according to the formula:

$$R = V \times P$$

Table 1 Matrix of risk assessment by Kinny method [11]

Identified danger or hazard	ASSESSMENT OF OH&S RISKS $R = V \times P$		
	Probability v	Consequence P	Risk level R
x			
y			
z			

2.2.1 Criteria for probability assessment - V

Table 2 Description of criteria for probability assessment of occurrence the dangers and hazards [11]

RANK	DESCRIPTION OF CRITERIA FOR PROBABILITY ASSESSMENT - V
0.1	Hardly conceivable
0.2	Practically unbelievable
0.5	There is, but only very unlikely
1	Unlikely, but possible in limited cases
3	Little as possible
6	It is quite possible
10	Predictably, the expected

2.2.2 Criteria for assessment of consequences - P

Table 3 Description of criteria for assessment of consequences in occurrence of dangers and hazards [11]

RANK	DESCRIPTION OF CRITERIA FOR ASSESSMENT OF CONSEQUENCES - P
1	Illness, injury which requires first aid and any other treatment
2	Medical treatment by a physician
3	Severe-disability, serious individual injury with hospitalization and lost days
6	Very serious individual-fatal accidents
10	Catastrophic-with multiple fatalities

2.2.3 Criteria for assessment the frequency of occurrence the dangers and hazards - U

Table 4 Description of criteria for assessment the frequency of occurrence the dangers and hazards [11]

RANK	DESCRIPTION OF CRITERIA FOR FREQUENCY - U
1	Exposed rarely (annually)
2	Exposed monthly
3	Exposed weekly
6	Exposed daily
10	Exposed permanent, continuous

2.3.4 Criteria for classification the risk level (R)

Table 5 Criteria for determining the risk level [11]

Total score	Risk class	Classification of risk level	Description the classification of risk level
>0.1 <20	R I	Negligible risk	No action is required.
>20 <70	R II	Low risk	There is no need for additional activities in the management of operation. An economically cost-effective solution or improvement without additional investment could be considered. It is necessary to monitor the situation in order to possess information on implementation the prescribed activities.
>70 <200	R III	Medium risk	Efforts are needed to reduce the risk, but the costs of prevention have to be carefully planned and limited to a certain level. It is necessary to define a deadline for implementation of improvements. For those events where extremely dangerous consequence can be occurred, it is necessary to further verify the probability of occurrence of such events in order to define the required level of activity to mitigate risk.
>200 <400	R IV	High risk	One must not start with a given activity, while the level of risk is not reduced. Significant resources are needed to reduce the risk. If the risk is applied to all started activities, it is necessary to take urgent actions to reduce the level of risk.
>400 <1000	R V	Extremely high risk	Activity must not be commenced nor continued until the level of risk is reduced to an acceptable level. If investing the limited resources it is not possible to reduce the level of risk to an acceptable level, the activity must remain prohibited.

2.2.5 Categorization and characterization of risk

Table 6 Criteria for categorization and characterization of risks [11]

Assessment the risk level	Categorization of risk level	Risk characterization
R I	Negligible risk	Acceptable risk
R II	Low risk	Acceptable risk
R III	Medium risk	Increased risk
R IV	High risk	Unacceptable risk
R V	Extremely high risk	Unacceptable risk

Table 7 Description of risk characterization [11]

Risk characterization	Description of risk characterization
Acceptable risk	Risk for which there is assessment and presumption that it will not result in: - occupational injuries and illnesses related to work, - inconsistency with legislation and / or deviation from the prescribed work organization, and - deviation from the prescribed policy of the health protection and safety at work system in organization.
Increased risk	Risk for which there is assessment and presumption that it will cause in the certain circumstances: - occupational injuries and illnesses related to work, - partly inconsistency with legislation and / or deviation from the prescribed work organization, and - occasional deviation from the prescribed policy and objectives of the system of health protection and safety at work.
Unacceptable risk	Risk for which there is assessment and presumption that it directly cause: - occupational injuries and illnesses related to work, inconsistency with legislation; - deviation from the prescribed work organization, and - deviation from the prescribed policies and objectives of the system of health protection and safety at work.

3 RESEARCH RESULTS - PRACTICAL EXAMPLE OF ASSESSMENT THE OH&S RISK

Job position code	IDENTIFYING AND DETERMINING THE DANGERS AND HAZARDS AND RISK ASSESSMENT AT THE JOB POSITION: DRILLER - GEOLOGICAL EXPLORATORY DRILLING
III GROUP	
1 GENERAL DATA ON JOB POSITION	
1.1 Name of work organization:	"GEOPS BALKAN DRILING SERVICES" LTD.
1.2 Sector:	Conduction the geological exploratory drilling
1.3 Service:	/
1.4 Department:	/
2 DATA ON THE WORK PROCESS:	
2.1 Jobs by job classification and work tasks (description):	
Driller - Geological exploratory drilling:	
<p>Works are done using the appropriate machines and methods for exploration of mineral resources. Drilling is carried out in geological surveyed areas in order to find the solid mineral resources. Geotechnical drilling machine is mounted ana special vehicle with caterpillars on which all working and driving parts of the machine are also installed, and the same are arranged and secured in a safe manner. Commanding of machine is done properly with the control board.</p> <p>Drilling a hole is carried out through the drive motor with reduction gear and system for drilling with diamond tools which are mounted on a special tube. Installation and removal of diamond tools on the machine is performed. Clamping of drilling tools and installation of extensions are performed appropriately performed. Extraction of geological cores via the pneumatic system and the system of ropes and drums and are also performed in a safe manner. Monitorinf and taking the appropriate measures for cooling the drilling through cooling system that is driven by a suitable pump. Monito-ring the operation of generators to supply electricity.</p>	
Periodical jobs: If necessary, driving a motor vehicle from the place of work to the base and vice versa.	

3 PODACI O RADNOM I POMOĆNOM PROSTORU				
3.1 Structures:	Business premises in Bor, Danila Kiša 6/28			
3.2 Workspace:	Actual site in the exploration area Brestovac - Metovnica			
3.3 Group of elements of work space	3.3.1 Elements of work space	3.3.2 Prescribed requirements	3.3.3 Assessment the state of workspace	
			Satisfies✓	Unsatisfies ✕
1) Size and height of work premises	Free floor space	2 m ² per worker	/	
	Free air space	10 m ³ per worker	/	
	Height of workroom	minimum 2.5 m	/	
2) Floors	Floor level	above the level of surrounding land	/	
	Material of floor	resistant to abrasion, water airtight	/	
	Method of making	flat smooth but not slippery	/	
	Condition and maintenance	regularly	/	
3) Walls and ceiling	Material and making	thermal, acoustic insulation	/	
	Processing and color	plastered and painted	/	
	Condition and maintenance	light surface/regularly	/	
4) Doors	Opening direction and width	depending on the purpose of room	/	
	Number and arrangement	at 30 to 50m min one door	/	
5) Windows	Surface of windows	min 12.5 % of floor area	/	
	Incidence angle of light	minimum 24°	/	
	Principle and method of opening	easily	/	
6) Heating	Method of heating	steam heating	/	
	Arrangement of heating bodies	properly	/	
	Condition and maintenance	according to the maintenance plan	/	
7) Microclimate	Room temperature	18-22° C	/	
	Relative room humidity	65-80 %	/	
	Airflow speed	0,3 m/s (air conditioned)	/	
8) Lighting	General illumination	classic properly executed	/	
	Local illumination	not required	/	
9) Others	Sanitary facilities	properly executed	/	
	Changing rooms	not required	/	
	First aid cabinet	there is prescribed equipment	/	
3.4 Auxiliary work-space:	/			
3.5 Note:	Work is performed in open space			

4 AVAILABLE MEANS AND EQUIPMENT FOR WORK			
4.1 Machines	Geological drilling machines CHRISTENSEN CS 14; CHRISTENSEN CS 10; CHRISTENSEN CS 14 - CE C 20;		
4.2 Devices	Compressors, pumps, etc.		
4.3 Facilities	/		
4.4 Installations	Compressed air		
4.5 Tools and accessories	Different types of tools for tightening of pipes that are used for geological drilling		
4.6 Other tools for work	Combined passenger – freight car		
5 MATERIALS, RAW MATERIALS AND OTHER SUBSTANCES THAT ARE USED IN THE OPERATION PROCESS			
5.1 Materials	Different types of raw materials such as oil and grease; AMC CR650 RD		
5.2 Raw materials	Samples of minerals obtained in geological drilling		
5.3 Other substances	/		
6 QUALIFICATION AND TRAINING			
6.1 Specific professional training:		Yes, training for machine operation	
6.2 Training for health and safety at work::		Yes, training was carried out	
6.3 Training for fire protection:		Yes, training was carried out	
7 EQUIPMENT AND MEANS FOR PERSONAL PROTECTION AT WORK			Score of condition
7.1 Means for head protection:		Safety helmet	Satisfies
7.2 Means for body protection:		Protective suit; Protective identification vest	Satisfies
7.3 Means for hands protection:		Protective gloves	Satisfies
7.4 Means for legs protection:		Safety shoes with steel drips; Protective rubber boots with steel drips	Satisfies
7.5 Means for eyes protection:		Safety glasses	Satisfies
7.6 Means for hearing protection:		Wear ear muffs; Earplugs and others.	Satisfies
7.7 Equipment for safe operation:		Safety harness for working at height	Satisfies
8 WORK ORGANIZATION			
8.1 Conditions for entering employment:			
Degree of education		From II to VI	
Educational profile		All professions	
Work experience		Preferably	
Special knowledge, skills and ability		Ability of driving a motor vehicle	
8.2 General information about executors:			
Total number of employees at the workplace/group:		>4	Men: Yes Women: No
Professional invalids works at the workplace:		No	Men:/ Women: /

8.3 General requirements of the workplace:			
Engagement according to the place of activities	In the work premises	Office	0%
		Ancillary work facilities	0%
	Work in the open	Field work	100 %
		Worksite	100 % periodically
Execution of tasks	Work with means of transport	Yes, periodically	
	Work in shifts	Yes	
	Work at night	Yes	
	Organizes and manages	Yes	

9 ANALYSIS OF THE CURRENT STATE OF SAFETY AND HEALTH AT WORK-PLACE		
9.1. Element of safety at work	9.2. Compliancy with requirements	
	Yes ✓	No ✗
Applicable and professional findings on executed reviews and testing of means for work	✓	
Applicable and professional findings on executed reviews and testing the conditions of work	✓	
Reports on previous and periodical medical examinations of employees	✓	
Data on occupational injuries	✓	
Data on occupational diseases and diseases related to work	✓	
Means and equipment for personal protection at work	✓	
Analysis of taken measures to prevent occupational injuries	✓	
Safety instructions for work	✓	
Required documentation for use and maintenance, or packaging, transportation, use, storage, destruction and others	✓	
Fire protection	✓	

10 IDENTIFYING THE DANGERS AT WORKPLACE				
10.1 Grouping of dangers				
Group of dangers	Code	Subgroup of dangers	Dangers ✓YES / ✗NO	
1) Mechanical dangers that occur using the work equipment such as:	(01)	Insufficient security due to rotating or moving parts,	✓	
	(02)	Free movement of parts or materials that can cause injury of employee,	✓	
	(03)	Internal transport and movement of working machines or vehicles, as well as moving some equipment for work,	✓	
	(04)	Use of dangerous instruments of work which can produce an explosion or fire,	✓	
	(05)	Inability or limitations of timely removal from the place of work, exposure to closure, mechanical shock, match, etc.,	✓	
	(06)	Other factors that may occur as mechanical sources of danger,	✓	

2) Dangers arising in connection with the characteristics of the workplace, such as:	(07)	Dangerous surfaces (floors and all kinds of treads, surfaces with which an employee comes in contact, and which have sharp edges, spikes, rough surfaces, protruding parts, etc.)	✓	
	(08)	Work at height or in depth, in terms of regulations on safety and health at work,	✓	
	(09)	Work in confined, restricted or danger area (between two or more fixed parts, between moving parts or vehicles, work indoors, which is insufficiently illuminated and ventilated, etc.)		✗
	(10)	Possibility of slipping or tripping (wet or slippery surfaces),	✓	
	(11)	Physical instability of workplace,		✗
	(12)	Possible consequences or disturbances due to the mandatory use of means or equipment for personal protection at work,	✓	
	(13)	Impacts due to the performance of work processes using inappropriate or unadjusted methods,		✗
	(14)	Other dangers that may occur in connection with the characteristics of workplace and work methods (using the means and equipment for personal protection at work that burden the employee, etc.);	✓	
3) Dangers that occur using electricity, such as:	(15)	Risk of direct contact with parts of electrical installations and equipment under voltage		✗
	(16)	Risk of indirect contact		✗
	(17)	Risk of thermal effects that are developed by electrical equipment and installations (overheating, fire, explosion, electric arc or sparks, etc.),		✗
	(18)	Danger of local lightning strike and consequences of atmospheric discharge	✓	✗
	(19)	Danger of harmful effects of electrostatic charge,		✗
	(20)	Other dangers that may occur related to the use of electricity,		✗

11 IDENTIFYING THE HAZARDS AT WORKPLACE				
11.1 Grouping of hazards				
Group of hazards	Code	Subgroups of hazards	Hazards ✓YES / ✗NO	
1) Hazards arising or occurring in the work process, such as:	(21)	Chemical hazards, dust and fumes (inhalation, ingestion, penetration into the body through the skin, burns, poisoning, etc.)	✓	
	(22)	Physical hazards (noise and vibration),	✓	
	(23)	Biological hazards (infections, exposure to micro-organisms and allergens)		✗
	(24)	Adverse impacts microclimate (high or low temperature, humidity and air velocity)		✗
	(25)	Inadequate – insufficient illumination,	✓	
	(26)	Harmful effects of radiation (heat, ionizing or non-ionizing, laser, ultrasound),		✗
	(27)	Adverse climatic effects (work outdoors),	✓	
	(28)	Hazards generated using hazardous substances in the production, transport, packaging, storage or destruction,		✗
	(29)	Other hazards that occur in the work process, and that may be the cause of injury of the employee at work, occupational disease or illnesses related to work,	✓	

2) Hazards arising from psychological and psycho-physiological efforts related causally to the workplace and jobs that an employee performs, such as:	(30)	Efforts or physical stresses (manual handling of loads, pushing or pulling the loads, various long-term increased physical activities and etc.),	✓	
	(31)	Unphysiological position of the body (prolonged standing, sitting, squatting, kneeling, etc.)	✓	
	(32)	Efforts for various tasks that cause psychological stresses (stress, monotony, etc.),	✓	
	(33)	Responsibility in receiving and transferring of information, use the appropriate knowledge and skills, responsibility in rules of conduct, responsibility for rapid changes in work procedures, work intensity, spatial causality of the workplace, conflict situations, working with clients and money, lack of motivation to work, responsibility in management, etc. ;	✓	
3) Hazards related to the work organization, such as:	(34)	Overtime working hours (overtime work), shift work, part-time, night work, standby in case of intervention,	✓	
4) Other hazards occurring at workplaces, such as:	(35)	Hazards caused by other persons (violence to persons working at the counters, security persons, etc.)		✗
	(36)	Work with animals,		✗
	(37)	Work in an atmosphere with high or low pre-sure		✗
	(38)	Work near water or under the water surface,		✗
	(39)	Other dangers and hazards.		✗

12 DETERMINING THE LIST OF DANGERS AND HAZARDS AT THE WORKPLACE	
12.1 Determined list of hazards	
01.1	Danger of occupational injuries caused by rotating or moving parts of the machine for geological drilling and explorations
02.1	Danger of occupational injuries caused by movement of parts during geological drilling and explorations
03.1	Danger of occupational injuries caused by movement of machines and vehicles as well as the equipment used in geological drilling and explorations
04.1	Danger of occupational injuries caused by the use of compressors and diesel generators that produce high pressures and that can cause explosions and fires
05.1	Danger of occupational injuries caused by inability or limitations for timely removal from the place of work on the machine for geological drilling and explorations
06.1	Danger of occupational injuries caused by potential traffic accidents in the management of intermittent of passenger car or light truck on categorized and uncategorized roads and transportation of working staff from the base to the place of work and vice versa;
07.1	Danger of occupational injuries caused by the type of treads and edges, rough surfaces and protruding parts on the machines for geological drilling and explorations
08.1	Danger of occupational injuries caused by work at height in servicing and maintenance the machines for geological drilling and explorations
	Danger of occupational injuries caused by the possibility of slipping or tripping (wet or slippery surfaces) on the machines and / or explored area on which the geological drillings are carried out

12.1	Danger of occupational injuries caused by mandatory use the means or equipment for personal protection at work (ear muffs, goggles, gloves, etc.).
14.1	Danger of occupational injuries caused by difficulty of precision work and difficulty of movement due to the mandatory use of personal protective equipment at work
18.1	Danger of occupational injuries caused by natural disasters and lightning and consequences of atmospheric discharge.
12.2 Specified list of hazards	
21.1	Hazard on health caused by chemical hazards caused by operation of diesel generators, work with muds containing chemicals and dusts that occur in geological drilling
22.1	Hazard on health caused by noise from the operation of diesel generators and machines for geological drilling and exploration
25.1	Hazard on health caused by insufficient illumination during night work
27.1	Hazard on health caused by adverse climate impacts in working outdoors during geological drilling and exploration
29.1	Hazard on health caused by hazards arising from the use of oils, lubricants, diesel fuel, and others.
30.1	Hazard on health caused by physical efforts and stresses during manual transfer of pipes, tools and equipment for geological drilling
31.1	Hazard on health caused by non-physiological body position during prolonged standing, squatting or kneeling in control and operation of machines for geological drilling and exploration
32.1	Hazard on health caused by the efforts of psychophysical stresses in monitoring and control the operation of machines for geological drilling and exploration,
33.1	Hazard on health caused by responsibility in receiving and transferring the information, using the appropriate knowledge and skills to work on machines for geological drilling and exploration,
34.1	Hazard on health caused by prolonged work as well as work at night for geological drilling and exploration.

13 ASSESSMENT OF OH&S RISK						
13.1	Risk assessment for determined specified hazards	V	T	U	R-Risk	Specified measures for risk assessment
01.1	Danger of occupational injuries caused by rotating or moving parts of the machine for geological drilling and explorations	6	3	6	108	Instructions for safe operation in geological drilling
02.1	Danger of occupational injuries caused by movement of parts during geological drilling and explorations	6	3	6	108	Use of technical protective devices; Instructions for safe operation in geological drilling
03.1	Danger of occupational injuries caused by movement of machines and vehicles as well as the equipment used in geological drilling and explorations	3	3	6	54	Instructions for safe operation in geological drilling;

04.1	Danger of occupational injuries caused by the use of compressors and diesel generators that produce high pressures and that can cause explosions and fires	3	3	6	54	Instructions for safe operation on the machine
05.1	Danger of occupational injuries caused by inability or limitations for timely removal from the place of work on the machine for geological drilling and explorations	6	3	6	108	Instructions for safe operation on machines
06.1	Danger of occupational injuries caused by potential traffic accidents in the management of intermittent of passenger car or light truck on categorized and uncategorized roads and transportation of working staff from the base to the place of work and vice versa;	6	3	6	108	Protective measures in the use of motor vehicles
07.1	Danger of occupational injuries caused by the type of treads and edges, rough surfaces and protruding parts on the machines for geological drilling and explorations	3	3	6	54	General instructions for safe operation; Instructions – safety measures at the site
08.1	Danger of occupational injuries caused by work at height in servicing and maintenance the machines for geological drilling and explorations	6	3	6	108	Instructions for safe work at height
10.1	Danger of occupational injuries caused by the possibility of slipping or tripping (wet or slippery surfaces) on the machines and/or explored area on which the geological drillings are carried out	3	3	6	54	Instructions – safety measures at the site ; Protective measures against slipping, tripping and falling
12.1	Danger of occupational injuries caused by mandatory use the means or equipment for personal protection at work (ear muffs, goggles, gloves, etc.).	3	3	6	54	Protection measures in the use of PPE
14.1	Danger of occupational injuries caused by difficulty of precision work and difficulty of movement due to the mandatory use of personal protective equipment at work	3	3	6	54	Protection measures in the use of PPE
18.1	Danger of occupational injuries caused by natural disasters and lightning and consequences of atmospheric discharge.	1	3	1	3	Operating Instructions for geological drillings

13.2	Risk assessment for determined specified hazards	V	T	U	R-Risk	Specified measures for risk assessment
21.1	Hazard on health caused by chemical hazards caused by operation of diesel generators, work with muds containing chemicals and dusts that occur in geological drilling	6	3	6	108	Use of personal protective equipment
22.1	Hazard on health caused by noise from the operation of diesel generators and machines for geological drilling and exploration	6	3	6	108	Use of personal protective equipment
25.1	Hazard on health caused by insufficient illumination during night work	3	3	6	54	Instructions – safety measures at the site
27.1	Hazard on health caused by adverse climate impacts in working outdoors during geological drilling and exploration	6	3	6	108	Use of personal protective equipment
29.1	Hazard on health caused by hazards arising from the use of oils, lubricants, diesel fuel, and others.	6	3	6	108	Use of personal protective equipment
30.1	Hazard on health caused by physical efforts and stresses during manual transfer of pipes, tools and equipment for geological drilling.	6	3	6	108	Use of personal protective equipment
31.1	Hazard on health caused by non-physiological body position during prolonged standing, squatting or kneeling in control and operation of machines for geological drilling and exploration,	6	3	6	108	Use of personal protective equipment
32.1	Hazard on health caused by the efforts of psychophysical stresses in monitoring and control the operation of machines for geological drilling and exploration,	3	2	6	36	Proper use the prescribed work breaks (daily, weekly, yearly)
33.1	Hazard on health caused by responsibility in receiving and transferring the information, using the appropriate knowledge and skills to work on machines for geological drilling and exploration,	3	2	6	36	Proper use the prescribed work breaks (daily, weekly, yearly)
34.1	Hazard on health caused by prolonged work as well as work at night for geological drilling and exploration.	3	2	6	36	Proper use the prescribed work breaks (daily)
13.3 Comment on assessed dangers and hazards:						
Based on identified, analyzed and defined specific dangers and hazards at work place and working environment Driller-Geological exploratory drilling , the assessed probabilities of occurrence the occupational injuries, damage to health and diseases in relation to the work and assessment the severity of injury, damage to health and diseases in relation with, the MEDIUM RISK (R III) was assessed of occupational injuries, damage to health and diseases related to work.						

13.4 Opinion of occupational health service:
Professional team of occupational health service has reviewed the assessed dangers and hazards for the work place Driller-Geological exploratory drilling and thinking that the indications exists for proclamation the work place with increased risk.
13.5 The final conclusion of the Team for assessment the OH&S risk:
Based on the assessed specific dangers, the Team for assessment the OH&S risks brings: THE FINAL CONCLUSION For the work place Driller-Geological exploratory drilling , the RISK LEVEL R III – MEDIUM RISK was established for occupational injuries, damage to health and diseases in relation to the work. Based on the final conclusion on assessment the OH&S risks, the mentioned work place is categorized as the work place with INCREASED RISK . For establishing the mechanism of control/management with increased OH&S risks, it is needed to define the MANAGEMENT PLAN OF ASSESSED OH&S RISKS .

14 PLAN OF MANAGEMENT THE ASSESSED OH&S RISKS							
Risk	List of increased OH&S risks for the workplace driller - geological exploration drilling	Hierarchy of management the increased OH&S risks					Priority
		1 Measures of complete risk elimination:	2 Measure of risk replacement (substitution)	3 Measures of technical (engineering) risk control:	4 Measures of signaling the warnings or administrative control risk:	5 Measures for application the PPE and equipment for BNR	
108	Risk of occupational injuries caused by rotating or moving parts of the machine for geological drilling and exploration	Not applicable	Mandatory application the technical protection devices with rotating or moving parts	Mandatory daily and weekly inspection and periodic testing	Mandatory application the procedures, instructions. Mandatory training for safe operation. Mandatory periodic medical examination	Mandatory use of personal protective equipment and equipment for safe operation	High
108	x						
54	y						
36	z						

CONCLUSION

Institutional changes that have occurred in the Republic of Serbia in the field of health and safety at work have inevitably caused the need for development and improvement of tools for decision making in planning and management the system of health and safety at work. Making decisions based on the previously presented models and methods of assessment the OH&S risks is a flexible approach that is proactive and provides identification, determining the priorities and

documentation on OH&S risks, as well as implementation the Plan of measures for control the assessed OH&S risks.

Based on a detailed identification and hazard analysis of dangers and hazards for the work place *Driller - geological exploratory drilling* in the organization "*Geops Balkan Drilling Services*" Ltd., it can be concluded that the optimized method Kinny and methodological approach to the assessment OH&S risks has fulfilled its purpose and gave the satisfactory results.

Management of OH&S risks in accordance with this methodological approach is very reliable and useful tool for decision makers in fulfilling the policy and objectives in terms of health and safety at work.

The optimized model of assessment the OH&S risks based on the Kinny method, applied in this paper, is practically tested in the other similar organizations such as: *Drillex International Ltd.*, *International Drilling Service Ltd.* and *Stara Planina Resources Ltd.* Based on this model, the efficient and effective management of occupational health and safety at work was established in accordance with SRPS OHSAS 18001: 2008.

From practical application the optimized model for assessment the OH&S risks in management of OH&S system, it can be concluded that in the most stages of geological exploratory drilling the increased OH&S risk is present, but that the same can be managed only if the planned measures are applied under the Plan of measures to control the assessed OH&S risks.

Thus proposed methodological procedure for assessment the OH&S risks can be of great use to the other organizations that use this method of risk assessment or deal with similar activities. Assessment of OH&S risks and establishing the control mechanisms of management is of great use in a system design of management the occupational health and safety at work. The proposed valuation model of OH&S risks enables that the information about OH&S risk are adequately processed and use in decision making at the relevant levels of the organization dealing with works on geological exploratory drillings.

Active and comprehensive assessment of OH&S risk as it is defined in this paper, the management organization that deals with geological exploratory drillings can:

- accept and approve the management policy by assessed OH&S risk;
- inform all stakeholders in the process of geological exploratory drillings;
- define the mechanisms of control the assessed OH&S risks that correspond to the performances of organization;
- provide the compliance with legal regulations and subordinate legislation as well as the legal acts of organization;
- provide the distribution of needed resources for managing the assessed OH&S risk.

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RAZVOJ MODELA PROCENE OH&S RIZIKA ZA RADNO MESTO BUŠAČ U PROCESU IZVOĐENJA GEOLOŠKIH ISTRAŽNIH BUŠENJA

Izvod

U radu je kreiran model procene OH&S rizika za radno mesto bušač u procesu izvođenja geoloških istražnih radova. Model procene OH&S rizika za radno mesto bušač bazira se na standardu ISO 31010 i ispunjenju zahteva standarda OHSAS 18001 i zakonske regulative. U ovom slučaju korišćena je delimično prilagođena i optimizovana Kinny metoda. Model procene OH&S rizika daje realne osnove za razvoj i implementaciju sistema menadžmenta zaštite zdravlja i bezbednosti na radu u skladu sa SRPS OHSAS 18001:2008, s obzirom da je praktično primenjen i proveren u organizacijama koje se bave geološkim istražnim bušenjima kao što su "Geops Balkan Drilling Services" d.o.o, Drillex International d.o.o, International Drilling Service d.o.o kao i Stara Planina Resources d.o.o

Cljučne reči: OH&S rizik, bušač, geologija, istražna bušenja

1. UVOD

Bezbednost i zdravlje na radu je veoma značajan segment rada kod svakog poslodavca – bez obzira na vrstu delatnosti koju poslodavac obavlja. Sistemskim pristupom bezbednosti i zdravlja na radu daje se značaj prevenciji u svim fazama rada. Procenom OH&S rizika teži se kontrolisanju rizika radi otklanjanja opasnosti i štetnosti od povreda na radu, profesionalnih oboljenja i oboljenja u vezi sa radom i da bi se uspostavio – sistem upravljanja zaštitom zdravlja i bezbednošću na radu (OHSAS). Postizanje kvaliteta u upravljanju sistemom zaštite zdravlja i bezbednosti na radu nije moguće bez usklađivanja sa osnovnim zakonskim obavezama procene OH&S rizika.

Organizacije čija je delatnost geološko istražno bušenje za očekivati je da će se

suočiti sa značajnim OH&S rizicima. Ukoliko OH&S rizici nisu adekvatno procenjeni i stavljeni pod konrolom mogu u negativnom smislu uticati na ostvarivanje ciljeva organizacije. Ciljevi organizacije se mogu odnositi na niz aktivnosti, od strateških inicijativa pa sve do operacija, a mogu se ogledati i u neusaglašenostima sa zakonskom regulativom i drugim zahtevima. S obzirom, da se tehnološki proces geoloških istražnih bušenja sastoji od operacija u kojima učestvuje značajan broj opasnih materija to potencijalni OH&S rizici mogu biti i veći.

Upravljanje OH&S rizikom podrazumeva primenu logičkih i sistematskih metoda za identifikaciju, analizu i procenu OH&S rizika tokom procesa geoloških

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istražnih bušenja, praćenje i preispitivanje rizika u cilju efektivnog i efikasnog upravljanja integrisanim sistemima menadžmenta kvalitetom (ISO 9001), zaštitom životne sredine (ISO 14001) i zaštitom zdravlja i bezbednosti na radu (OHSAS 18001).

Cilj ovog istraživanja je procena OH&S rizika u procesu geološkog istražnog bušenja uz pronalaženje odgovora na sledeća osnovna pitanja:

- Šta se u procesu geoloških istražnih bušenja može desiti i zašto (identifikacija opasnosti)?
- Koje su to verovatnoće pojave opasnosti i štetnosti?
- Da li se procenjenim OH&S rizicima može upravljati i da li se zahteva dalji tretman smanjenja OH&S rizika?
- Kako izvršiti planiranje mera zaštite zdravlja i bezbednosti na radu koje mogu da utiču na smanjenje verovatnoće pojave opasnosti i štetnosti?

U skladu sa utvrđenim ciljem istraživanja, postavljena je se sledeća hipoteza istraživanja:

- a) Na osnovu sistemskog pristupa moguće je izvršiti identifikaciju, analizu opasnosti i procenu OH&S rizika i uspostaviti mehanizme za kontrolu procenjenih OH&S rizika.

Na osnovu identifikacije problema, postavljenog cilja i hipoteze istraživanja poistekli su sledeći zadaci istraživanja i to:

- 1) izvršiti sistemsku analizu, i definisati model i metodu procene OH&S rizika;
- 2) izvršiti identifikaciju opasnosti, utvrditi verovatnoću pojave i potencijalnih posledica;
- 3) izvršiti procenu OH&S rizika za konkretno radno mesto.
- 4) definisati Plan mera za kontrolu povećanih OH&S rizika.

U cilju ispunjenja zadataka istraživanja i postizanja cilja i provere postavljene hipoteze istraživanja korišćene su poznate metode koje su doprinele poboljšanju metodologiji istraživanja, a to su:

- 1) deskriptivna metoda (metoda zapažanja i opisivanja) kroz analizu dostupnih podataka;
- 2) metoda analize teorije i prakse;
- 3) metoda opšte teorije sistema odnosno sistemskih pristupa i sistemske analize;
- 4) metoda modeliranja procesa, i izrade dijagrama toka.

2. TEORIJSKI PRISTUP, IZABRANI METODOLOŠKI POSTUPAK I METODA PROCENE OH&S RIZIKA

2.1. Teorijski pristup procene OH&S rizika

Da bi se ispunili zahtevi standarda OHSAS 18001 kao i zahtevi zakonske regulative potrebno je da za sve opasnosti i štetnosti koje se javljaju i/ili se mogu javiti na radnom mestu **bušać u procesu geoloških istražnih bušenja** izvrši procena OH&S rizika. Radi efektivne i efikasne procene OH&S rizika, neophodno je koristiti odgovarajuću metodu koja će dati proaktivne, a ne reaktivne rezultate procene [10]. Efektivnost i efikasnost OH&S sistema se ne može postići samo procenom OH&S rizika, već je neophodno da nakon izvršene procene OH&S rizika organizacija obezbediti uslove da se rezultati procene OH&S rizika uzmu u obzir prilikom uspostavljanja OH&S sistema i definiše plan upravljanja povećanih OH&S rizicima.

U svetu, a i u R. Srbiji je najčešće upotrebljeni alat za uspostavljanje, održavanje i unapređivanje sistema upravljanja zaštitom zdravlja i bezbednošću na radu standard OHSAS 18001. OH&S sistem je strukturiran proces za savlađivanje OH&S rizika. Navedenim standardom su precizno dati zahtevi nekih ključnih elemenata sistema upravljanja zaštitom zdravlja i bezbednošću na radu kao što su: prepoznavanje opasnosti i štetnosti koje mogu nastati gde se obavezno uzimaju u obzir ponašanja i sposobnosti zaposlenih, vođenje, komunikacija, saradivanje i savetovanje sa zaposlenima.

Upravljanje OH&S rizicima znači pronaći onu prihvatljivu kombinaciju koja omogućava akcije povećanja bezbednosti i zdravlja na radu i otklanjanja svih opasnosti i štetnosti koje dovode u pitanje optimalno funkcionisanje OH&S sistema. Upravljanje OH&S rizicima moguće je ostvariti uz pretpostavke koje podrazumevaju sledeće:

- pravovremeno identifikovanje svih opasnosti i štetnosti;
- utvrđivanje liste opasnosti i štetnosti koje imaju uticaj na OH&S sistem;
- analiza ranijih podataka o posledicama nastanka povreda na radu, profesionalnih oboljenja i oboljenja u vezi sa radom;
- analiza pojedinačnih opasnosti i štetnosti njihovo grupisanje po srodnosti;
- analiza međuzavisnosti pojedinačnih opasnosti i štetnosti i njihovih eventualnih posledica;
- procena OH&S rizika za utvrđenu listu opasnosti i štetnosti;

- formiranje okruženja koje neguje tradiciju timskog rada;
- razvoj metoda i tehnika za procenu i upravljanje OH&S rizicima;
- uspostavljanje optimalnog nivoa bezbednosti na radu;
- donošenje ciljeva, planova i programa za upravljanje procenjenim OH&S rizicima.

Za efikasnu kontrolu OH&S rizika, potrebno je znati upravljati informacijama na osnovu kojih se donose zaključci i odluke, tj. potrebno je obratiti pažnju na kvalitet informacija kojima se raspolaže iz Akta o proceni OH&S rizika.

Procena OH&S rizika u poslovnom procesu nije ni u kom slučaju neka konstanta, već dinamička veličina koja se menja od trenutka do trenutka. Svaki puta kada se promeni neki od elemenata opasnosti i štetnosti, menja se i nivo OH&S rizika. Postoji standard koji definiše proces procene rizika ISO 31010: 2010 [8].

Sl. 1. Blok dijagram procesa procene OH&S rizika[8], [12]

2.2. Izabrana metoda procene OH&S rizika

Jedna od metoda kojom je moguće izvršiti procenu OH&S rizika je Kinny metoda. OH&S rizici se tokom vremena menjaju kroz tri osnovne kategorije koje analizira metoda Kinny i to:

- verovatnoća pojave opasnosti i štetnosti;
- težina posledica koje mogu nastati kod pojave opasnosti i štetnosti;
- učestalost pojavljivanja opasnosti i štetnosti.

Na osnovu identifikacije opasnosti štetnosti na radnom mestu i radnoj okolini i statističke obrade podataka o opasnim događajima (povredama na radu), opasnim materijama i kritičnim tačkama procesa može se izvršiti procena OH&S rizika.

Postupkom identifikacije opasnosti i štetnosti i vrednovanja uticaja postiže se sledeće:

- identifikuju se sve opasnosti i štetnosti koje mogu imati uticaja na radno mesto i radnu okolinu;
- analiziraju se uticaji opasnosti i štetnosti na radno mesto i radnu okolinu;
- utvrđuje se sistem vrednovanja svake opasnosti i štetnosti;
- određivanja značaja svake opasnosti i štetnosti.

Parametri analize se numerički vrednuju, pa je i konačna procena OH&S rizika na

radnom mestu i radnoj okolini izražena numerički. Osnovna postavka metode Kinny u funkciji procene rizika na radnom mestu i radnoj okolini je u suštini jednostavna i laka za razumevanje. Suština metode sastoji se u realizaciji sledećih aktivnosti:

- a) utvrđivanje svih potencijalnih opasnosti i štetnosti koje su/ili mogu nastati kao posledica procesa rada;
- b) utvrđivanje mogućih uzroka nastanka svake opasnosti i štetnosti;
- c) analiza svake opasnosti i štetnosti sa ciljem da se analitičkim metodama utvrde:
 - verovatnoća pojave potencijalne opasnosti i štetnosti;
 - težina posledica koje koje zaposleni trpi kod pojave opasnosti i štetnosti;
 - učestalost pojavljivanja opasnosti i štetnosti.
- d) vrednovanje nivoa rizika čine proizvod tri faktora i to:
 - verovatnoća pojave opasnosti i štetnosti - V;
 - težina posledice zbog pojave opasnosti i štetnosti - P;
 - učestalost pojavljivanja opasnosti i štetnosti - U;

Vrednovanje rizika **R** vrši se po formuli:

$$R = V \times P$$

Tabela 1. Matrica procene rizika po Kinny metodi [11]

Identifikovana opasnost ili štetnost	PROCENA OH&S RIZIKA $R = V \times P$		
	Verovatnoća V	Posledica P	Nivo rizika R
x			
y			
z			

2.2.1. Kriterijum za procenu verovatnoće - V

Tabela 2. Opis kriterijuma za procenu verovatnoće pojave opasnosti i štetnosti [11]

RANG	OPIS KRITERIJUMA ZA PROCENU VEROVATNOĆE - V
0,1	<i>Jedva pojmljivo</i>
0,2	<i>Praktično neverovatno</i>
0,5	<i>Postoji, ali samo malo verovatno</i>
1	<i>Mala verovatnoća, ali moguća u ograničenim slučajevima</i>
3	<i>Malo moguće</i>
6	<i>Sasvim moguće</i>
10	<i>Predvidivo, očekivano</i>

2.2.2. Kriterijum za procenu posledica - P

Tabela 3. Opis kriterijuma za procenu posledica kod pojave opasnosti i štetnosti [11]

RANG	OPIS KRITERIJUMA ZA PROCENU POSLEDICA - P
1	<i>Bolest, povreda koja zahteva prvu pomoć i nikakav drugi tretman</i>
2	<i>Medicinski tretman od strane lekara</i>
3	<i>Ozbiljne-invalidnost, ozbiljna pojedinačna povreda sa hospitalizacijom i izgubljenim danima</i>
6	<i>Veoma ozbiljne-pojedinačne nesreće sa smrtnim ishodom</i>
10	<i>Katastrofalne-sa višestrukim smrtnim ishodima</i>

2.2.3. Kriterijum za procenu učestalosti pojavljivanja opasnosti i štetnosti - U

Tabela 4. Opis kriterijuma za procenu učestalost pojavljivanja opasnosti i štetnosti [11]

RANG	OPIS KRITERIJUMA ZA UČESTALOST - U
1	<i>Izlaže se retko (godišnje)</i>
2	<i>Izlaže se mesečno</i>
3	<i>Izlaže se nedeljno</i>
6	<i>Izlaže se dnevno</i>
10	<i>Izlaže se trajno, kontinualno</i>

2.3.4. Kriterijumi za klasifikaciju
nivoa rizika (R)

Tabela 5. Kriterijumi za određivanje nivoa rizika [11]

Ukupna ocena	Klasa rizika	Klasifikacija nivoa rizika	Opis klasifikacije nivoa rizika
>0,1 <20	R I	Zanemarljivo mali rizik	Ne zahteva se nikakva akcija.
>20 <70	R II	Mali rizik	Nema potrebe za dodatnim aktivnostima pri upravljanju operacijom. Može se razmotriti ekonomski isplativije rešenje ili unapređenje bez dodatnih ulaganja. Potrebno je pratiti situaciju, kako bi posedovali informacije o sprovođenju propisanih aktivnosti.
>70 <200	R III	Srednji rizik	Potrebno je uložiti napor kako bi se smanjio rizik, ali troškovi prevencije moraju biti pažljivo planirani i ograničeni do izvesnog nivoa. Potrebno je definisati rok za sprovođenje unapređenja. Kod onih događaja kod kojih mogu nastupiti izuzetno opasne posledice, potrebno je dodatno proveriti verovatnoću nastanka takvog događaja kako bi se definisao potreban nivo aktivnosti na ublažavanju rizika.
>200 <400	R IV	Veliki rizik	Ne sme se započeti sa datom aktivnošću dok nivo rizika ne bude snižen. Potrebna su znatna sredstva kako bi se rizik smanjio. Ako se rizik odnosi na sve započete aktivnosti, potrebno je preduzeti hitne akcije na smanjenju nivoa rizika.
>400 <1000	R V	Ekstremno veliki rizik	Aktivnost ne sme biti započeta ni nastavljena, sve dok se nivo rizika ne smanji na prihvatljivi nivo. Ako ulaganjem ograničenih sredstava nije moguće smanjiti nivo rizika na prihvatljiv nivo, aktivnost mora ostati zabranjena.

2.2.5. Kategorizacija i karakterizacija rizika

Tabela 6. Kriterijumi za kategorizaciju i karakterizaciju rizika [11]

Procena nivoa rizika	Kategorizacija nivoa rizika	Karakterizacija rizika
R I	Zanemarljivo mali rizik	Prihvatljiv rizik
R II	Mali rizik	Prihvatljiv rizik
R III	Srednji rizik	Povećani rizik
R IV	Veliki rizik	Neprihvatljiv rizik
R V	Ekstremno veliki rizik	Neprihvatljiv rizik

Tabela 7. Opis karakterizacije rizika [11]

Karakter rizika	Opis karakterizacije rizika
Prihvatljiv rizik	Rizik za koji postoji procena i pretpostavka da neće uzrokovati: - povrede na radu i oboljenja u vezi sa radom, - neusaglašenost sa zakonskom regulativom i/ili odstupanje od propisane organizacije rada i - odstupanje od propisane politike sistema zaštite zdravlja i bezbednosti na radu u organizaciji.
Povećani rizik	Rizik za koji postoji procena i pretpostavka da u određenim okolnostima može uzrokovati: - povrede na radu i oboljenja u vezi sa radom, - delimičnu neusaglašenost sa zakonskom regulativom i/ili odstupanje od propisane organizacije rada i - povremeno odstupanje od propisane politike i ciljeva sistema zaštite zdravlja i bezbednosti na radu.
Neprihvatljiv rizik	Rizik za koji postoji procena i pretpostavka da direktno uzrokuje: - povrede na radu i oboljenja u vezi sa radom, - neusaglašenost sa zakonskom regulativom; - odstupanje od propisane organizacije rada i - odstupanje od propisane politike i ciljeva sistema zaštite zdravlja i bezbednosti na radu.

3. REZULTATI ISTRAŽIVANJA - PRAKTIČAN PRIMER PROCENE OH&S RIZIKA

Šifra r.m.	PREPOZNAVANJE I UTVRĐIVANJE OPASNOSTI I ŠTETNOSTI I PROCENA RIZIKA NA RADNOM MESTU: BUŠAČ - GEOLOŠKIH ISTRAŽNIHBUŠENJA
III GRUPA	
1. OPŠTI PODACI O RADNOM MESTU	
1.1. Naziv radne organizacije:	"GEOPS BALKAN DRILING SERVICES" D.O.O
1.2. Sektor:	Izvođenje geoloških istražnih bušenja
1.3. Služba:	/
1.4. Odeljenje:	/
2. PODACI O PROCESU RADA:	
2.1. Poslovi po sistematizaciji poslova i radnih zadataka (opis poslova): Bušač - geoloških istražnih bušenja:	
Izvođe se radovi primenom odgovarajućih mašina i metoda za istraživanje mineralnih sirovina. Vrše se bušenja na geološki ispitanim područjima u cilju pronalaženja čvrstih mineralnih sirovina. Mašina za istražna bušenja je montirana na specijalnom vozilu sa gusenicama na kome su postavljeni svi radni i pogonski delovi mašine, a isti su raspoređeni i učvršćeni na bezbedan način. Komandovanje mašinom se vrši na odgovarajući način sa komandnog pulta. Bušenje rupa se izvodi preko pogonskog motora sa reduktorom i sistema za bušenje sa dijamantskim alatima koji se montiraju na specijalnim cevima. Vrši se montaža i demontaža dijamantskih alata na mašini. Vrši se učvršćivanje alata za bušenje i spajanje nastavaka na odgovarajući način. Vrši vadjenje uzoraka geoloških jezgara preko pneumatskih sistema i sistema užadi i doboša i isto se izvodi na bezbedan način. Nadgleda i preduzima odgovarajuće mere na hladjenju alata za bušenje preko sistema za hladjenje koji se pogoni preko odgovarajuće pumpe. Vrši se nadgledanje rada agregata za snabdevanje električnom energijom.	
Povremeni poslovi: Po potrebi upravlja motornim vozilom od mesta rada do baze i obratno.	

3. PODACI O RADNOM I POMOĆNOM PROSTORU				
3.1. Objekti:	Poslovni prostor u Boru, ul. Danila Kiša 6/28			
3.2. Radni prostor:	Aktuelno radilište na istražnom prostoru Brestovac - Metovnica			
3.3. Grupa elemenata radnog prostora	3.3.1. Elementi radnog prostora	3.3.2. Propisani zahtevi	3.3.3. Ocena stanja radnog prostora	
			Zadovoljava ✓	Ne zadovolja. x
1) Veličina i visina radne prostorije	Slobodna površina poda	2 m ² po radniku	/	
	Slobodan vazdušni prostor	10 m ³ po radniku	/	
	Visina radne prostorije	min. 2,5 m	/	
2) Podovi	Nivo poda	iznad nivoa okolnog zemljišta	/	
	Materijal poda	otporn na habanje, vodonep.	/	
	Način izrade	ravan gladak ali ne klizav	/	
	Stanje i održavanje	redovno	/	
3) Zidovi i plafon	Materijal i izvođenje	toplotna, zvučna zaštita	/	
	Obrada i boja	malterisano i obojeno	/	
	Stanje i održavanje	svetla površina / redovno	/	
4) Vrata	Smer otvaranja i širina	u zavisn. od namene prostor.	/	
	Broj i raspored	na 30 do 50m min jedna vrata	/	
5) Prozori	Površina prozorskih otvora	min 12,5 % površine poda	/	
	Upadni ugao svetla	min 24 ⁰	/	
	Princip i način otvaranja	sa lakoćom	/	
6) Zagrevanje	Način zagrevaja	parno grejanje	/	
	Raspored grejnih tela	propisno	/	
	Stanje i održavanje	po planu održavanja	/	
7) Mikroklima	Temperatura prostorije	18-22 ⁰ C	/	
	Relativ. vlažnost prostori.	65-80 %	/	
	Brzina strujanja vazduha	0,3 m/s (klimatizovano)	/	
8) Osvetljenje	Opšta rasveta	klasična propis. izvedena	/	
	Lokalna rasveta	ne zahteva se	/	
9) Ostalo	Sanitarne prostorije	propis. izvedene	/	
	Garderobe	ne zahteva se	/	
	Ormaric za prvu pomoć	propisana oprema i postoji	/	
3.4. Pomoćni radni prostor:	/			
3.5. Napomena:	Rad se izvodi na otvorenom prostoru			

4. RASPOLOŽIVA SREDSTVA I OPREMA ZA RAD	
4.1. Mašine	Mašine za geološka bušenja CHRISTENSEN CS 14; CHRISTENSEN CS 10; CHRISTENSEN CS 14 - CE C 20;
4.2. Uređaji	Kompresori, pumpe i dr.
4.3. Postrojenja	/
4.4. Instalacije	Komprimirani vazduh
4.5. Alat i pribor	Različite vrste alata za pritezanje cevi koje se koriste za geološka bušenja
4.6. Druga sredstva za rad	Kombinovani putničko - teretni automobil

5. MATERIJALI, SIROVINE I DRUGE SUPSTANCE KOJE SE KORISTE U PROCESU RADA	
5.1. Materijali	Različite vrste repromaterijala kao što su: ulja i maziva; AMC CR650 RD
5.2. Sirovine	Uzorci mineralnih sirovina koji se dobijaju pri geološkom bušenju
5.3. Druge supstance	/

6. OSPOSOBLJAVANJE I OBUKE	
6.1. Specifično stručno osposobljavanje:	Da, obuka za rukovanje mašinom
6.2. Obuka za zaštitu zdravlja i bezbednost na radu:	Da, obuka je izvršena
6.3. Obuka za zaštitu od požara:	Da, obuka je izvršena

7. OPREMA I SREDSTVA ZA LIČNU ZAŠTITU NA RADU		Ocena stanja
7.1. Sredstva za zaštitu glave:	Zastitni šlem	Zadovoljava
7.2. Sredstva za zaštitu tela:	Zaštitno odelo; Zaštni identifikacioni prsluk	Zadovoljava
7.3. Sredstva za zaštitu ruku:	Zaštitne rukavice	Zadovoljava
7.4. Sredstva za zaštitu nogu:	Zaštitne cipele sa čeličnom kapnom; Zaštitne gumene čizme sa čelič.kap.	Zadovoljava
7.5. Sredstava za zaštitu očiju:	Zaštitne naočare	Zadovoljava
7.6. Sredstava za zašt. sluha:	Zaštitni antifoni; Čepići za uši i dr.	Zadovoljava
7.7. Oprema za bezbedan rad:	Sigurnosni pojas za rad na visini	Zadovoljava

8. ORGANIZACIJA RADA			
8.1. Uslovi za zasnivanje radnog odnosa:			
Stepen stručne sprema	Od II do VI		
Obrazovni profil	Svih struka		
Radno iskustvo	Poželjno je		
Posebno znanje, veštine i sposobnost	Sposobnost upravljanja motornim vozilom		
8.2. Opšti podaci o izvršiocima:			
Ukupan broj zaposlenih na radnom mestu/grupi:	>4	Muškarci: da	Žene: ne
Na radnom mestu rade invalidi rada:	Ne	Muškarci: /	Zene: /

8.3. Opšti zahtevi radnog mesta:			
Angažovanje prema mestu aktivnosti	U radnim prostorijama	Kancelarija	0%
		Pom. radne prostorije	0%
	Rad na otvorenom	Terenski rad	100 %
		Radilište	100 % povremeno
		Rad sa prevoznim sredstvom	Da, povremeno
Izvršavanje zadataka	Radi u smenama	Da	
	Radi noću	Da	
	Organizuje i rukovodi	Da	

9. ANALIZA POSTOJEĆEG STANJA BEZBEDNOSTI I ZDRAVLJA NA RADNOM MESTU		
9.1. Element bezbednosti na radu	9.2. Usklađenost sa zahtevima	
	Da ✓	Ne ✗
Važeći stručni nalazi o izvršenim pregledima i ispitivanjima sredstava za rad	✓	
Važeći stručni nalazi o izvršenim pregledima i ispitivanjima uslova rada	✓	
Izveštaji o prethodnim i periodičnim lekarskim pregledima zaposlenih	✓	
Podaci o povredama na radu	✓	
Podaci o profesionalnim bolestima i oboljenjima u vezi sa radom	✓	
Sredstva i oprema za ličnu zaštitu na radu	✓	
Analiza preduzetih mera radi sprečavanja povreda na radu	✓	
Uputstva za bezbedan rad	✓	
Propisana dokumentacija za upotrebu i održavanje, odnosno pakovanje, transport, korišćenje, skladištenje, uništavanje i dr.	✓	
Zaštita od požara	✓	

10. PREPOZNAVANJE OPASNOSTI NA RADNOM MESTU				
10.1. Grupisanje opasnosti				
Grupa opasnosti	Šifra	Podgupa opasnosti	Opasnosti ✓IMA /✗NEMA	
1) Mehaničke opasnosti koje se pojavljuju korišćenjem opreme za rad kao što su:	(01)	Nedovoljna bezbednost zbog rotirajućih ili pokretnih delova,	✓	
	(02)	Slobodno kretanje delova ili materijala koji mogu naneti povredu zaposlenom,	✓	
	(03)	Unutrašnji transport i kretanje radnih mašina ili vozila, kao i pomeranja određene opreme za rad,	✓	
	(04)	Korišćenje opasnih sredstava za rad, koja mogu proizvesti eksplozije ili požar,	✓	
	(05)	Nemogućnost ili ograničenost pravovremenog uklanjanja sa mesta rada, izloženost zatvaranju, mehaničkom udaru, poklapanju, i sl.,	✓	
	(06)	Drugi faktori koji mogu da se pojave kao mehanički izvori opasnosti.	✓	

2) Opasnosti koje se pojavljuju u vezi sa karakteristikama radnog mesta kao što su:	(07)	Opasne površine (podovi i sve vrste gazišta, površine sa kojima zaposleni dolazi u dodir, a koje imaju oštre ivice-rubove, šiljke, grube površine, izbočene delove, i sl.)	✓	
	(08)	Rad na visini ili u dubini, u smislu propisa o bezbednosti i zdravlju na radu,	✓	
	(09)	Rad u skučenom, ograničenom ili opasnom prostoru (između dva ili više fiksiranih delova, između pokretnih delova ili vozila, rad u zatvorenom prostoru koji je nedovoljno osvetljen ili provetran, i sl.),		✗
	(10)	Mogućnost klizanja ili spoticanja (mokre ili klizave površine),	✓	
	(11)	Fizička nestabilnost radnog mesta,		✗
	(12)	Moguće posledice ili smetnje usled obavezne upotrebe sredstava ili opreme za ličnu zaštitu na radu,	✓	
	(13)	Uticiji usled obavljanja procesa rada korišćenjem neodgovarajućih ili neprilagođenih metoda rada,		✗
3) Opasnosti koje se pojavljuju korišćenjem električne energije, kao što su:	(14)	Druge opasnosti koje se mogu pojaviti u vezi sa karakteristikama radnog mesta i načinom rada (korišćenje sredstava i opreme za ličnu zaštitu na radu koja opterećuju zaposlenog, i sl.);	✓	
	(15)	Opasnost od direktnog dodira sa delovima električne instalacije i opreme pod naponom,		✗
	(16)	Opasnost od indirektnog dodira,		✗
	(17)	Opasnost od toplotnog dejstva koje razvijaju električna oprema i instalacije (pregrevanje, požar, eksplozija, električni luk ili varničenje, i dr),		✗
	(18)	Opasnosti usled udara groma i posledica atmosferskog pražnjenja	✓	✗
	(19)	Opasnost od štetnog uticaja elektrostatičkog naelektrisanja,		✗
	(20)	Druge opasnosti koje se mogu pojaviti u vezi sa korišćenjem električne energije.		✗

11. PREPOZNAVANJE ŠTETNOSTI NA RADNOM MESTU				
11.1. Grupisanje štetnosti				
Grupa štetnosti	Šifra	Podgupa štetnosti	Štetnosti ✓IMA / ✗NEMA	
1) Štetnosti koje nastaju ili se pojavljuju u procesu rada, kao što su:	(21)	Hemijske štetnosti, prašina i dimovi (udisanje, gušenje, unošenje u organizam, prodor u telo kroz kožu, opekotine, trovanje, i sl.),	✓	
	(22)	Fizičke štetnosti (buka i vibracije),	✓	
	(23)	Biološke štetnosti (infekcije, izlaganje mikroorganizmima i alergenima),		✗
	(24)	Štetni uticaji mikroklimе (visoka ili niska temperatura, vlažnost i brzina strujanja vazduha),		✗
	(25)	Neodgovarajuća - nedovoljna osvetljenost,	✓	
	(26)	Štetni uticaji zračenja (toplotnog, jonizujućeg ili nejonizujućeg, laserskog, ultrazvučnog),		✗
	(27)	Štetni klimatski uticaji (rad na otvorenom),	✓	
	(28)	Štetnosti koje nastaju korišćenjem opasnih materija u proizvodnji, transportu, pakovanju, skladištenju ili uništavanju,		✗
	(29)	Druge štetnosti koje se pojavljuju u radnom procesu, a koje mogu da budu uzrok povrede na radu zaposlenog, profesionalnog oboljenja ili oboljenja u vezi sa radom.	✓	

2) Štetnosti koje proističu iz psihičkih i psihofizioloških napora koji se uzročno vezuju za radno mesto i poslove koje zaposleni obavlja, kao što su:	(30)	Napori ili telesna naprezanja (ručno prenošenje tereta, guranje ili vučenje tereta, razne dugotrajne povećane telesne aktivnosti i sl.),	✓	
	(31)	Nefiziološki položaj tela (dugotrajno stajanje, sedenje, čučanje, klečanje i sl.),	✓	
	(32)	Napori pri obavljanju određenih poslova koji prouzrokuju psihološka opterećenja (stres, monotonija i sl.),	✓	
	(33)	Odgovornost u primanju i prenošenju informacija, korišćenje odgovarajućeg znanja i sposobnosti, odgovornost u pravilima ponašanja, odgovornost za brze izmene radnih procedura, intenzitet u radu, prostorna uslovljenost radnog mesta, konfliktne situacije, rad sa strankama i novcem, nedovoljna motivacija za rad, odgovornost u rukovođenju, i sl.;	✓	
3) Štetnosti vezane za organizaciju rada, kao što su:	(34)	Rad duži od punog radnog vremena (prekovremeni rad), rad u smenama, skraćeno radno vreme, rad noću, pripravnost za slučaj intervencija,	✓	
4) Ostale štetnosti koje se pojavljuju na radnim mestima, kao što su:	(35)	Štetnosti koje prouzrokuju druga lica (nasilje prema licima koja rade na šalterima, lica na obezbeđenju, i sl.),		✗
	(36)	Rad sa životinjama,		✗
	(37)	Rad u atmosferi sa visokim ili niskim pritiskom,		✗
	(38)	Rad u blizini vode ili ispod površine vode,		✗
	(39)	Ostale opasnosti i štetnosti.		✗

12. UTVRĐIVANJE LISTE OPASNOSTI I ŠTETNOSTI NA RADNOM MESTU	
12.1. Utvrđena lista opasnosti	
01.1	Opasnost od povreda na radu uzrokovana od rotirajućih ili pokretnih delova na mašini za geološka bušenja i istraživanja
02.1	Opasnost od povreda na radu uzrokovana od kretanja delova pri izvođenju geoloških bušenja i istraživanja
03.1	Opasnost od povreda na radu uzrokovana od kretanja radnih mašina i vozila kao i opreme koja se koristi pri geološkim bušenjima i istraživanjima
04.1	Opasnost od povreda na radu uzrokovana od korišćenje kompresora i dizel agregata koji proizvode velike pritiske i koji mogu uzrokovati eksplozije i požare
05.1	Opasnost od povreda na radu uzrokovana od nemogućnost ili ograničenost pravovremenog uklanjanja sa mesta rada na mašini za geološka bušenja i istraživanja
06.1	Opasnost od povreda na radu uzrokovana od potencijalnih saobraćajnih udesa pri povremenom upravljanju putničkim ili poluteretnim vozilom na kategorisanim i nekategorisanim putevima i prevozu radnog osoblja od baze do mesta rada i obratno;
07.1	Opasnost od povreda na radu uzrokovana od vrsta gazišta i rubova, grubih površina i izbočenih delova koji se nalaze na mašinama za geološka bušenja i istraživanja;
08.1	Opasnost od povreda na radu uzrokovana radom na visini pri opsluživanju i održavanju mašina za geološka bušenja i istraživanja

10.1	Opasnost od povreda na radu uzrokovana mogućnost klizanja ili spoticanja (moke ili klizave površine) na mašinama i/ili na istražnom prostoru na kome se vrše geološka bušenja.
12.1	Opasnost od povreda na radu uzrokovana od usled obavezne upotrebe sredstava ili opreme za ličnu zaštitu na radu (antifoni; naočare; rukavice i sl.)
14.1	Opasnost od povreda na radu uzrokovana otežanom preciznošću rada i otežanom kretanju usled obaveznog korišćenja opreme za ličnu zaštitu na radu.
18.1	Opasnost od povreda na radu uzrokovana od prirodnih nepogoda i udara groma i posledica atmosferskog pražnjenja.
12.2. Utvrđena lista štetnosti	
21.1	Štetnost po zdravlje uzrokovana hemijskim štetnostima uzrokovana radom dizel agregata, radom sa isplakama koje sadrže hemijske supstance i prašina koje se javljaju pri geološkim bušenjima.
22.1	Štetnost po zdravlje uzrokovana bukom od rada dizel agregata i mašina za geološka bušenja i istraživanja.
25.1	Štetnost po zdravlje uzrokovana nedovoljnom osvetljenošću u toku noćnog rada
27.1	Štetnost po zdravlje uzrokovana štetnim klimatskim uticajima pri radu otvorenom prostoru u toku geoloških bušenja i istraživanja.
29.1	Štetnost po zdravlje uzrokovana štetnostima koje nastaju korišćenjem ulja, maziva, dizel goriva i sl.
30.1	Štetnost po zdravlje uzrokovana naporima i telesnim naprezanjima pri ručnom prenošenju cevi, alata i pribora za geološka bušenja.
31.1	Štetnost po zdravlje uzrokovana nefiziološkim položajem tela pri dugotrajnom stajanju, čučanju ili klečanju pri nadzoru i opsluživanju mašina za geološka bušenja i istraživanja.
32.1	Štetnost po zdravlje uzrokovana naporima psihofizičkih opterećenja u nadgledanju i kontoli rada mašina za geološka bušenja i istraživanje.
33.1	Štetnost po zdravlje uzrokovana odgovornošću u primanju i prenošenju informacija, korišćenju odgovarajućeg znanja i sposobnosti za rad na mašinama za geološka bušenja i istraživanja.
34.1	Štetnost po zdravlje uzrokovana produženim radom kao i radom noću pri geološkim bušenjima i istraživanjima.

13. PROCENA OH&S RIZIKA						
13.1	Procena rizika za tvrđene konkretne opasnosti	V	T	U	R-Rizik	Mere kon. pro.riz.
01.1	Opasnost od povreda na radu uzrokovana od rotirajućih ili pokretnih delova na mašini za geološka bušenja i istraživanja.	6	3	6	108	Uputstvo za bezbedan rad pri geološkim bušenjima.
02.1	Opasnost od povreda na radu uzrokovana od kretanja delova pri izvođenju geoloških bušenja i istraživanja.	6	3	6	108	Primena tehničkih zaštitnih naprava. Uputstvo za bezbedan rad pri geološkim bušenjima.

03.1	Opasnost od povreda na radu uzrokovana od kretanja radnih mašina i vozila kao i opreme koja se koristi pri geološkim bušenjima i istraživanjima.	3	3	6	54	Uputstvo za bezbedan rad pri geološkim bušenjima; Uputstvo – mere bezbednosti na radilištu.
04.1	Opasnost od povreda na radu uzrokovana od korišćenje kompresora i dizel agregata koji proizvode velike pritiske i koji mogu uzrokovati eksplozije i požare.	3	3	6	54	Uputstvo za bezbedan rad na mašinama
05.1	Opasnost od povreda na radu uzrokovana od nemogućnost ili ograničenost pravovremenog uklanjanja sa mesta rada na mašini za geološka bušenja i istraživanja.	6	3	6	108	Uputstvo za bezbedan rad na mašinama
06.1	Opasnost od povreda na radu uzrokovana od potencijalnih saobraćajnih udesa pri povremenom upravljanju putničkim ili poluteretnim vozilom na kategorisanim i nekategorisanim putevima i prevozu radnog osoblja od baze do mesta rada i obratno.	6	3	6	108	Mere zaštite pri upotrebi motornih vozila
07.1	Opasnost od povreda na radu uzrokovana od vrsta gazišta i rubova, grubih površina i izbočenih delova koji se nalaze na mašinama za geološka bušenja i istraživanja.	3	3	6	54	Opšte uputstvo za bezbedan rad; Uputstvo – mere bezbednosti na radilištu
08.1	Opasnost od povreda na radu uzrokovana radom na visini pri opsluživanju i održavanju mašina za geološka bušenja i istraživanja.	6	3	6	108	Uputstvo za bezbedan rad na visini
10.1	Opasnost od povreda na radu uzrokovana mogućnost klizanja ili spoticanja (moke ili klizave površine) na mašinama i/ili na istražnom prostoru na kome se vrše geološka bušenja.	3	3	6	54	Uputstvo – mere bezbednosti na radilištu; Mere zaštite od klizanja, saplitanja i padanja
12.1	Opasnost od povreda na radu uzrokovana usled obavezne upotrebe sredstava ili opreme za ličnu zaštitu na radu (antifoni; naočare; rukavice i sl.).	3	3	6	54	Mere zaštite pri upotrebi LZS
14.1	Opasnost od povreda na radu uzrokovana otežanom preciznošću rada i otežanom kretanju usled obaveznog korišćenja opreme za ličnu zaštitu na radu.	3	3	6	54	Mere zaštite pri upotrebi LZS
18.1	Opasnost od povreda na radu uzrokovana od prirodnih nepogoda i udara groma i posledica atmosferskog pražnjenja.	1	3	1	3	Uputstvo za rad pri geološkim bušenjima
13.2	Procena rizik za tvrdene konkretne štetnosti	V	T	U	R-Rizik	Mere kon. pro.riz.

21.1	Štetnost po zdravlje uzrokovana hemijskim štetnostima uzrokovana radom dizel agregata, radom sa isplakama koje sadrže hemijske supstance i prašina koje se javljaju pri geološkim bušenjima.	6	3	6	108	Primena ličnih zaštitnih sredstava
22.1	Štetnost po zdravlje uzrokovana bukom od rada dizel agregata i mašina za geološka bušenja i istraživanja.	6	3	6	108	Primena ličnih zaštitnih sredstava
25.1	Štetnost po zdravlje uzrokovana nedovoljnom osvetljenošću u toku noćnog rada.	3	3	6	54	Uputstvo – mere bezbed. na radilištu
27.1	Štetnost po zdravlje uzrokovana štetnim klimatskim uticajima pri radu otvorenom prostoru u toku geoloških bušenja i istraživanja.	6	3	6	108	Primena ličnih zaštitnih sredstava
29.1	Štetnost po zdravlje uzrokovana štetnostima koje nastaju korišćenjem ulja, maziva, dizel goriva i sl.	6	3	6	108	Primena ličnih zaštitnih sredstava
30.1	Štetnost po zdravlje uzrokovana naporima i telesnim naprezanjima pri ručnom prenošenju cevi, alata i pribora za geološka bušenja.	6	3	6	108	Primena ličnih zaštitnih sredstava
31.1	Štetnost po zdravlje uzrokovana nefiziološkim položajem tela pri dugotrajnom stajanju, čučanju ili klečanju pri nadzoru i opsluživanju mašina za geološka bušenja i istraživanja.	6	3	6	108	Primena ličnih zaštitnih sredstava
32.1	Štetnost po zdravlje uzrokovana naporima psihofizičkih opterećenja u nadgledanju i kontoli rada mašina za geološka bušenja i istraživanje.	3	2	6	36	Propisno koristiti propisane pauze u radu (dnevne, nedeljne, godišnje)
33.1	Štetnost po zdravlje uzrokovana odgovornošću u primanju i prenošenju informacija, korišćenju odgovarajućeg znanja i sposobnosti za rad na mašinama za geološka bušenja i istraživanja.	3	2	6	36	Propisno koristiti propisane pauze u radu (dnevne, nedeljne, godišnje)
34.1	Štetnost po zdravlje uzrokovana produženim radom kao i radom noću pri geološkim bušenjima i istraživanjima.	3	2	6	36	Propisno koristiti propisane pauze u radu (dnevne)
13.3. Komentar procenjenih opasnosti i štetnosti:						
Na osnovu identifikovanih, analiziranih i utvrđenih konkretnih opasnosti i štetnosti na radnom mestu i radnoj okolini Bušač-Geološka istražna bušenja , procenjene verovatnoće nastanka povreda na radu, oštećenja zdravlja i oboljenja u vezi sa radom i procene težine povrede na radu, oštećenja zdravlja i oboljenja u vezi sa, procenjen je SREDNJI RIZIK (R III) od povreda na radu, oštećenja zdravlja i oboljenja u vezi sa radom.						

13.4. Mišljenje službe medicine rada:
Stručni tim medicine rada sagledao je procenjene opasnosti i štetnosti zaradno mesto Bušač-Geološka istražna bušenja i mišljenja je da postoje indikacije za proglašenje radnog mesta sa povećanim rizikom.
13.5. Konačan zaključakTima za procenu OH&S rizika:
Na osnovu procenjenih konkretnih opasnosti i štetnosti Tim za procenu OH&S rizika donosi: KONAČAN ZAKLJUČAK Za radno mesto Bušač-Geološka istražna bušenja utvđen je NIVO RIZIKA R III - SREDNJI RIZIK od povreda na radu, oštećenja zdravlja i oboljenja u vezi sa radom. Na osnovu konačnog zaključka o proceni OH&S rizika navedeno radno mesto kategoriše se kao radno mesto sa POVEĆANIM RIZIKOM . Za uspostavljanje mehanizama kontrole/upravljanja povećanim OH&S rizicima neophodno je definisati PLAN UPRAVLJANJA PROCENJENIM OH&S RIZICIMA .

14. PLAN UPRAVLJANJA PROCENJENIM OH&S RIZICIMA							
Rizik	Lista povećanih OH&S rizika za radno mesto Bušač-Geološka istražna bušenja	Hijerarhija upravljanja povećanim OH&S rizicima					Prioritet
		1. Mere potpunog otklanjanja rizika:	2. Mere zamene (substitucije) rizika:	3. Mere tehničke (inženjerske) kontrole rizika:	4. Mere signalizacije upozorenja ili administrativne kontrole rizika:	5. Mere primene LZS i opreme za BNR	
108	Opasnost od povreda na radu uzrokovana od rotirajućih ili pokretnih delova na mašini za geološka bušenja i istraživanja	Nije primenljivo	Obavezna primena tehničkih zaštitnih naprava kod rotirajućih i pokretnih delova	Obavezan dnevni i nedeljni pregled i periodično ispitivanje	Obavezna primena procedura, uputstava. Obavezna obuka za bezbedan rad. Obavezan periodični lekarski pregled	Obavezna primena ličnih zaštitnih sredstava i opreme za bezbedan rad	Veliki
108	x						
54	y						
36	z						

ZAKLJUČAK

Institucionalne promene koje su se desile u Republici Srbiji u oblasti zaštite zdravlja i bezbednosti na radu neminovno su uslovile potrebu za razvojem i poboljšanjem alata za donošenje odluka pri planiranju, i upravljanju sistemom zaštite zdravlja i bezbednosti na radu. Donošenje odluka na osnovu prethodno prikazanog modela i metoda procene OH&S rizika je fleksibilni pristup koji je proaktivan i obezbeđuje identifikaciju, određivanje prioriteta i dokumen-

tovanost OH&S rizika, kao i primenu Plana mera za kontrolu procenjenih OH&S rizika.

Na osnovu detaljne identifikacije i analize opasnosti i štetnosti za radno mesto *Bušač - Geološka istražna bušenja* u organizaciji *"Geops Balkan Drilling Services" d.o.o.*, može se zaključiti da je optimizovana metoda Kinny i metodološki pristupak procene OH&S rizika ispunio svoju svrhu i dao zadovoljavajuće rezultate.

Upravljanje OH&S rizicima u skladu sa ovim metodološkim postupkom je vrlo pouzdan i koristan alat za donosiocima odluka u ispunjavanju politike i ciljeva u pogledu zaštite zdravlja i bezbednosti na radu.

Optimizovani model procene OH&S rizika na bazi Kinny metode primenjen u ovom radu je praktično ispitano u i drugim sličnim organizacijama kao što su: *Drillex International d.o.o.*, *International Drilling Service d.o.o.* kao i *Stara Planina Resources d.o.o.* Na osnovu ovog modela je uspostavljen efikasan i efektivan sistem upravljanja zaštitom zdravlja i bezbednosti na radu u skladu sa SRPS OHSAS 18001:2008.

Iz praktične primene optimizovanog modela za procenu OH&S rizika pri upravljanju OH&S sistemom može se zaključiti da je u većini faza geološkog istražnog bušenja prisutan povećani OH&S rizik ali da se istim može upravljati samo ako su primenjene planirane mere iz Plana mera za kontrolu procenjenih OH&S rizika.

Ovakvo predloženi metodološki postupak procene OH&S rizika može biti od velike koristi i u drugim organizacijama koje koriste ovu metodu procene rizika ili se bave sličnom delatnošću. Procena OH&S rizika i uspostavljanje kontrolnih mehanizama upravljanja je od velike koristi i pri projektovanju sistema upravljanja zaštitom zdravlja i bezbednošću na radu. Predloženi model procene OH&S rizika omogućava da se informacije o OH&S riziku adekvatno procesuiraju i koriste u donošenju odluka na relevantnim nivoima organizacije koja se bavi izvođenjem radova na geološkim istražnim bušenjima.

Aktivnom i sve obuhvatnom procenom OH&S rizika kako je to definisano ovim radom menadžment organizacije koja se bavi geološkim istražnim bušenjem može da:

- prihvata i odobrava politiku upravljanja procenjenim OH&S rizikom;
- obaveštava sve zainteresovane strane u procesu izvođenja geoloških istražnih bušenja;

- definiše mehanizme kontrole procenjenog OH&S rizika koji odgovaraju performansama organizacije;
- obezbeđuje usaglašenost sa zakonskom i podzakonskom regulativom kao i sa pravnim aktima organizacije;
- obezbeđuje raspodelu potrebnih resursa za potrebe upravljanja procenjenim OH&S rizikom.

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