Revista Minelor – Mining Revue
ISSN-L 1220-2053 / ISSN 2247-8590
vol. 30, issue 1 / 2024, pp. 1-11

OCCUPATIONAL SAFETY RISK ASSESSMENT FOR WOLA HEAVY-DUTY MACHINERY OPERATOR IN A ROMANIAN DIABASE OPEN –PIT MINE

Raluca CEPREAGA MOLDOVEANU[1], Roland Iosif MORARU[2]*

[1]University of Petroşani, Petroşani, Romania, ralucacepreaga@gmail.com
[2] University of Petroşani, Petroşani, Romania, roland_moraru@yahoo.com

DOI: 10.2478/minrv-2024-0001

Abstract: *Occupational safety risk assessment is always the basic stage of the systematic approach of reducing the impact of undesired events (work injuries and occupational illnesses), by decreasing both their likelihood of occurrence and the gravity/severity of the generated impact. Eighteen years ago, when, as a consequence of the regulatory changes induced by our country's accession into the European Union, the risk assessment became mandatory/compulsory. Since then some progress was factually realized in the spirit of applying different risk analysis techniques in all Romanian organizations. Even if there are many aspects that are requiring further improvement, an effectively validated and nationally accepted indigenous tool is nowadays available. This method was put in practice in this research paper, in order to analyse, evaluate and assess the safety risks related to several of the main activities/jobs in a diabase open pit mine exploiting construction stone in a certain province of the country. Based on the results obtained, it has become feasible to propose realistic measures aimed at preventing the identified and quantified risks located in the field of unacceptable risks and protecting exposed workers to their effects. The case study developed and synthesized in this article confirms the capability of the risk assessment process to facilitate the substantiation of the decisions regarding the allocation of resources towards the minimization of the risks encountered in the work processes by different categories of workers in the mining companies.*
Keywords: *risk assessment, occupational health and safety, diabase, open-pit, wola heavy-duty machinery operator, prevention, protection*

1. Introduction

Risk assessment involves identifying all risk factors in the analysed system and quantifying their size based on the combination of two parameters: the severity and frequency of the maximum possible consequence on the human body [1], [2]. Thus, partial risk levels are obtained for each risk factor, respectively global risk levels for the entire analysed system [3], [4].

Law no. 319/2006 on occupational safety and health contains the following provisions regarding the obligation of risk assessment [5]:

- the employer has the obligation "*to assess the risks to the safety and health of workers, including the choice of work equipment, chemicals or preparations used and the arrangement of jobs*" (art. 7, paragraph 4, letter a);
- the employer has the obligation "*to carry out and be in possession of a risk assessment for occupational safety and health, including for those groups sensitive to specific risks*" (art. 12, paragraph 1, letter a).

Also, through the provisions of art. 13, lit. b, Law no. 319/2006 Regulation (on occupational safety and health states that, in order to ensure occupational safety and health and to prevent accidents at work and occupational diseases, employers are required to *„draw up a prevention and protection plan consisting of technical, health, organizational and other measures, based on the risk assessment, to be applied according to the working conditions specific to the unit".*

* Corresponding author: Professor Roland Iosif Moraru, Ph.D., University of Petroşani, Petroşani, Romania, contact details (20, University St., Petroşani, Romania, roland_moraru@yahoo.com)

In accordance with art. 15, paragraph 1, point 1 of H.G. no. 1425/2006 for the approval of the Methodological Norms for the application of the provisions of the Law on safety and health at work no. 319/2006, the first of the prevention and protection activities carried out within the enterprise and / or unit is represented by *"hazard identification and risk assessment for each component of the respective work system: worker, workload, means of work / work equipment and work environment"* [6], [7].

A relatively large number of methods have been designed and are currently used to facilitate the fulfilment of employers' legal obligations in the field of occupational injury and disease risk assessment. [8], [9], [10].

The company in which the research was carried out in this paper is with fully private capital based in Constanţa, is registered in the Trade Register and has as main activity: "*Extraction of ornamental stone and building stone, extraction of limestone, gypsum, chalk and of slate*", according to the national codification - CAEN Code 0811 having a Working Point in Somova Commune, Tulcea County, Romania.

2. Material and method

2.1. Company location, goal and importance

The exploitation perimeter Valea Ormanu cu Pari is located on the western slope of Movila Săpată hill (+153.32 m), from the right slope of Ormanu cu Pari valley and at about 2.5 km SSV from the western limit of Somova village, Tulcea County.

The analysed company leased from the City Hall of Somova, Tulcea County, a non-productive land, with an area of 16 ha, which includes the exploitation perimeter and the crushing-sorting station in order to exploit construction materials in the perimeter Valea Ormanu cu Pari.

The access to the perimeter is made along DN 22 A Tulcea - Măcin, from which, about 1.5 km southwest of the exit from Somova, it is traversed, on the paved road that follows Ormanu cu Pari valley, a distance of about 1, 3 km, in the bifurcation area of the valley. From here, an access road has been arranged on the right side of the valley following the + 110m level curve (which represents the basic elevation of the quarry). This surface also includes the surfaces on which the platforms of the site organization, the crushing-sorting station, and the platforms of the vegetal and sterile soil piles are placed, as well as the technological roads destined for the transport of the extracted useful rock.

2.2. Site organization

The platform arranged in a protected area at the base of the right slope of the valley, at about 500 m from the intersection with DN 22A is concreted (e.g.: office / warehouse area, fuel depot, equipment supply platform, waste container platform, etc.) and the surface of approx. 250 m^2 comprises the following:

- a Diesel tank (capacity 5000 litters), above ground, placed on a metal support provided with a retention tank (platform of 25 m^2); the diesel supply will be made with the tank from the distributors from Tulcea municipality; next to it a special storage place has been arranged on which oil and burnt oil barrels will be placed;
- a PSI picket equipped with foam and powder fire extinguishers;
- an industrial water tank of 5000 litters (water will be provided from sources in the Municipality of Somova) - located on a platform of 15 m^2;
- 2 containers, one for recyclable waste and one for non-recyclable waste (15 m^2 platform);
- dry type bathroom; - with the development of the operation, a social group will be built with a septic tank, drainable of 15 m^3;
- 1 Caterpillar 275 KVA generator set (for power supply to the crushing-sorting station);
- an MC 10 type motor compressor;
- the concrete platforms on which the diesel and industrial water tank will be stored, as well as the waste containers will be provided with covered pens.

The investment objective is represented by the quarry exploitation works of the diabases from the exploitation perimeter Valea Ormanu cu Pari, as they will continue in the following years, until the depletion of the reserves in the field. The necessary investments for the works of preparation, opening and capitalization of the useful rock resource, consisting of diabases, are made in order to carry out works of public interest. In order to participate in the implementation of complex programs for development and regularization of banks on the Danube, as well as for the maintenance of roads and communal roads in

Tulcea County, the investigated company is interested in the exploitation and production of stone for construction.

The plots of the construction site organization, the crushing-sorting station and the vegetal and tailings soil dumps are arranged within a plot with unproductive land, with an area of 3.5 ha, intended for industrial constructions (according to the cadastral classification). It is located on the right side of Ormanu cu Pari valley, in the vicinity of gallery no. XIII. Occupied and exploited areas are summarized in Table 1.

Table 1. Centralizer with the surfaces occupied and exploited by the site organization

No.	Specification	Surface (m^2)
1	Quarry openness	11,900
2	Site organization	250
3	Vegetal topsoil tailing dump	1,000
4	Sterile tailing dump platform (from the 2nd year of exploitation)	1,000
5	Access road to the primary crusher feed hopper	600
6	Crushing-sorting station, finished storage platforms	1,250
	Total	**16,000**

At the level of the entire panel for exploitation + technological platforms, an area of about 15,000 m^2 (the surface of 1000 m^2, destined for the vegetal soil heap was not discovered, but only scarified), covered by a thin blanket (0.00 - 0.10 m) of soil with fragments of coherent rocks. The detection coefficient is low, about 25% of the surface being covered with diabase outcrops.

2.3. Opening, preparatory and exploitation works

The access in the perimeter from the road DN 22 A Tulcea - Măcin is made on the paved road that follows Ormanu cu Pari valley line, about 1.3 km, until the bifurcation area of the valley. The paved road in the valley is in very good condition, requiring minimal improvements.

From its end, on the right side of the valley, an access road to the NNE has been arranged, which will follow, approximately, the level curve having the elevation + 110 m (which represents the basic elevation of the quarry). From this road were arranged the short access braces to the working berms of the attack half-lines (located inside the exploitation panel to be discovered).

The platform of the crushing-sorting station is arranged on a natural plateau at the base of the right slope of the valley, located about 0.5 km away from the intersection of the road on the valley with DN 22A. The access roads are arranged, for the most part, for car traffic (dump trucks) of 16 tons.

Fig. 1. General view of the crushing - sorting station

The road has, for the most part, a 3.0 m wire, with waiting areas 1.0 m wide and a trapezoidal trench 0.5 m deep (in sectors where the transverse profile requires it). In order to arrange the access road to the platform of the crusher feeding hopper, the vegetal soil was scraped and removed on a width of 3.0 m and a total length of about 200 m, totalling approx. 1,500 m^2.

The land area, uncovered for the opening of the pre-exploited useful rock reserves, is 11,900 m^2. It has the shape of a polygon with 6 sides, with the northeast side having a length of about 110 m, and an average width of about 75 m, being oriented with the long side on the NE - SW direction.

Valea Ormanu cu Pari quarry is equipped with a crushing station - semi-mobile sorting at which only the main crusher is fixed in a concrete foundation (fig.1).

The platform of the station has an area of about 1,250m3 (including the area on which the aggregates are stored). The crushing-sorting station is intended for the complex processing of quarry mineral aggregates, by crushing-sorting and is organized in a stream consisting of the following equipment:

- Feed hopper;
- A jaw crusher, C 12090 - Brăila type, capacity 140 tons / h;
- Reinforced rubber conveyor belts, mounted on fixed metal trusses, for transport and final storage of aggregates;
- 8 m^2 pre-screening screen;
- Silo buffer;
- GR granulators;
- Vibrating screen with four sieves for sorting aggregates, 12 m^2;
- 275 kvA generator set.

The rock blasted from the operating stage is loaded using a 3.4 m^3 bucket Wolla front loader or the 16-ton ATLAS COPCO bucket excavator, which transports it to the tipping-feeding platform of the primary crusher, equipped with feed hopper and tailings separator. Operating losses are estimated at about 10% of the extracted mining mass (29,050 tons). The crushing losses - sorting of the processed mining mass are estimated at about 5% (9,950 tons).

2.4. The INCDPM Bucharest risk assessment method

From the multitude of methods used worldwide and nationally to assess the risks of occupational injury and illness, in this paper is applied the method developed by the I.N.C.D.P.M. Bucharest. This method was approved by the Ministry of Labour and Social Protection in 1993, revised in 1996, edited in 1998 and republished in 2002 [11], [12], [13].

The method developed by the I.N.C.D.P.M. Bucharest is part of the category of analytical, semi-quantitative methods and consists, in essence, in identifying all risk factors in the analyzed system (workplace) using pre-established checklists and quantifying the size of the risk for each risk factor, based on the combination of the severity and the frequency of the maximum foreseeable consequence. The overall level of risk in the workplace is determined as a weighted average of the partial risk levels, so that the compensations are minimal. The safety level is indirect, being inversely proportional to the level of risk [14].

The application of the method ends with two centralizing documents for each job: the risk assessment sheet and the proposed measures sheet. The first file includes the identified risk factors, their quantification parameters, the maximum foreseeable consequence, the severity and frequency classes, the risk level for each risk factor and the overall risk level at work. The second sheet contains the technical and organizational measures necessary to combat the action of each risk factor at the evaluated workplace, ranked according to the levels of risk, starting with very high levels (7, 6, 5, 4, …) [15].

3. Case study: occupational risk assessment for wola heavy-duty machinery operator

The operator drives, maintains and supervises the heavy - duty WOLA equipment intended for loading the mined (processed) material. The components of the work system are described below:

a) Work equipment

- Wola (front loader);
- Intervention and repair tools;
- First aid kit;
- Reflective triangles;

- Fuels (diesel);
- Lubricants (engine oil, transmission oil, hydraulic oil, greases);
- Antifreeze (toxic);
- Freon (in air conditioning systems);
- Brake fluid (toxic);
- Electrolyte battery packs (H_2SO_4 solution);
- Windscreen cleaning fluid;
- Suspension devices (mechanical and hydraulic);
- Riding wedges;
- Fire extinguisher;
- Personal protective equipment (overalls, earmuffs, helmet, gloves, dust mask, goggles, protective footwear, reflective vest;

b) Work task

The driver of the equipment is obliged to check the technical condition of the machine before starting work, to check that the warning and alarm systems are in working order. During the whole period of travel to the working point, he will comply with the traffic rules. The fixing of the machine in order to start the work will be done according to the own instructions and the provisions from the technical book of the machine (ground level, distance from the working point, existing obstacles near the working point, etc.). The operation of the machine will be done with great care, avoiding its overload. It is forbidden for other people to be present in the area of the machine. At the end of the work or whenever the driver leaves the machine, he will insure it against accidental movement or use by unauthorized persons. The operator participates in all occupational safety and health training and complies with his own occupational safety and health instructions and the legislation of OSH, emergency response and environmental regulations.

c) Work environment

The activity takes place in the cabin of the machine but also in the open air - atmospheric weather, with permanent noise generated by the operation of the machine as well as pneumoconiogenic dust (dust) released when unloading the material in the means of transport.

Applying the tools and the procedure specific to the INCDPM Bucharest method [14], the concrete forms of manifestation of the risks were identified, the severity classes and the probability classes related to each of the identified risks were assigned, and then - using the scale of framing the risk levels, the partial risk levels were set. The results obtained are centralized in Table 2. The meaning of the notations in table 1 is as follows: *WSE - Work system element; IR - identified risk; RF – risk factor; MC - Maximum consequence; S - Severity; Likelihood; RL - Risk level; WE - Working equipment; OE - Occupational environment; WT - Working task; HF - Human factor; LTI 3-45 – Lost Time Injury from 3 to 35 days; LTI 45-180 – Lost Time Injury from 45 to 180 days; INV I – first degree invalidity; INV II – second degree invalidity; INV III – third degree invalidity; D – death.*

Table 2. Risk Assessment Sheet

Unit: Quarry		**RISK ASSESSMENT SHEET**	**Workers exposed: 2**			
Crushing station			**Exposure length: 8 h/shift**			
WOLA Mechanical equipment operator			Assessment Team: Authors, Occupational Health Physician, worker			
WSE	**IR**	**The concrete form of manifestation of risk factors (description, parameters)**	**MC**	**S**	**L**	**RL**
WE	Mech. RF	Grinding, crushing upper limbs during machine interventions;	INV. III	4	3	4
		Crushing, hitting by moving technical equipment or during work (especially when repairing the lower part of the machine blade, falling bucket drop);	D	7	2	4
		Crushing of persons in the area of action of the machine due to improper handling of the machine or dump truck in which the material is loaded;	D	7	2	4

		Failure and overturning of technical equipment due to un-assurance or improper operation (uneven surfaces, high inclination, overload);	D	7	2	4
		Slips, trips or falls when getting on / off the technical equipment;	LTI 45-180	3	3	3
		Contact members with petroleum products for fuel supply, maintenance, carburettor repair, hydraulic fluid jet;	LTI 3-45	2	3	2
OE	Physical RF	Seasonal climatic variations - weather;	LTI 45-180	3	3	3
		Noise during machine operation;	LTI 45-180	3	3	3
	Chemical RF	Working in an exhaust gas environment;	LTI 3-45	2	5	3
		Various powders, silica;	LTI 45-180	3	3	3
	Natural/Biol. RF	Natural disasters, landslides, trees falling,, dangerous animals (venomous snakes)	LTI 3-45	2	5	3
WT	Inadequate WT content	Repetitive operations, monotony of work;	D	7	1	3
		Entrusting the operation of technical equipment to unauthorized, inadequately trained or inexperienced persons;				
HF	Wrong actions	Starting the activity without signalling and withdrawing people from the work area, without ensuring the stability of the machine;	D	7	1	3
		Improper manoeuvres: • high speed travel, not adapted to the condition of the travel route; • high speed travel, not adapted to the condition of the travel route; • equipment overload; • improper operation.	INV. I	6	2	4
		Failure to comply with the Traffic Code on public roads, driving on unsuitable, slippery roads;	INV. III	4	3	4
		Execution of equipment repair works without ensuring accident prevention measures and with the help of untrained persons;	INV. II	5	2	4
		Inflating the tires without using the guard;	D	7	1	3
		Making dangerous jokes by minimizing the danger of injury;	INV. III	4	1	2
		Use of technical equipment without technical overhaul, in improper condition: • used tires above the permissible limit, with air pressure below the permissible limit; • without acoustic and optical signalling system; • faulty or inadequate lighting system; • defective braking system;	D	7	2	4
		Leaving the machine without accidental movement assurance and without taking the ignition key;	INV. III	4	2	3
		Accidental communications while traveling, unloading material from the bucket, interventions on the machine (bucket grab);	D	7	2	4
		Transporting people in the cab, on the stairs, on the sides of the machine;	INV. I	6	3	4
		Continuation of the activity in case of situations generating risks of injury;	INV. I	6	1	2
		Failure to appear at the regular medical check-up in order to detect in the incipient phase the possible ailments determined by the work environment;	LTI 45-180	3	3	3
		Presentation at work in inappropriate psycho-physiological conditions (fatigue, working under the influence of alcohol or drugs).	D	7	1	3
	Omissions	Omitting the proper use of PPE	D	7	1	3

The centralization of the data in the Evaluation Sheet/Risk Assessment Card shows the level of global risk of the job "*WOLA Machine operator*":

$$\mathbf{N_{rg}} = \frac{\sum_{i=1}^{26} R_i r_i}{\sum_{i=1}^{26} r_i} = \frac{0\,(7x7) + 0(6x6) + 0(5x5) + 10(4x4) + 14(3x3) + 2(2x2) + 0(1x1)}{0x7 + 0x6 + 0x5 + 10x4 + 14x3 + 2x2 + 0x1} = \mathbf{3,42}$$

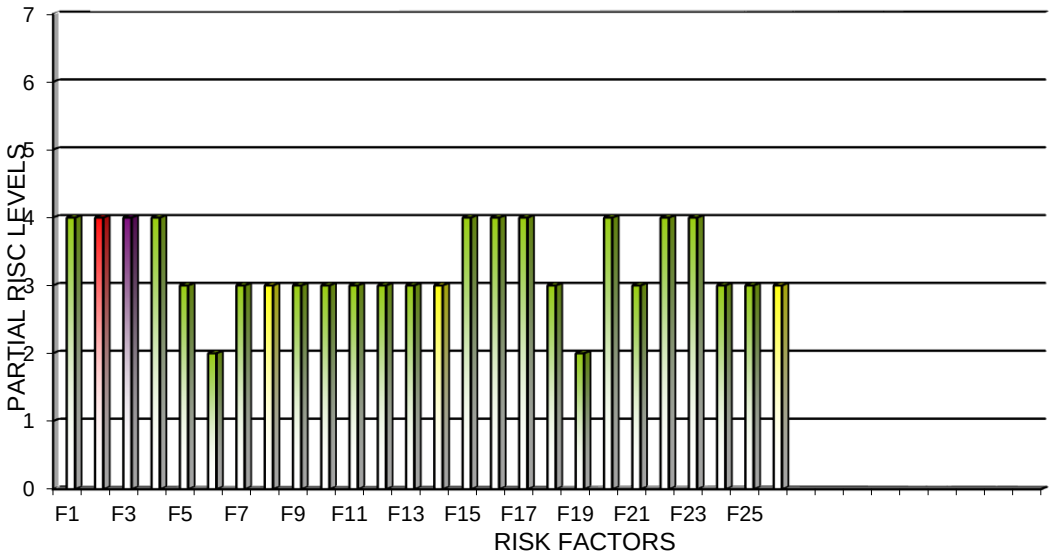

Fig. 2. Partial risk levels by risk factors: Workplace: "WOLA Machine operator"

Table 3. Proposed prevention and protection measures sheet -excerpt

S.C. XYZ CONSTRUCT LLC. Workplace: "WOLA Machine operator"					
No.	**Risk Factor**	**RL**	**Proposed measure**		
			Measure denomination	**Accountability/Liability**	**Deadline**
1.	F1- crushing upper limbs when doing machine interventions in function;	**4**	**Technical measures:** - the technical equipment will be in proper technical condition, equipped with all devices for traffic safety (brake, optical signalling, acoustic signalling, lighting system, appropriate tires, etc.); - periodically, based on the schedule and operating instructions, the technical condition of operation will be reviewed, the verification works will be performed only by qualified personnel; **Organizational measures:** - Periodic training of workers - own instructions for safety and health at work;	Company administrator WOLA Machine operator	Permanently Periodically
2.	F2- Crushing, hitting of moving technical equipment or during work (especially when repairing the lower part of the machine blade, falling bucket drop);	**4**	**Technical measures:** - the technical equipment will be in proper technical condition, equipped with all devices for traffic safety (brake, optical signalling, acoustic signalling, lighting system, appropriate tires, etc.); - periodically, based on the schedule and operating instructions, the technical condition of operation will be reviewed, the verification works will be performed only by qualified personnel; **Organizational measures:** - Periodic training of workers; - Signalling the working areas.	Company administrator	Periodical Permanently
3.	F3 - Crushing of persons in the area of action of the machine due to improper handling of the machine or dump truck in which the material is loaded;	**4**	**Technical measures:** - the technical equipment will be in proper technical condition, equipped with all devices for traffic safety (brake, optical signalling, acoustic signalling, lighting system, appropriate tires, etc.); - periodically, based on the schedule and operating instructions, the technical condition of operation will be reviewed, the verification works will be performed only by qualified personnel; **Organizational measures:** - Periodic training of workers; - Signalling the working areas.	Company administrator WOLA Machine operator	Periodically Permanently

4.	F4- Failure and overturning of technical equipment due to failure to insure it or improper operation (uneven, high inclination, overload);	**4**	**Technical measures:** - - the technical equipment will be in proper technical condition, equipped with all devices for traffic safety (brake, optical signalling, acoustic signalling, lighting system, appropriate tires, etc.); - periodically, based on the schedule and operating instructions, the technical condition of operation will be reviewed, the verification works will be performed only by qualified personnel; **Organizational measures:** - Periodic training of employees in compliance with safety provisions.	Company administrator	Permanently Periodically
8.	F15 - Improper manoeuvres:	**4**	**Technical measures:** - the instructions in the technical book as well as the own instructions for safety and health at work will be strictly respected; **Organizational measures:** - the operation of the technical equipment will be done only by trained and authorized persons on the basis of training and verification of knowledge, medically fit.	WOLA Machine operator	Permanently
9.	F16 - Failure to comply with the traffic code, improper driving on slippery roads;	**4**	**Organizational measures:** - the operation of the technical equipment will be done only by trained and authorized persons on the basis of training and verification of knowledge, medically fit.	Company administrator Machine operator	Permanently Periodically

4. Interpretation of results

The level of global risk calculated for the job "WOLA Machine operator" is equal to 3.42, a value that falls into the category of jobs with an acceptable level of risk because it does not exceed 3.5. The result is supported by the "Assessment Sheet", which shows that out of a total of 26 identified risk factors, 10 exceed the partial risk level, value 3, falling into the category of average risk factors, the other 14 are falls into the category of low risk factors and 2 into the category of very low risk factors. The 10 risk factors that are in the unacceptable range are summarized in Table 4:

Table 4. Risk factors located in the intolerable area

F1	Crushing upper limbs when doing machine interventions in function;;
F2	Crushing, hitting of moving technical equipment or during work (especially when repairing the lower part of the machine blade, falling bucket drop);;
F3	Crushing of persons in the area of action of the machine due to improper handling of the machine or dump truck in which the material is loaded;
F4	Failure and overturning of technical equipment due to failure to insure it or improper operation (uneven, high inclination, overload);
F15	Improper manoeuvres: • high speed travel, not adapted to the condition of the travel route; • high speed travel, not adapted to the condition of the travel route; • equipment overload; • improper operation.
F16	Failure to comply with the traffic code on public roads, improper driving on slippery roads;
F17	Execution of equipment repair works without ensuring accident prevention measures and with the help of untrained persons;
F20	Use of technical equipment without technical overhaul, in improper condition: • used tires above the permissible limit, with air pressure below the permissible limit; • without acoustic and optical signalling system; • faulty or inadequate lighting system; • defective braking system.
F22	Accidental communications while traveling, unloading material from the bucket, interventions on the machine (bucket grab);
F23	Transporting people in the cab, on the stairs, on the sides of the machine.

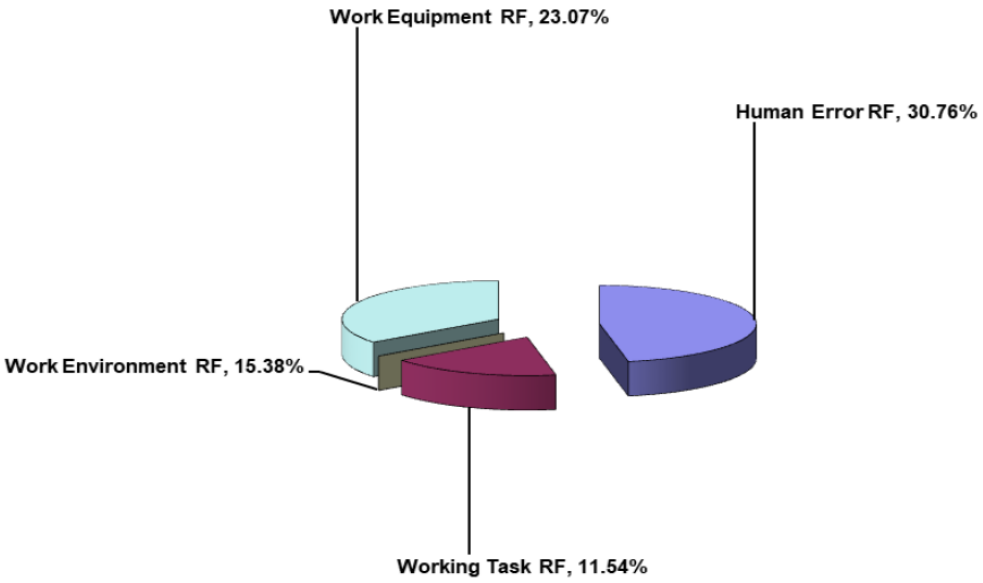

Fig. 3. The share of risk factors identified by the generating source within the work system

In order to reduce or eliminate the 10 risk factors (which are in the unacceptable range), the measures presented in the "Proposed Measures Sheet" for the analysed workplace are required. Regarding the distribution of risk factors by generating sources, the situation is as follows:

- 23.07%, factors specific to the *work equipment*;
- 15.38%, factors specific to the *work environment*;
- 11.54%, factors specific to the *working task*;
- 30.76%, factors specific to the *human operator*.

The share of risk factors according to the component of the work system is represented in figure 3. The analysis of the Evaluation Sheet shows that 51.42% of the identified risk factors may have irreversible consequences on the executor (DEATH or DISABILITY).

5. Conclusions

The research aimed at assessing the risks and elaborating the prevention and protection plan for a Romanian company exploiting a diabase quarry (open-pit mine), in accordance with the provisions of art. 7, paragraph 4, letter b, art. 12, paragraph 1, lit. a and art. 13 of Law no. 319/2006 and art. 15, paragraph. 1, points 1 and 2 of H.G. no. 1425/2006. A relatively large number of methods have been designed and are currently used to facilitate the fulfilment of employers' legal obligations in the field of risk assessment. From the multitude of methods used worldwide and nationally for risk assessment, in this paper it was chosen to use the method developed by I.N.C.D.P.M. Bucharest. This method was approved by the Ministry of Labour and Social Protection in 1993, revised in 1996, edited in 1998 and republished in 2002. The work consisted of completing the following steps:

- analysis of the activities carried out within the company;
- establishing the jobs for which the risk assessment for occupational safety and health was performed;
- identifying risk factors for each job;
- establishing the maximum foreseeable consequence of the action of risk factors on human body, for each risk factor;
- classification in severity classes;
- classification in probability classes (frequency);
- determining the partial risk level for each identified risk factor;
- calculation of the overall risk level for each job;
- interpretation of the results of the occupational safety and health risk assessment for each job, in the light of current legislation;
- preparation of action sheets for each job, for risk factors exceeding the acceptable level.

The results of the risk assessment are presented in the "Job Assessment Sheet" and the "Proposed Measures Sheet" for each job analysed. The list of evaluated jobs is given in Table 5.

Table 5. Results of global risk levels

No	Sheet no.	Work place / job	Global risk level / workplace
1	F 1	Economist	2,67
2	F 2	WOLA operator	3,42
3	F 3	IT Engineer	2,11

The overall level of risk per company is:

$$N_{gS} = \frac{\sum_{i=1}^{3} r_i \cdot N_{gi}}{\sum_{i=1}^{3} r_i} = 2{,}73$$

According to the ranking, it is found that all jobs have the overall risk level below the allowable limit (3.5), they fall into the category of those with low to medium risk level. The value of the aggregate global risk level per company N_{gS} = 2.73, determines its classification in the category of those with low risk level. This situation, which is good in terms of compliance with occupational safety and health legislation, is due to both the concerns of the designated worker (or the internal / external prevention and protection service) and the efforts of the company's management, which integrates economic efficiency issues and occupational safety and health.

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