



NEWSLETTER

On Occupational Safety and Health & Working Environment

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Vietnam National Institute of Occupational Safety and Health - VNNIOSH

VNNIOSH 50TH ANNIVERSARY

1971 - 2021



VNNIOSH 50TH ANNIVERSARY:

THE PROCESS OF ESTABLISHING VIETNAM NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH

Dr. Do Tran Hai,

*Member of the Presidium of the Vietnam General Confederation of Labour
Director General of VNNIOSH*

The establishment of VNNIOSH

The National Institute of Labour Protection (NILP), the predecessor of the VNNIOSH, was established on May 1, 1971 under Decision No. 82/CP dated May 1, 1971 of the Government Council (now the Government) with 07 research departments, 06 function and management departments, 01 design department - experimental workshop. The establishment of NILP marked an important turning point in the operation of occupational safety and health (OSH), protection and health care for our country's workers.

After the Southern region of Vietnam was completely liberated, in order to promptly satisfy the requirements of developing the cause of labor protection to serve the workers of provinces in the Southern and Central regions, the Vietnam General Trade Union (now the Vietnam General Confederation of Labour) issued Decision No. 476/QD-TCD dated May 1, 1977 to establish the Sub-Institute of NILP in Southern Region in Ho Chi Minh City and Decision No. 723/QD-TCD dated May 1, 1979 to establish the Sub-Institute of NILP in Central Region in Danang.

In 1998, considering the requirements of the country and the Institute's practical ability to meet the requirements of facilities and the quality of scientific staff in the period of industrialization and modernization of the country, the Prime Minister issued Decision No. 141/1998/QD-TTg dated August 1, 1998, recognizing the Institute as one of the leading institutes of the State, invested and developed by the State.

In 2017, stemming from the actual operation of the Institute, especially in accordance with the Law on Occupational Safety and Health and international cooperation activities in the integration period, the Institute changed its name to Vietnam National Institute of Occupational Safety and Health in accordance with Decision No. 17/2017/QD-TTg dated May 29, 2017 of the Prime Minister. According to the Prime Minister's Decision on the organization and operation of the Institute: VNNIOSH is a public science and technology organization under the Vietnam General Confederation of Labour, with the function of scientific research in service of management, implementation and application of scientific and technological results on occupational safety and health and working environment in accordance with the provisions of law.

In the first day of establishment, the Institute had only 19 staff. Up to now, the staff of the Institute expanded to 207 people, including 57 doctors, doctors of science and masters, more than 100 people with university degrees, along with other professional and technical staff, this provides sufficient capacity to meet the requirements of a scientific and technological research agency to carry out scientific and technological activities according to its assigned functions and tasks. The Institute continues to strive to improve the quality of its staff to better meet the requirements of the new period.

Along with the development of organization and scientific staff, the Institute's technical facilities have also been enhanced and completed



The first generation of the Institute's staff

with a system of working rooms, machinery and equipment and a system of laboratories. Currently, the Institute has 05 laboratories that have been recognized as in accordance with the requirements of ISO/IEC 17025:2005, ISO/IEC 15189:2012 (TCVN 15189:2014), including 03 environmental measurement and analysis labs (Vilas 441, Vilas 593 and Vilas 646), 01 labour safety laboratory (Vilas 956) and 01 occupational disease testing laboratory (Vilas MED 120) with analytical equipment modern. This system of laboratories has really contributed to improving the scientific and technological research capacity of the Institute in monitoring and analyzing environmental and OSH factors, as well as indicators of human psychology being able to affect the health and life of workers during the working process.

The Institute's achievements and contributions are recognized

With continuous and tireless efforts, scientific and technological achievements in OSH and

Environmental Protection that the Institute has achieved during the past 50 years, the Party and State highly appreciate the Institute's contribution awarded the Institute the First Class Independence Medal (2011), Second Class (2006), Third Class (2001) and First Class Labor Medal (1991), Second Class (1981), Certificate of Merit of the Prime Minister (2016), Emulation Flag of the Prime Minister (2020) as well as many other noble rewards.

It can be affirmed that, over the past 50 years, VNNIOSH has continuously grown and developed in all aspects, meeting the increasing needs of improving OSH. Today, in the context of industrialization, modernization and international integration deepening, it is more and more demanding that the Institute strive to build and develop further to not only be the leading unit of the whole country in scientific research OSH and taking care of workers' health, but also rising to the regional level, worthy of the stature and prestige of the Vietnam Trade Union.

VNNIOSH 50TH ANNIVERSARY:

Scientific and technological research on occupational safety and health and environmental protection in the past 50 years

Dr. Do Tran Hai,

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Director General of VNNIOSH*

With the goal of ensuring safety and health protection for workers, the scientific and technological research activities on occupational safety and health and environmental protection of VNNIOSH over the past 50 years have been gradually developing and achieved achievements through each maturity milestone:

The period of 1971-1980

In the first 10 years of its establishment, despite many difficulties in terms of human resources and limited facilities, the Institute has completed 91 scientific and technological research projects at the General Federation (Ministry) and Institute level in the fields of: Occupational hygiene, noise and vibration, radiation and ergonomics; physicochemical analysis; Personal protective equipment; Industrial and working environment ventilation; Safety engineering; Lighting engineering; Electrical safety engineering... The results of scientific research projects have been utilized to design and instruct the implementation of many projects to improve the environment, working conditions, and equipments for occupational accident prevention for employees in enterprises. Especially, with the research on Silicosis, the Institute has contributed to putting this disease in the list of the first 08 occupational diseases insured by the State. In addition, the project "Wireless phase circuit resistance tester" made the State Scientific and Technical Committee granted a "public service patent" to the Institute and a "patent of invention" to the authors carrying out the project.

The period of 1981-1990

During this period, the Institute has successfully

implemented two key State programs of scientific and technical progress on labor protection, including:

- The State's key scientific and technical progress program on labor protection 58.01: "Research and apply labor protection science and technology solutions in manufacturing industry to initially improve working conditions, reduce occupational accidents and occupational diseases", consisted of 19 state-level scientific projects, carried out in the period 1981-1985. The research program was accepted by the State Council of Science and Technology with excellent results and was awarded the Certificate of Merit by the Chairman of the State Committee for Science and Technology.

- State-level Science and Technology Progress Program on Labor Protection 58.A: "Research on scientific basis and technical solutions for labor protection to apply in manufacturing industry to improve working conditions and reduce labor costs, occupational accidents and occupational diseases", consisted of 16 state-level scientific projects. The program was accepted by the State Council of Science and Technology with excellent results and was commended by the Council of Ministers. In addition, the Program Manager and the program co-ordinating officers were also awarded certificates of merit by the Chairman of the State Scientific Committee.

In addition to implementing and successfully completing 2 Programs 58.01 and 58.A, the Institute has successfully implemented 40 scientific projects at the General Confederation level and at the grassroots level. On the basis of



research results of those scientific projects, the Institute has designed, manufactured and put into application more than 300 projects to improve working conditions of manufacturing facilities and created several labor protection and personal protective equipments for manufacturing industry. At the National Initiative Conference, 03 projects of the Institute were rewarded, in which the project "Centrifugal blower fan" with good results was applied in manufacturing industry and was granted a certificate of merit by the Prime Minister and receive the prize of the Conference.

The period of 1991-2000

The Institute has presided over the implementation of 05 State-level projects and participated in the implementation of 07 State-level projects; implemented 32 projects at ministerial level and 120 at grassroots level. In particular, 02 state-level projects were awarded with certificates of merit by the Ministry of Science, Technology and Environment (now the Ministry of Science and Technology).

In the years 1994-1997, the Institute cooperated with the University of Occupational Health and Environmental Hygiene (UOEH) and the National Institute of Industrial Health (NIIH) of Japan to successfully carry out 02 scientific research projects. Japanese scientists cooperated with the Institute's staff to research in facilities

and laboratories both in Vietnam and in Japan.

In addition to carrying out the above-mentioned scientific research projects, the Institute also carried out 06 projects on trial production and manufacturing of products such as shoes and boots that are resistant to oil and grease; industrial fans of all kinds; some specific personal protective equipment; toxic gas treatment equipment, etc.

Also during this period, the Institute strongly promoted the implementation of projects assisting the improvement of working conditions such as anti-heat, anti-dust and toxic gas, anti-noise and vibration, anti-lightning, anti-harmful radiation, lighting techniques, electrical safety, wastewater treatment projects, etc., providing labor protection equipment for facilities nationwide.

The period of 2001-2010

The Institute has presided over the implementation of 06 state-level scientific research topics and tasks and participated in the implementation of 02 state-level branch projects; implemented 92 topics and scientific tasks at ministerial level and 35 at grassroots level. The products of these topics are technical solutions, workplace planning organization, working conditions improvement systems, pollution treatment systems, various types of personal protective equipment, etc., which were widely used for manufacturing facilities due to their high efficiency.



In 2006, for the first time, the State implemented a National Program on occupational safety and health. The program has 07 projects and the Institute is assigned to lead Project 7: “Improving the capacity of research and application of OSH science and technology”. In the period of 2006-2010, the Institute has completed the implementation of Project 7 with the following results: Building and putting into operation a technological line for the manufacture of equipment for working environment treatment; Implemented a number of technical solutions to improve the working environment and working conditions for employees in the Southern region and employees working in a number of specific occupations in the Central Highlands region.

Also during this period, the Institute implemented 07 manufacturing-test projects at ministerial level. The project's products were applied throughout the country and highly appreciated by facilities such as producing and testing safety belts against high falls; Equipment for filtering furnace smoke; Masks to protect the respiratory organs; Completing the small-scale production technology of water treatment equipment for domestic use with small capacity to serve people and workers in remote areas.

The Period of 2011-2020

The Vietnam General Confederation of Labor

and the Ministry of Science and Technology signed a program to coordinate scientific and technological activities for the period of 2012 - 2020 and assigned the Institute as the standing agency in organizing and implementing the content of the Coordination Program. Based on the program's objectives and contents, the Institute has coordinated with the Departments of the Ministry of Science and Technology to develop key topics under the Coordination Program. Specifically, the Institute has implemented 15 projects under the coordination program and 12 projects under the key program of the Vietnam General Confederation of Labour.

Also during this time, the Institute presided over the implementation of 02 national independent science and technology projects; implementing 78 science and technology projects at ministerial level and 79 at grassroots level.

Within the framework of the National Program on OSH for the period 2011-2015, the Institute has applied 24 typical models of manufacturing facility with the design and application of several of solutions to improve the working environment, control and prevent occupational accidents for people working in industries with high risk of occupational accidents such as construction, mechanical-metallurgy, coal-mineral mining, shipbuilding, electricity, etc.

ASSESSING OSH RISKS AT INTERMITTEN PLASTIC RECYCLING FACILITIES

Dr. Nguyen Thu Thuy

1. Introduction

Currently, plastic recycling by mechanical methods is very popular in Vietnam as well as in the world, because mechanical recycling is easy to implement and has high recycling potential. However, this activity is still highly spontaneous in craft villages. Although there are still facilities with automatic and modern scale and production lines, there are still many establishments with intermittent manual lines using old and outdated machines. Some of the main stages in intermittent plastic recycling (washing, preliminary shredding, crushing, etc.) have high and very-high risks. This article presents the results of the occupational health and safety (OSH) risk assessment (RA) and proposes some control measures in small and manual plastic recycling facilities in Vietnam.

2. Research methods

- **Data collection method:** Survey method, interviewing employees and employers, measuring environmental parameters at plastic recycling facilities.

- **Hazard identification method:** It is combined with a number of hazard identification methods such as checklists, job safety analysis, combined with direct interviews with workers as well as employers of facilities manufacturing raw materials from recycled plastic.

- **Risk assessment method for occupational safety hazards:** Using a qualitative risk assessment method for occupational safety hazards, the risk matrix is presented in Table 1.

- **Risk assessment for occupational health hazards:** Using a semi-quantitative risk assessment method. Based on the “VNIOSH Method – 2017” and current QCVN/BYT standards on occupational hygiene, occupational health risk assessment methods used for typical health hazards in plastic recycling are: microclimate, dust, noise and chemicals, these parameters are measured at factories or workshops that produce plastic beads from waste plastic. The process of risk assessment is performed based on the measured values and referenced with the corresponding value in the above method.

Table 1. Labor safety risk matrix

Chance for consequences	Severity				
	Very low	Low	Moderate	High	Severe
No chance	Very low	Very low	Low	Low	Moderate
Very low chance	Very low	Low	Moderate	Moderate	High
Possible	Low	Moderate	Moderate	High	Severe
Likely	Low	Moderate	High	Severe	Severe
Highly likely	Moderate	High	Severe	Severe	Severe

3. Results of risk assessment and control measures

Surveys at manual plastic recycling facilities show that there are many hazards that need to be assessed and controlled. However, at each stage, there are many other potential hazards that need to be specifically assessed. The following are the results of the risk assessment at some key stages according to the steps in the process of producing recycled plastic beads.

- At the raw material warehouse: At most manual plastic recycling facilities, the raw material warehouse is placed in the same area with the production workshop, so the main hazards are fire and explosion, residual organic matter on the packaging, microorganisms, tripping, fall bruised limbs, muscle aches, microclimate, etc. The reason is that the raw materials were collected in the market and dumped in a mess (under the influence of summer heat in the Northern region, the raw materials released foul smell, etc.), electrical wires running on the workshop floor, wetness, short-circuited and lead to fire and explosion, etc. Risk assessment results show that there is a risk of fire and explosion, discomfort, allergies, rashes caused by microorganisms, molds/substances organic matter, high temperature are high-risk hazards. The hazards of muscle fatigue, falls are medium-risk.

- Pre-washing/washing materials: Hazards such as injury due to clamped by machinery, sharp objects stabbing hands, slippery, tripping, allergies, rashes, caustic hand and foot skin caused by microorganisms, fungi mold, organic matters left in the packaging combined with moisture causing a very uncomfortable feeling, electrical cords running on wet ground prone to electric shock are hazards that are assessed as high risk. In addition, washing machine is a single machine, workers insert materials into the machine and this work is done in batches, so there will be muscle pain, this hazard is assessed as medium-risk.

- Drying raw materials outdoors: Workers have to carry raw materials after washing them to dry outdoors and have to pluck them to dry between hot and humid summer temperatures,

workers are prone to heatstroke, heatstroke thus this stage is deemed high-risk. This stage depends very much on the weather, the hazards of microclimate, ergonomics, etc., are assessed as high risk.

- Preliminary cutting of raw materials: This stage appears in establishments that buy raw materials in the form of tarpaulins, or bavia from tarpaulin factories of large size, so preliminary cutting is required. The main hazard is rolling, clamping, cutting into the hand which is assessed as very high risk. The risk of electric shock, working posture is also high risk in this stage.

- Feeding materials into blender/crusher: A common hazard is clamping, falling into the blender/crusher. The main reason is the improper arrangement of materials and equipment in the factory. Raw materials are piled high, bumpy, higher than the location of the grinder/crusher, workers standing on the pile of materials to put them into the grinder/crusher and sometimes they are careless and use their feet to push the materials into the machine, slipping and falling in the grinder/crusher in operation, etc. Risk assessment results considered this stage highly-risky. In addition, at this stage, there are hazards such as tripping and ergonomics that are assessed as high risk.

- Feeding materials for heating stage: After being crushed raw materials are loaded by workers into the heater, at this stage the main danger is muscle, bone and joint pain and is assessed as medium risk.

- Monitoring the spinning heating process: When the material is heated to a certain temperature (depending on the type of plastic), the plastic will melt, during the extrusion heating process, there will be gas explosion, splashes of liquid, hot plastic causing burns to workers occur frequently. This is also a common hazard in automatic recycling facilities. VOCs (volatile organic compounds) are detected in this process. The factory is cluttered, and the power cord runs on the floor of the factory, so workers are prone to slips, tripping on wires, objects and edges of equipment. The risk assessment

results for these hazards are high-risk. Risks of microclimate are assessed as very high risk on summer days in the North, noise is of medium risk.

- Supervision of fiber shaping cooling process: Workers have bruised limbs due to tripping on the edge of the base of this unit, which is a common hazard and is considered high-risk.

- Granulating-Packing plastic granules: At this stage, there is a risk of microclimate and ergonomics, workers have to carry bags of plastic beads with a weight of 25kg. The risk assessment results for hazards are high risk. Slip hazards are medium risk.

- Maintenance/repair/cleaning of machinery: At this stage, there are many hazards that are assessed as high risk such as sharp objects stab in the hands, get caught-in equipment, high falls, chemicals/organic substances, microorganism.

General assessment and control measures

Most of the production stages of recycled plastic pellets have working positions that are rated as high-risk. In the stages of preliminary chopping, feeding the grinder/crusher, there are many hazards such as sharp objects hitting the hands or clamping that are very risky. During the fiber extrusion heating process, the phenomenon of gas explosion, which shoots liquid plastic droplets, often causes burns to workers.

The occupational health hazards are expressed through parameters such as microorganism, noise, dust, organic vapors, etc. Measurement results show that most of the production stages in these facilities have temperature within the range of 32-37°C, all exceed the allowable limit according to standard QCVN 26:2016/BYT, especially in the spinning heating stages, the temperature rises from 36-37°C and is considered to have high level of risk. Noise is mainly due to crude, old and outdated machinery, measured at many stages with a value greater than 90dB. According to VNIOSH – 2017 method, noise is assessed at medium risk. Toxic VOCs were detected in plastic recycling facilities, particularly in the granulation (heating, spinning, granulating) areas but at low levels and assessed as an

acceptable risk. However, it is necessary to have control methods for these factors because they can enter the body through the respiratory tract, digestive tract, skin and accumulate in the employee's body up to a certain time, which can develop into diseases. Organic matter left in the packaging is also a hazard that needs to be controlled (unpleasant smell, etc.).

Occupational safety hazards need to be controlled and preventive measures should be immediately implemented such as redesign of power lines, rearrangement of machinery locations, warehouses, factories and basic measures such as administrative control methods (compliance with 5S rules, signs, etc.). The safe working rules, especially the safe implementation process in the crushing/grinding stage, the fiber heating stage, it is necessary to have studies to avoid the phenomenon of plastic explosions flying into workers, resulting in burn. Occupational health hazards need to be taken measures to strengthen the mechanism to collect, absorb toxic gas, ventilate dust, and shield to isolate noise. Employees need to be trained in OSH and fully equipped with personal protective equipment. It is strictly forbidden to eat and drink in the factory. In addition, these facilities need to supplement or strengthen the waste and wastewater treatment unit after the recycling process.

4. Conclusion

Risk assessments in manual plastic recycling facilities have identified many high-risk, very high-risk occupational safety hazards. The factory layout is not reasonable and scientific, so there are many great dangers. Occupational health hazards in which physical hazards such as noise are also at medium risk require mitigation measures. Toxic VOCs are only at detectable levels, but also considered as a hazard that needs attention and a control plan because it is a possible carcinogen if exposed for a long time. Some control measures such as administrative controls, OSH training, industrial sustainable development, etc., are easy and effective to be implemented and need to be implemented immediately.

VNNIOSH 50TH ANNIVERSARY:

Advisory role to assist the Vietnam General Confederation of Labor in the work of OSH and environmental protection

MBA. Xuan Dai

As the leading Institute of OSH operation under the Vietnam General Confederation of Labour (VGCL) over the past 50 years, the Institute has always determined its responsibility to advise the VGCL on scientific bases to participate in State management in the field of OSH, ensuring Vietnamese workers have increasingly favorable conditions to exercise their right to work in a safe and hygienic environment.

In participating with the State in developing legal documents, standards and regulations on labor and OSH, the Institute was assigned by VGCL to directly implement or provide comments and suggestions, or collaborate with state agencies to compile the aforementioned documents. Many activities have been carried out by the Institute such as:

- Participating in the compilation and commenting of the Labour Code, the Law on Occupational Safety and Health in different periods;

- Contributing ideas to many legal documents under the Law such as Decrees, Joint Circulars, Circulars of Ministries... to concretize the issues of OSH in the Labour Code;

- Participating in compiling the State's system of standards and regulations on occupational safety for the manufacturing sectors, hundreds of promulgated Vietnam standards (TCVN) and safety regulations were accepted by the State;

- Proposing many issues related to the development strategy of labor protection in our country such as proposing the establishment of a National Labour Insurance Council; the development of national programs on OSH according to the 5-year plan; coordinated to organize "National Week on OSH", etc.

The Institute satisfactorily performed in

assisting the VGCL in organizing and carrying out many specific and practical activities in the Trade Union's operation of occupational safety and hygiene such as: presiding over drafting documents for the Presidium of the Confederation to sign and promulgate Resolution No. 01/TLD dated April 21, 1995 on improving the content and operation of the Trade Union in labor protection; Directive No. 05/TLD dated April 24, 1996 on launching the campaign "Green, clean, beautiful, ensuring OSH"; Directive No. 01/CT dated 16/01/1997 on strengthening activities of trade unions at all levels in labor protection work. Assisted VGCL in preparing and organizing the National Labor Protection Conference of the Trade Union system and the Competition of Good Safety and Hygiene Practitioners at all levels. Organized many working groups to go to localities and establishments to guide and inspect labor protection activities of trade unions at all levels.

As a science and technology organization, the Institute also conducted in-depth research on statistics and analysis of occupational accidents; joined with the State in researches to promulgate the list of Occupational Diseases in our country; investigated and surveyed working conditions, assessed the health and disease status of employees, proposed scientific and technical measures and management to assist the VGCL and the State in establishing specific policies and measures to prevent occupational accidents and diseases.

With research on silicosis, the Institute has contributed to the inclusion of this disease in the list of the first 08 occupational diseases insured by the State (1976). 15 years later, based on the results of two State-level scientific research programs 58.01 and 58.A, the Institute proactively

proposed to the Inter-Ministry of Health, the Ministry of Labour - Invalids and Social Affairs and the VGCL considering the recognition of a number of new occupational diseases in our country and the Inter-Ministry issued a Circular on recognition of 8 newly insured occupational diseases, increasing the number of insured occupational diseases to 16 diseases in 1991.

According to the Institute's proposal, Vietnam's national OSH information network was established in 1996, in which the Institute is one of the three focal points of the network.

Based on the results of the State-level Science Project KX-07-15, the Institute has proposed a "List of personal protective equipment for different occupations" including 552 occupa-

tions in 28 other industries (groups of occupations), and have been officially handed over to the Ministry of Labour - Invalids and Social Affairs to study, utilize and compile documents on the State's regulations on the provision of personal protective equipment for workers by sectors.

Besides, the monitoring and control of working environment pollution is maintained by the Institute annually, with an average of nearly 100 production facilities in concentrated industrial zones of 3 regions of the country. The content and quality of pollution monitoring and evaluation indicators are increasingly improved with objective reliability, satisfying the requirements of providing a working environment database for the annual National Environmental Report of the Ministry of Natural Resources and Environment.

Situation of occupational accidents in 2020

Nguyen Hanh Tu

In 2020, in the area of labor relations, the number of occupational accidents increased, as well as the total number of victims, the number of fatal cases, the number of deaths, the number of serious injuries, and the number of cases with 02 or more victims reduced.

1. Data on the situation of occupational accidents

According to statistics from the Ministry of Labour - Invalids and Social Affairs (MOLISA), in 2020, there were 8,380 occupational accidents causing 8,610 victims (including in the areas with labor relations and areas where employees work without labor contracts).

Number of deaths from occupational accidents: 966 people, reduced by 13 people, equivalent to 1.34% of that in 2019, (in which the area with labor relations: 661 people, an increase of 51 people, equivalent to 8.36% compared to 2019; the area of employees working without labor contracts: 305 people, a decrease of 64

people, equivalent to 17.34% compared to 2019).

Number of people seriously injured: 1,897 people (in which the area with labor relations: 1,617 people, an increase of 25 people, equivalent to 1.57% compared to 2019; the area of employees working without labor contracts employees: 280 people, a decrease of 20 people, equivalent to 6.57% compared to 2019).

Through the analysis of occupational accidents from the investigation records of occupational accidents in the field of labor relations, it is found that in the manufacturing and business sector, many fatal occupational accidents occurred including mining and mineral extraction accounted for the 16.51% of total cases and 17.39% of total deaths; Construction sector accounted for 15.6% of total accidents and 16.52% of total deaths; The mechanical and metallurgical sectors accounted for 6.42% of the total number of cases and 7.83% of the total number of deaths; The service sector accounted for 5.51% of the total number of cases and 5.22% of

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the total number of deaths; The textile, garment and footwear sectors accounted for 5.5% of the total cases and 5.22% of the total deaths.

2. Major injury factors that caused the most deaths

- Falling and falling from height accounted for 26.61% of the total number of cases and 25.22% of the total number of deaths;

- Traffic accidents accounted for 22.02% of total cases and 22.61% of total deaths;

- Electric shock accounted for 13.76% of total cases and 13.04% of total deaths;

- Collapse accounted for 12.84% of total cases and 15.65% of total deaths;

- Objects splashed and bumped accounted for 7.34% of the total number of cases and 6.96% of the total number of deaths.

3. Main causes of fatal occupational accidents

Employers accounted for 44.97% of the total number of cases and 44.35% of the total number of deaths, specifically:

- Employers failed to provide occupational safety training or inadequately provided occupational safety training for employees, accounting for 17.43% of total cases and 16.52% of total deaths;

- Unsafe equipment accounted for 11.93% of the total number of cases and 11.3% of the total number of deaths;

- Labor organization and working conditions accounted for 8.27% of total cases and 9.57% of total deaths;

- Employers who did not develop safe working procedures and measures accounted for 4.59% of the total number of cases and 4.35% of the total number of deaths;

- Employers not providing personal protective equipment or unsecured personal protective equipment accounted for 2.75% of total cases and 2.61% of total deaths.

Employee's violation of the process of occupational safety and safety standards accounted for 23.85% of the total number of cases and 22.61% of the total number of deaths.

The remaining 31.18% of the total number of occupational accidents with 33.04% of the total number of deaths occurred due to other causes such as traffic accidents, occupational accidents caused by other people or causes not taken into account.

VIETNAM GENERAL CONFEDERATION OF LABOUR

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