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Assessment of occupational injury and illness risks for the position of mineral water warehouse forklift operator

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Abstract. Optimizing the work accident and/or occupational disease prevention activity has as its starting point the assessment of occupational injury and disease risks. The notion of risk is defined in specialized literature by the probability with which an accident or an occupational illness occurs in a work process with a certain frequency and severity of consequences. The purpose of assessing the level of risk is to offer the possibility of knowing the real situation at each workplace, from the point of view of work security, in order to take the most suitable preventive measures for the given situation. The basis of the risk assessment principle consists in taking into account two parameters: the frequency of accidents and the severity of the maximum foreseeable consequence (principles also included in European standards).
Keywords: *risk assessment, accident, occupational disease.*

1. The object of activity of the company

S.C. AQUA VITALIS SRL is established in 2017 by the association of two investors who take over an old factory for bottling mineral water by the liter. The object of the company's activity is the bottling, transport and distribution of mineral water, locally in Bucharest, then at the national level. It has a number of 300 employees. Our factory is located in the place Harghita county. Here the carbonated mineral water is bottled from a spring located at a depth of 800m, and the non-carbonated mineral water is extracted from another borehole located at a depth of 600 m also in the same locality.

The company respects the legislative norms in the field of safety and health at work [1], [2], [3], [4].

2. Organizational structure of the company

The hierarchical structure of the company SC AQUA VITALIS SRL brings simplicity and clarity in defining responsibilities. The organization has 10 departments, including the general director department and the country director department. The organizational structure of the company has some advantages:

-ensures the possibility of in-depth study of the problems to be solved;

-the adopted decisions are of superior quality;

-creates specialized management elements (compartments and functions).

-the control is carried out directly and centrally with the help of a relatively small number of personnel;

-there is the possibility of implementing effective global policies;
-duplication of functions is eliminated and the principle of unity of decision and action is respected.
The organizational structure of the company has some disadvantages:
-leads to the extension of information circuits and distorts information;
-it leads to the growth of bureaucracy.
AQUA VITALIS SRL organizational chart is presented in figure 1.

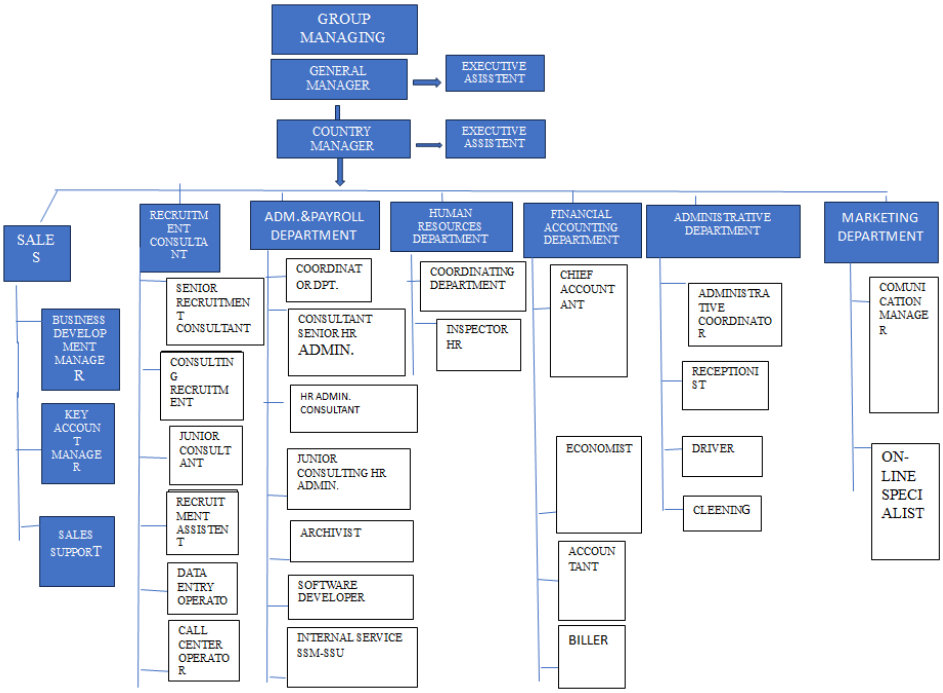

Figure 1. Organizational chart

3. Presentation of the risk assessment method

Within the present work, the assessment of the risks of accident and occupational disease is carried out by the INCDPM method, for the forklift operator function within the work point of SC AQUA VITALIS, in Bodoc city, Covasna county [5], [6], [7], [8].

The optimization of the activity of prevention of occupational accidents and/or diseases has as its starting point the assessment of the risks of occupational accidents and diseases.

The notion of risk is defined in the literature by the probability with which an accident or an occupational disease occurs in a work process with a certain frequency and severity of consequences.

The method used in this paper allows the prioritization of risks according to their value and the efficient allocation of resources for labor protection.

The principle of the method consists of:

-identification of risk factors at the analyzed workplace; establishing the consequences of the actions of the risks of the performer, including their seriousness;

-establishing the probability of action of the risks on the contractor;

-assigning the level of risk according to the severity and probability of the consequences of the risk factors;

-quantification and prioritization of risks.

4 .Components of the work system

The assessment of the risks of occupational accident or disease involves the systematic analysis of the established activities in order to identify the risk factors dependent on the four components of the work system: executor; workload; the means of production; work environment.

Executor (forklift operator) is the person directly involved in the execution of a work task. He prepares the goods for all branches for which he receives the order on PDA/scanner, place/position pallets according to orders/instructions and stores the pallets from the reception only in the areas allocated by the system;

Workload represents the totality of actions that must be performed by means of the means of production and under certain environmental conditions by the performer, in order to carry out the work process. Work load includes the following: inspection of the electric forklift, ensures internal transport, lifting and lowering of pallet trucks, taking over loads from the means of car transport, stacking of pallet trucks and participates in carrying out technical revisions of the forklift.

The means of production represents the totality of the means of labor, technical equipment and objects of labor, raw materials, materials, etc. used in the labor process. Means of production includes the following: forklifts, pallets, racks and storage structures, personal protective equipment (helmet, gloves, goggles and reflective vests to ensure operator safety), air conditioning and ventilation systems, loading and unloading equipment (conveyor belts to facilitate fast pallet handling).

Work environment represents the set of physical, chemical, biological and psychological conditions in which one or more performers perform their work task. The contractor carries out his activity in the warehouse where there is air conditioning and artificial lighting installation.

5. Identification of risk factors

Separate tables are made for each element of the work system. The following notations are made in the tables: CG-Gravity Class; CF-Frequency class and NPR-Partial level of risk.

Table 1 presents the risk factors from the executor's side.

Table 1 Risk factors for the Executor

No	Name of risk factor	CG	CF	NPR
F1	Execution of unforeseen operations in the workload; faulty operation of the lift-down controls.	7	1	3
F2	Performing maneuvers without the necessary visibility, with shocks or moving between two points with high load, near ramps, pedestrian crossings, at the entrance or exit of the warehouse/production, at intersections	7	2	4
F3	Incorrect positioning of loads on racks or incorrect positioning of the electric forklift in relation to the means of transport or the rack	7	1	3
F4	Improper attachment of the forks to the front frame of the electric forklift	7	1	4
F5	Failure to comply with the speed of travel on the premises	7	1	3
F6	Leaving the electric forklift with the keys in the ignition and with the load high	7	1	3
F7	Parking under the load of the forklift	7	1	3
F8	Fall to the same level: imbalance, by slipping, by tripping – when walking the paths inside or in the outer perimeter	3	2	2
F9	Improper use of the means of protection provided (including collective ones	3	4	3
F10	Minimization of danger by non-compliance with work and occupational health and safety instructions	7	1	3
F11	Omissions in the assessment of existing risks	3	1	2
F12	Dangerous Interventions in Case of Emergency Situations	7	1	3

Table 2 shows the risk factors for the Workload.

Table 2 Risk Factors for Workload

No	Denumire factor de risc	CG	CF	NPR
F13	Repetitive maneuvers when transporting large batches of materials, products	2	5	3
F14	Gripping, hand or clothing drive by belt drives (fan, water pump, compressor)	7	1	3
F15	Hitting by the means of motor transport when moving within the premises of the organization and at the work points	7	2	4
F16	Exposure outside the work load to dangerous factors, by moving / stationary in places or areas with temporary or permanent danger	7	1	3
F17	Failure to perform in a timely manner operations indispensable to work safety	2	1	1
F18	Static effort – working mainly in the sitting position	2	6	3

Table 3 presents the risk factors from the Means of Production's side.

Table 3 Risk Factors for the Means of Production

No	Name of risk factor	CG	CF	NPR
F19	Hitting by the means of motor transport when moving within the premises of the organization and at the work points	7	2	4
F20	Self-locking of the operation of the steering mechanism or braking system, while driving	7	1	3
F21	Tipping of finished products, materials not insured against uncontrolled movements	7	2	4
F22	Hitting by the means of motor transport when moving within the premises of the organization and at the work points	7	2	4
F23	Crushing by balance-phase masses	7	1	3
F24	Tipping of finished products, materials not insured against uncontrolled movements	7	2	4
F25	Deviation from the normal trajectory of the loads in case of incorrect operation of the control systems	7	1	3
F26	Crushing by masses in swing	7	1	3
F27	Jet, oil eruption due to accidental cracking of the elements of hydraulic installations	2	6	3
F28	Cutting, stinging, on contact with dangerous surfaces	2	6	3
F29	High temperature of some surfaces, accidentally touched	2	5	3
F30	Electrocution by indirect contact: - penetration of some parts of the equipment in the area of influence, - touching some metallic surfaces accidentally under voltage, - damage to the circuits connecting to the earthing installation, including in areas where there is step voltage	7	2	4
F31	Working with toxic substances: antifreeze, brake fluid	2	5	3
F32	Working with caustic substances: battery electrolyte-chemical burn	3	2	2

Table 4 presents the risk factors from the Work Environment 's side.

Table 4 Risk Factors for the Work Environment

No	Name of risk factor	CG	CF	NPR
F33	Pneumochonoid dusts in the atmosphere of the working environment	2	5	3
F34	Natural calamities, the capture of the earthquake on the premises	7	1	3

F35	Insect bites, bites, scratches caused by animals.	2	1	1

6.Risk factors and partial levels of risk
Figure 2 shows all risk factors and partial risk levels. An overall risk level of 3.04 was also obtained.

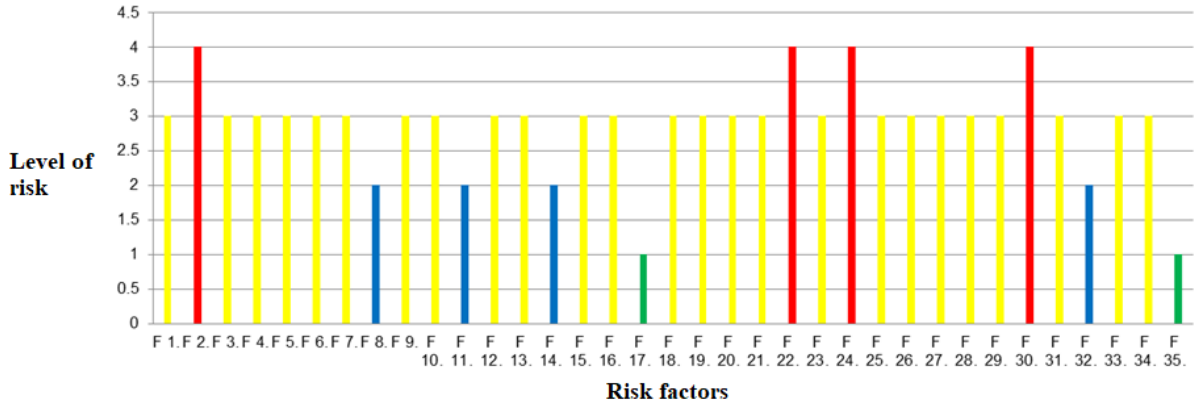

Figure 2. Partial levels of risk

7. Weight of risk factors by elements of the work system
Figure 3 shows the weight of risk factors according to the elements of the work system.

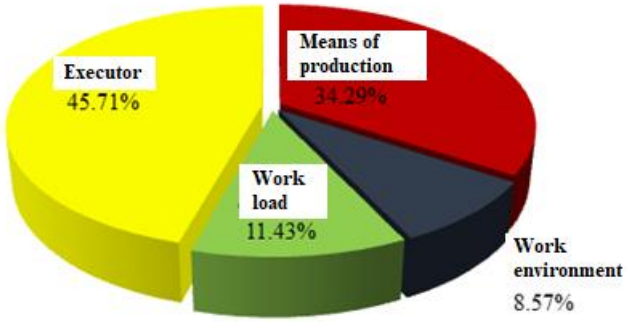

Figure 3. Weight of risk factors by elements of the work system

8. Overall level of risk
Overall risk level-ORL is 3,040.

9.Conclusions
A risk analysis was made for the forklift position. A number of 35 risk factors were identified with partial risk levels between 1 and 4. An overall risk level of 3,040 was determined. In order to combat risk factors with a partial level of risk higher than 4, the related measures are presented in Table 5.

Table 5 Measures to combat risk factors that are in the unacceptable field

No	Name of risk factor	Measures to combat
F2	Performing maneuvers without the necessary visibility, with shocks or moving between two points with high load, near ramps, pedestrian crossings, at the entrance or exit of the	Training of all employees on work instructions and information on the consequences of non-compliance with them (organizational measure)

	warehouse/production, at intersections	
F22	Hitting by the means of motor transport when moving within the premises of the organization and at the work points	Marking of work areas in accordance with the legal provisions and HSE's own instructionsSecurity signage (signs, posters, etc.); (technical measure), Training of employees on the circulation routes in the warehouse (organizational measure)
F24	Tipping of finished products, materials not insured against uncontrolled movements	Anchoring the products according to the specific safety and health instructions at work Respecting the maximum weight limit allowed on each level of the shelf Applying the maximum load allowed on each level of the shelf in a visible place (technical measure). Training all employees regarding the risks at work and the consequences of non-compliance with occupational health and safety legislation (organizational measure)
F30	Electric shock by indirect touch:- penetration of portions of machinery in the area of influence,- touching metal surfaces accidentally under voltage,- damage to the connection circuits to the grounding installation, including in areas where there is a stepping voltage	Visual verification of the integrity of the earthing of the housings, appliances in the work area; Periodic checks of grounding sockets (PRAM) (technical measure) Periodic control aimed at compliance with electrosecurity measures (organizational measure)

References

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[2] HG. No. 1425/2006 - Methodological norms for the application of Law no. 319/2006;
[3] GD no. 971/2006 - Minimum requirements for safety and/or health signage at the workplace
[4] GD no. 1048/2006 - Minimum safety and health requirements for the use by workers of personal protective equipment at the workplace;
[5] Occupational Safety and Health Management. Guide for the evaluation of compliance with legal requirements – Doru Darabont, ed. Agir, Bucharest 2010.
[6] Course Notes Methods of Occupational Risk Assessment and Means of Preventing Occupational Accidents
[7] AQUA VITALIS internal documents.
[8] Guide "Occupational Risk Assessment" published by the National Authority for Occupational Safety (ANSM).