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Reviewers:

V. Bogolyubov – Doctor of Pedagogical Sciences, Professor of General Ecology and life safety NUBiP Ukraine;

N. Palapa – Doctor of Agriculture Sciences, Senior Researcher, Institute of Agroecology and Environmental of Ukraine;

V. Zaplatinskiy – Candidate of Agriculture Sciences, Professor, Chairman of the Advisory Scientific and Methodological Council Ministry of Education and Science of Ukraine

S. Kaczmarczyk –Senior teacher, Department of English Philology of Humanities - Pedagogical Faculty NUBiP Ukraine;

L. Piskunova, V. Bondar

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The textbook contains basic techniques that allow practical course to learn safety and life, as the complex relationships in the system "man-living environment" at various levels. Special attention is paid to the person of physiological and psychological characteristics. Practice includes guidelines, tests, aimed at in-depth study of the properties of the human psyche, types of human temperament and behavior that contribute to a better understanding of theoretical material. Shows quantitative characteristics of threats, including anthropogenic, specific methods and ways to prevent or reduce their negative effects.

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CONTENTS

List of Abbreviations

AEWS	Accident Emergency Warning System
APELL	Awareness and Preparedness for Emergencies at Local Level
BBB	Building Back Better
BRS	Basel, Stockholm, and Rotterdam Convention
CAPP	Chemical Accident Prevention, Preparedness (and Response; OECD)
EC	European Commission
EMSA	European Marine Safety Agency
EU	European Union
GIS	Geographic Information System
GSR	General Safety Requirements
IAEA	International Atomic Energy Agency
IFRC	International Federation of Red Cross and Red Crescent Societies
INEX	International Nuclear Emergency Exercise(s) (of OECD's NEA)
IOMC	Inter-Organisation Programme for the Sound Management of Chemicals
JEU	Joint Environment Unit (of UNEP/OCHA)
JRC	Joint Research Center of the European Commission Man-made/Tech Man-made/Technological (hazards)
Natech	Natural-hazard triggered technological accident
NEA	Nuclear Energy Agency (of OECD)
NGO	Non-Governmental Organisation
NIRS	National Institute of Radiological Sciences (Japan)
OCHA	Office for Coordination of Humanitarian Affairs
OECD	Organisation for Economic Cooperation and Development
OSCE	Organisation for Security and Cooperation in Europe
RAC	Regional Action Centre
SPIs	Safety Performance Indicators
UN	United Nations
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UNISDR	UN Office for Disaster Risk Reduction
WHO	World Health Organization

INTRODUCTION

Labor safety and vital activity – a branch of scientific knowledge that covers an extremely wide range of issues that are closely related to the physical, chemical, biological, health sciences and engineering.

Further development of the Ukrainian state assumes an active role professionally trained, educated and erudite specialists with knowledge and humanitarian outlook in various aspects of modern society, including the problems of its security.

Discipline "Safety and life" is a leader in structural and logical scheme of training in the educational degree "bachelor". "Safety and life" is a discipline that uses achievements and methods of basic and applied sciences of philosophy, biology, physics, chemistry, sociology, psychology ecology, economics, management, etc., and allows graduates to solve professional tasks for a certain degree of the risk of internal and external threats that cause emergencies and their consequences.

The purpose of the discipline is gaining student competencies, knowledge and skills for professional activity on the specialty, taking into account the risk of industrial accidents and natural hazards that can cause emergency situations and lead to adverse effects on facilities management, as well as the formation of student responsibility for individual and collective security.

Objectives of the discipline involves the mastery of knowledge, skills and ability to solve professional tasks obligatory account industry requirements for the safety of personnel and protection in hazardous and emergency situations.

Mastered discipline "Safety" future bachelors (junior specialist) should have a set of comprehensive and professional competencies for life safety in their respective areas of professional training to address problems associated with guaranteeing the health care staff in the CO and emergency conditions dangerous situations.

The proposed guidelines should help teachers and students in the study of this discipline, to form a preventive way of thinking and professional work of the future expert

The paper contains basic techniques that allow practical course to learn safety and life, as the complex relationships in the system "man-living environment" at various levels. Special attention is paid to the person of physiological and psychological characteristics. Practice includes guidelines, tests, aimed at in-depth study of the properties of the human psyche, types of human temperament and behavior that contribute to a better understanding of theoretical material. Shows quantitative characteristics of threats, including anthropogenic, specific methods and ways to prevent or reduce their negative effects.

The modern period is accompanying the socio-economic and environmental crisis in the society that has led to a disastrous decline in the living standards. In the recent years Ukraine has seen a steady trend towards deterioration of health; every year a growing number of factors affecting people. This leads to an increase in the number of people, especially the young, with functional diseases and congenital deformities. This situation requires urgent rehabilitation of children, enhancing cultural identity, taking into account the importance of a behavioral component of the health formation that corresponds to the strategic World Health Organization’s program “Health for All in the Twenty-First Century.”

The history of society establishment has shown that neglecting life safety may lead to serious negative consequences and tragedies. The main objective of life safety is warning and prevention of potential hazard, which is a universal feature of the process of human interaction with the environment. All human actions and all environmental components, except properties and positive results, are characterized by the ability to generate harmful and dangerous factors.

Transformation of Ukrainian society through the development of production and increase in economic activity leads to increased anthropogenic pressure on the environment and imbalance in the environment. In the last two decades intensified negative processes and phenomena, including landslides, mudflows, collapsing riverbanks, the number of man-made accidents and disasters.

In most regions of Ukraine situation with drinking water supply is worsening. The concentration of certain pollutants in many rivers, lakes and other bodies of water often exceeds the maximum permissible levels by tens and hundreds of times. The number of pollutants that reach the atmosphere because of stationary sources tends to decrease, while the volume of pollutants coming from automobile transport is rapidly growing. Over the last 5-6 years, it has become the largest polluter of the environment in cities. Moreover, its contribution to the total emissions is constantly increasing. Industrial emissions from chemical, petrochemical, oil refining and steel industries, the areas contaminated by pesticides and the negative impact on public health, in particular children, and hence future generations. In the areas of chemical plants, morbidity rate is too high, as well as the number of complications during pregnancy and childbirth, congenital deformities, stillbirth, etc. The residents of radioactively and chemically contaminated areas have suffered from growing incidence of malignant neoplasms. Moreover, the mere statement of hazards from waste and pollution for present and future generations is not eliminating the causes of the deep environmental crisis that has engulfed almost the whole territory of Ukraine. Fundamentally, new environmental and economic thinking should be established. Without establishing such thinking among management personnel at all levels, it is, in fact, impossible to count on the creation of a highly efficient, socially oriented and ecologically safe the structure and model of the national economy in our country.

According to the current legislation, ensuring safety on the territory of Ukraine is the responsibility of both state administrative bodies and each citizen in particular, including private entrepreneurs. The Constitution of Ukraine envisages that each everybody “has the right to the environment which is safe for life and health and to reimbursement of the damage from the right violation” (Art. 50), but is also “obliged not to harm the nature, and “reimburse the damage s/he made” (Art. 66).

The training program for the students of institutions of higher education in the discipline “Life Safety”. (Joint order of the Minister of Education of Ukraine and the Chief of Staff - Deputy Chief of Civil Defense of Ukraine as of 20.06.1995 No.182/200 “About teaching the discipline “Life Safety” and “Civil Defense”) was one of the first steps in the educational field. The next step in establishing a modern discipline was the program on “Life Safety” published in 1999, according to the order of the Minister of Education of Ukraine No.420 as of December 2, 1998 “On the improvement of the training on health and life safety at higher education institutions.”

The Study Guide includes the main chapters of theoretical material on life safety, in accordance with the typical program of the discipline. The main methods for determining that allow practically learn the course of life safety as a complex of interactions in the system “man-living environment” at different levels are gathered. Special attention is given to a human, its physiological and psychological characteristics, biomedical and social problems of health.

After each chapter, the Study Guide contains practical and laboratory exercises aimed at in-depth study of properties of the human psyche and types of temperament. Assessment of direct and indirect damage to people and the environment, namely noise pollution, the risk of the use of pesticides; deviant behavior impact on safety and health; description of dangerous biological agents and the investigation of accidents outside workplace. This will contribute to a better understanding of the theoretical material. Quantitative characteristics of threats, including man-made hazards, specific methods and ways to prevent or reduce their consequences have been provided.

The authors will appreciate all comments and suggestions to improve the content and structure of educational – methodical Study Guide in subsequent editions.

1. LIFE SAFETY TODAY IS A MULTIFACETED SUBJECT

Based on modern concepts, ***life safety*** is a discipline that studies the threats to humans in daily life (at home, on the street, at work, on vacation) and emergency situations (accidents, man-made and natural disasters, etc.) as well as methods of protection from them.

As a complicated category, it covers the life and work of human interaction with the environment (natural and artificial). Certainly, ***life safety*** today is a multifaceted subject of understanding and perception of reality, which requires the integration of different strategies, sectors, aspects, forms and levels of knowledge. The components of this industry are diverse sciences on safety bearing ideological and professional character:

- Humanities (Philosophy, Theology, Linguistics);
- Natural Sciences (Mathematics, Physics, Chemistry, Biology);
- Engineering Sciences (Strength of materials, Engineering, Electronics);
- Human sciences (Medicine, Psychology, Ergonomics, Pedagogy);
- Sciences on society (Sociology, Economics, Law).

Life safety accumulates the achievements, enabling the individual to realize their potential without hurting himself or herself or the environment or society.

The aim of the education on life safety is the preparation of a human to active participation in the provision of the continuous fulfilling life in the society, which is changing dynamically. The main tasks of such education include:

- shaping a human culture according to its safety, its corresponding moral values, attitudes, behavior, etc;
- ensuring a state of individual protection by the formation and development of the personality traits that promote safety, and the necessary knowledge and skills;
- intensification of technical, scientific and other forms of educational work in the direction of life safety both in educational institutions and beyond;
- promoting the increasing efficiency of the state system of public safety through education and training of people to the adequate interaction, active position to improve the state system, including the legislative sphere;
- improvement of education management of all groups of the population under the criteria of life safety.

The object of the educational direction of life safety is considered the safety of the person as a phenomenon, and the subject - security model. Hence, it prepares a person to a normal life with the active participation to ensure safety, depending on the environment (environment, life, transportation, entertainment, production, social relations, etc.); State support system for human security (fire protection, law enforcement, civil defense, labor, health, etc.) and individual security of a person (psychological state, motivation, skills, personal protective equipment, etc.).

Basic concepts and definitions in the safety of life. Studying the discipline ***"Life Safety"*** starts with the title consisting of two words ***"safety"*** and ***"life".*** Let us first discuss the term "life". Although the concept of life has existed since the beginning of humankind, the term "life" is relatively new. The term has appeared with the advent of manned space exploration, but it is now increasingly being used in all spheres: we are

talking about the life of the village, town, district and even the microorganisms, although this, as it will be further viewed is inappropriate.

Human activity has a feature that distinguishes it from the rest of the activity of living organisms and creatures. This feature is not only that people adapt to the environment, but also transform it to meet their own needs, interact with it, hence, deliberately reaches the set goal, arising from the manifestation of the specific needs.

As an element of nature and the link in the global ecological system, a human feels the impact of the laws of nature. However, due to the activity combining its biological, social, and spiritual cultural essence, a human itself impacts the nature, altering and adapting it according to the laws of social development to meet its material and spiritual needs.

Life is a human feature not to just act in life environment that surrounds it, but the process of sustainable existence and personal self-fulfillment, group of people, society and humanity in general in the unity of their needs and opportunities.

It is often possible to meet the definition of safety as "such state of any object in which it is not in danger." But this definition does not satisfy us completely, since this understanding of safety only indicates the absence of the source of danger, that it can describe some ideal situation in which safety is advocated as a desirable, but unattainable goal. Safety is better defined as a state of activity upon which with the predetermined probability the manifestations of possible hazards or risk of missing an emergency may be excluded. However, this definition, as well as the previous one, contains the ***"hazard"*** that had to be determined. The specialized literature contains the following definition:

DSTU 22293-99 defines the term ***"safety"*** as a state of protection of a person and society from the risk of incurring damage.

In the definition of ***"safety",*** the term ***"risk"*** is also present. The risk of accidents, damage to or malfunctioning of simple technical devices is not quite difficult to determine. For the very complex technical systems, and especially for the person or society, the risk is a category that has many individual features and characteristics and it is extremely difficult and sometimes impossible to pinpoint it mathematically. In such cases, the risk can be assessed only through peer review.

Safety is a balanced state of a human, society, state, natural and man-made systems, etc. (upon peer review).

Safety is a state of protection of an individual and social from risk;

Human safety is a concept that reflects the very essence of human life, its mental, social and spiritual heritage. Human safety is an integral characteristic of strategic humanity direction the UN defined as "sustainable human development", a development which is not only an economic but also a social, cultural, spiritual growth that contributes to humanize the mentality of people and enrich the positive universal experience.

Life safety is a branch of knowledge and scientific and practical activities aimed at studying the general laws of hazards. The consequences of their impact on the human body, fundamentals of protection of health and life of a human and its environment against the hazards as well as the development and implementation of appropriate

means and measures to create and maintain healthy and safe living conditions and human activities both in everyday life and production as well as in emergencies.

Classification of hazards, affecting factors. Hazard is considered as an objectively existing reality in relations among society and technology, human environment. According to the definition, by the Committee on Risk Perception and Communication of the US National Research Council hazard is "...situation or thing that has the potential to harm a person." According to the American researcher William Marshall (1934-1996), it is a natural or man-made phenomenon, which may occur as a result of phenomena or processes able to infect people, to cause property damage, destroy the environment, etc..

Hazard is ***1)*** a negative feature of animate and inanimate matter, which can cause harm to the matter: people, environment, property.

2) a condition or situation that exists in the environment and can lead to the undesirable release of energy that can cause physical damage, injury or trauma.

Hazards identified due to the principle of "everything affects everything": the source may be all the animate and inanimate objects; the risks exist to animate and inanimate as well.

- Science that deals with hazard classification is called taxonomy. Depending on the specific needs, hazard classification is applied according to different criteria:
- time of action (impulsive and cumulative);
- localization (associated with litho-, hydro-, atmosphere and space);
- consequences (disease, mortality, reduction in the life expectancy, destabilization of society);
- scale (global, national, regional, local);
- scope for manifestations (domestic, sport, industrial);
- structure (simple and derivatives);
- origin (natural, technological, socio-political, combined).

Hazard classification according to the origin is the most frequently applied one. Natural objects, natural phenomena and natural disasters that threaten the life or health of a human (earthquakes, landslides, volcanoes, storms, hurricanes, fog, clouds, asteroids) are distinguished among the *natural hazards. Man-made hazards* are associated with the use of vehicles, technical equipment, the use of combustible, flammable substances, different types of radiation. The social hazards are those caused by low spiritual and cultural level, vagrancy, prostitution, alcoholism. The sources of political hazard are conflicts at international level, political terrorism, war. *Combined hazards* are divided into the following subgroups:

- natural-man-made (smog, acid rain, reduction of soil fertility);
- natural-social (addiction, epidemics, infectious diseases, venereal);
- social-technological (occupational diseases and professional injury)

All hazards, one way or another, are caused by striking (negative) factors. Depending on the specific consequences of damaging factors on the human body, in some cases, they fall into a harmful and dangerous.

A hazardous situation is an event, which creates a real opportunity to display danger, or the danger appears.

Hazardous factors are habitat factors that lead to injuries, burns, frostbite and other injuries of the body or its organs and even to a sudden death.

Harmful factors are habitat factors that lead to poor health, reduced disability, disease and so on.

According to the character, nature, and energy they possess, all the factors are divided into the following groups: *physical; chemical; biological; physiological*.

Apart from the above-mentioned groups of harmful and hazardous factors, there is a group of *passive - active* factors: they effect through the energy of a human (still sharp objects, rough or very smooth surfaces, etc.); and a group of *passive* factors that affect people indirectly through the degradation of material properties (revealed through the destruction, explosions, etc.)

Risks in a human life. Hazards may be observed in any sphere of activity and quantitative characteristics depending on many factors that are constantly changing over time. One of the most characteristic revelations of hazards is the risk. The action risk or inaction risks is present in 90% of accident causes of injuries at work.

The term "risk" has no clear definition. There is no generally accepted system of terms in risk assessment. The terms "hazard" and "risk" are the most often applied. The interpretation of these terms is not agreed upon, therefore, it is important to give them a precise definition that would reflect the relationships and contradictions between society, environment, and the latest technologies. The source of hazard and risk to human health can be society, environment, and technology altogether or each of these factors individually, therefore, it is possible to isolate the source of hazard and risk of natural, social or natural-social genesis (development).

In its broadest interpretation, the risk is taken as an act that is carried out in conditions of uncertainty, but the risk can be passivity, inaction. Usually, people risk in order to achieve the desired goal or to avoid physical hazards. Consequently, the risk can be assessed as both a hazardous condition and an act (dangerous action of man as part of the system).

The risk is the statistical frequency of likelihood of hazards occurrence, i.e., adverse circumstances that may occur within an adverse event; quantitative characterization of hazards.

Consequences or quantification of damages caused by a hazard depends on many factors such as the number of people present in the danger zone, the quantity and quality of the damaged material assets, natural resources, the potentiality of the zone, etc.

In the structure of subjective activity, risk performs various psychological functions. It may be the aim of a human activity, and its motive, if she seeks for thrills. Psychologists believe that everybody has the need for risk.

According to the degree of acceptability, the risk may be neglected, acceptable, maximum allowable, excessive; however, to achieve zero risks, i.e. absolute safety is impossible in practice.

At present, the most common are the concept of tolerable (acceptable) risk. Its essence is to achieve such level of safety, which society could accept (economically justify). *The allowable risk* is defined as the existing one in a kind of activity that does not keep an aware person from actions related to a probable danger. Thus, acceptable

risk is a compromise between the level of safety and technical, economic, social and political possibilities of the state.

By increasing costs, the amount of risk may be significantly reduced, but economic opportunities to improve technical safety are quite limited. Excessive consumption of budget on the technical reduction of risk can harm social sphere (expenditures on the medical sphere, education, pensions are reduced) and increase economic risk. The balance between the cost of technical and social spheres is necessary to be established. These circumstances should be considered when choosing acceptable risk which society should accept.

In some countries (the Netherlands, Sweden, etc.) allowable risk level is set by the law. The maximum acceptable level of individual risk of death is considered to 10^{-6} per year. A very small individual risk of death is 10^{-8} per year, the maximum risk for the ecosystem is such upon which no more than 5% of the ecological community type can suffer.

To compare the risks and benefits some countries introduced financial evaluation of life. In Ukraine, many experts claim against, stressing that human life is sacred and evaluate it financially is impossible. However, in order to protect a human, life should be evaluated, especially when it comes to channeling funds for the salvation of a man or compensation for a damage. In the US, human life is estimated at between 650 thousand and $7,000,000 (depending on the state). The introduction of the concepts of acceptable risk, although there are those who criticize it for inhumane approach, will significantly increase the safety of techno sphere and humans.

In Ukraine, the only state system of prevention of disasters and response so far focused primarily on response and overcome the consequences of hazards. This affects the capabilities, efficiency measures, reducing losses and reducing risk. The experience of developed countries proves that the protection of the population and territories should base on the risk management of natural and man-made disasters through the application of preventive measures, the introduction of new quantitative methods for assessing technological and natural risks. It is necessary to gradually change the reflective management model, switch to a strategy focused on preventing the consequences of emergencies, and minimize them. Therefore, the implementation of a risk-oriented approach to reducing the risk of crises and the development of state programs in prevention of adverse events and their elimination are the topical issues nowadays.

The risk-oriented approach is a complex of organizational arrangements, which involves monitoring, analysis, risk assessment of any entity because of probabilistic safety analysis aiming at preventing disasters and risk management in general.

The main tasks of the risk-oriented approach is to ensure the safety of industrial and warehouse buildings (structures), complex potentially dangerous objects and objects with a high risk potential, enterprises, technical systems, objects of mass occupancy (airports, seaports, river, rail and car stations of republican and regional significance, stations), which are of strategic importance for the economy of the state. The presence in Ukraine of over 17 thousand potentially dangerous objects leads to a high probability of crises that could potentially threaten people, economy, and environment. This calls for the creation of a real scientific basis for the development

of methods for assessing the danger of objects and scientific foundations of the concept of acceptable level of risk (socially, economically, technically and politically reasonable risk does not exceed the maximum allowable level).

Switching to risk analysis and management should not only ensure the overcoming of the negative trend to the increasing number of emergencies but also minimize their negative consequences: life losses, financial losses, damage to the environment.

The principles of risk-oriented approach are applied in both strategic planning and daily activities of civil defense. One of the possible ways of improvement in this area is taking more effective practical measures to prevent dangerous situations and minimize their negative consequences. This can be done by borrowing best practices of effective regulation of state security from European countries.

Risk-oriented approach to the process of safety management involves the following steps:

1. Identification of risk factors. It lies in identifying all the sources of hazards (threats), events that trigger the occurrence of accidents or emergencies, descriptions of objects and existing remedies, possible scenarios of the events and their ranking.

2. Risk assessment. This is the process of determining the likelihood of adverse events (accidents) during a certain period and magnitude of impacts on human health, property and the environment.

3. Risk management. In the area of environmental and technical safety, it is oriented to minimize social and economic consequences of emergencies of technogenic and natural character in Ukraine through the introduction of modern mechanisms of regulation in this area because of a risk-oriented approach and ensuring an acceptable level of safety of the population and territories. To achieve the declared goal the following should be developed:

- the system of monitoring, risk analysis and forecasting of emergency situations as the basis of activities to reduce the risk of emergencies;
- emergency prevention system and state regulation risks mechanism;
- emergency response system;
- the system of the training for administrative government officers, experts and the public on reducing risks and emergency scales.

The risk-oriented approach also provides a measurement of risks, which is a legal activity to develop and approve the rules of natural and industrial safety and regulations towards business activities, which are determined on the grounds of the risk index within acceptable measurement. It helps set the boundaries of acceptability of technological activity. Introducing the measurement of risk emergencies of natural and industrial character in Ukraine a state system of measurement is required. For its effective functioning it is necessary to develop unified methodological approaches to risk assessment of hazards of different nature and different type that exist in Ukraine; consider all factors and sources of danger affecting the magnitude of the risk of emergencies; human impact and climatic features of the territories; the significance of all the consequences (of economic, environmental, social nature) that may be caused by the expected emergency situations of natural and man-made character.

Today, risk-oriented approach to the assessment of environmental issues is the most promising area that is rapidly developing. Its application allows solving some problems of toxicology and hygienic regulation. On the basis of risk analysis, a new toxicometry with appropriate mathematical tools may be established, hygienic rationing by creating a new methodological basis may be standardized. Thus, unlike the toxic, carcinogenic factors have no obvious threshold actions, a single hygienic measurement can be defined since it is impossible to determine such measurement within traditional approaches. The risk-oriented approach may be applied as the threshold for toxic and carcinogenic threshold factors that helps bring together liminality and non-liminality as the principles of hygienic regulation.

A reference point for establishing acceptable levels of risk in Ukraine is risk index in the developed countries: the minimum allowable risk should not exceed $1 \cdot 10^{-6}$; maximum allowable should not be less than $1 \cdot 10^{-4}$.

The methodology of risk-oriented approach has been applied in both strategic planning and daily operational activities.

2.Man-made and Technological Hazards

The Sendai Framework for Disaster Risk Reduction 2015-2030 adopted by UN Member States seeks to bring about a paradigm shift from managing disasters to preventing them through greater focus on managing disaster risk. It also advocates for reducing existing levels of risk and avoiding the creation of new risk in order to achieve a substantial reduction in disaster losses by 2030.

The Sendai Framework serves as a blueprint for multi-hazard disaster risk reduction. It has a wider scope than its predecessor covering all types of disaster risk, caused by natural or man-made hazards including biological, technological and environmental hazards.

The Sendai Framework calls upon “the United Nations Office for Disaster Risk Reduction, in particular, to support the implementation, follow-up and review of this framework” including through generating evidence-based, practical guidance for implementation in close collaboration with States.

To meet this demand, the Words into Action Initiative (WiA) was launched to develop practical guides on how best to implement the priorities for action of the Sendai Framework in order to achieve reductions in disaster-related mortality, numbers of persons affected, economic losses and damage to critical infrastructure. Man-made and technological hazards were identified as one of the main themes to be included in this initiative.

The number and magnitude of man-made disasters worldwide has risen since the 1970s and continues to grow in both frequency and impact on human wellbeing and national economies particularly in low and middle-income countries.

Several major technological accidents (e.g. the Bhopal gas tragedy in 1984, the Chernobyl nuclear accident in 1986, and the Deepwater Horizon oil spill in 2010) and the increased number of new hazardous substances and materials has highlighted the

need to tackle these hazards within the overall frame of inclusive disaster risk management.

The UN Office for Disaster Risk Reduction (UNISDR), the UN Environment Program (UNEP) and the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) have collaborated to develop this targeted guide, which aims to strengthen national and local disaster management plans, support training and capacity building and to raise awareness of the risks and impacts of man-made and technological hazards.

This guide provides a set of evidence-based, practical activities for implementation at national and local levels for chemical, industrial and transport accidents, and nuclear and radiological hazards under each of the Sendai Framework's four priorities for action.

The guide also highlights the existing diversity of thematic frameworks, institutional and legal mechanisms at global and regional levels that are related to and used for addressing man-made hazards. It also draws attention to existing collaborations to implement these tools within the disaster risk.

Finally, the guide promotes and strengthens communities of practice and professional networks. It will evolve and incorporate new knowledge as needed.

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The Sendai Framework for Disaster Risk Reduction 2015-2030 was adopted at the Third UN World Conference on DRR in Sendai, Japan, on 18 March 2015. The main features of the Sendai Framework are: 1) a shift in focus from managing disasters to managing risks; 2) a wider scope which includes risk of small- to large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risks; and 3) a more people-centered, all-hazards and multi-sectoral approach to DRR.

This Words in Action (WiA) Guide addresses man-made hazards, including the subset of technological hazards. It is one of a series of documents prepared as part of the UN Office for Disaster Risk Reduction (UNISDR) Initiative[1] supporting "the implementation, follow-up and review of the Sendai Framework by generating evidence-based and practical guidance for implementation in close collaboration with States, and through mobilization of experts; reinforcing a culture of prevention in relevant stakeholders".

This WiA Guide was developed by a working group, consisting of government representatives and international stakeholders, and chaired by UNISDR and the UN

Environment / Office for the Coordination of Humanitarian Affairs (OCHA) Joint Unit (JEU).

The Guide takes a practical approach in addressing man-made and technological (Man-made / Tech hazards), and builds upon previous analyses and recommendations relating to such hazards in the context of DRR. The Guide builds on the outcomes of the Open-ended Intergovernmental Expert Working Group on Indicators and Terminology for the Sendai Framework, and the work on hazard classification and terminology related to man-made hazards.

Man-made (i.e., anthropogenic, or human-induced) hazards are defined as those "induced entirely or predominantly by human activities and choices". This term does not include the occurrence or risk of armed conflicts and other situations of social instability or tension which are subject to international humanitarian law and national legislation. Technological hazards are normally considered a subset of man-made hazards.

Chemical, nuclear and radiological hazards, as well as transport hazards are defined as those "originate from technological or industrial conditions, dangerous procedures, infrastructure failures or specific human activities.

Examples include industrial pollution, ionizing radiation, toxic wastes, dam failures, transport accidents, factory explosions, fires and chemical spills. Technological hazards also may arise directly as a result of the impacts of a natural hazard event. A technological accident caused by a natural hazard is known as a Notec.

This guide does not cover structural collapses of buildings and infrastructures such as bridges, dams and factories as this is subject of another guide.

Purpose, Objective and Scope

The purpose of this Guide is to:

Improve understanding of risk management of man-made hazards as they relate to DRR;

Provide practical guidance to national DRR focal points[6] and technical experts on how to address man-made hazards in the implementation of the Sendai Framework;

Raise awareness of man-made hazards within the overall DRR agenda, including the challenges and opportunities in adequately addressing these.

This Guide outlines opportunities for DRR interventions focusing on the links between man-made and natural hazards. It covers the management of man- made hazards at different scales, and offers case studies from existing policies and practices.

The objective of this WiA Guide is on providing clear, straightforward, key considerations that can be taken up by national and local-level DRR practitioners to address man-made hazards. It is meant to provide timely, relevant and useful information to the DRR community and to support knowledge management and capacity building.

The Guide also highlights the existing diversity of thematic frameworks, institutional and legal mechanisms at global and regional levels that are related to and used for addressing man-made hazards. It also highlights existing collaborations to implement these tools within the DRR community.

Examples for disaster events related to man-made hazards

- *Disasters related to radiological hazard:* The Great East Japan Earthquake and Tsunami of 2011 caused severe damages at the Fukushima Daiichi Nuclear Power Plant, resulting in a large release of radioactivity into the environment. More than one hundred thousand people were evacuated because of the release of radionuclides to the environment.
- *Disasters related to chemical hazard:* On 9 December 2014, an oil tanker accident in the Sundarbans of Bangladesh led to the release of approximately 350,000 litres of heavy fuel oil into the river and mangrove ecosystem which is listed as a UNESCO World Heritage and a Ramsar site.
- *Disasters related to chemical hazard:* In December 1984, a major gas leak at a pesticide plant in Bhopal, India resulted in the release of 40 tons of methyl isocyanate gas. The incident caused an estimated 3,800 deaths in the immediate aftermath and a significant higher morbidity for the exposed population which the government reported to be more than 500,000 people.
- *Disasters related to transport hazard:* In July 1978, a road tanker transporting liquefied propylene sprang a leak as it passed a camp site at Los Alfaques in Spain. The leak resulted in the release of liquefied gas into the camp site, where it immediately ignited. The explosion killed more than 200 people and the devastation spread for 400 yards in all directions.

The Sendai Framework requests governments to “establish a designated national focal point” (Sendai Framework paragraph 27 g) for implementing the post-2015 framework. A selected number of man-made hazards have been chosen to illustrate the topic. These are:

Chemical/industrial hazards;

Nuclear and radiological hazards;

Transport hazards.

The Sendai Framework requests governments to “establish a designated national focal point” (Sendai Framework paragraph 27 g) for implementing the post-2015

framework. A National Focal Point for DRR is defined as a national governmental body and entry point responsible for the implementation, review and reporting of the Sendai Framework and is supported by the national platform for DRR.

Marine incidents are described in a separate section. By providing concrete examples of specific hazards, the guide will illustrate how similar guidance can be compiled for other types of man-made hazards.

The scope of the WiA Guide is organized according to the four Sendai Framework priorities for action (understanding disaster risk, strengthening disaster risk governance, investing in disaster risk reduction, and enhancing disaster preparedness and "building back better"). Each of these priorities is explored in terms of how and what *practical steps* can be taken to better prepare for, prevent and respond to hazard events. Each sub-section includes *case studies***,** which illustrate the "what" and the "how" of carrying out DRR- related actions for man-made hazards.

At the end of the Guide, a series of recurring themes from the Sendai Framework are described. These include: collaboration and partnerships, data access, education and training, science and technology, and the multi-hazard approach. An Annex with relevant information and links to institutions, literature, resources, existing communities and networks is provided.

The Guide is also intended to help UN Member States and relevant authorities take a multi-hazard approach to risk. It advocates for strengthened collaboration between man-made and natural hazards management communities and to ultimately strengthen the involvement and accountability of all relevant stakeholders in reducing disaster risk.

Overall, the Guide emphasizes the vital nature of improving current interaction between all parties and at all levels to raise the profile of man- made hazards within the DRR agenda. This is needed in order to make a visible difference in preparedness for, prevention of and response to disasters caused by man-made hazards.

Target Audience

The Guide main target audiences are national DRR practitioners, including:

Government planners and policy-makers working within national and local disaster risk management authorities, including national and local DRR focal points;

DRR experts in international, regional and national development and humanitarian entities supporting countries on disasters and man-made risk management; and

Technical experts working in various sectors of man-made risk management, who wish to support national DRR strategies and programs. Background

How to Use this Guide

This WiA Guide on man-made and technological hazards is meant for practical use. It provides practical examples of the types of actions that can be taken to prevent or reduce the risk of man-made hazards and minimize their potential impacts on human lives, health, well-being, livelihoods, the economy and the environment.

The content was compiled on the basis of information from recognized scientific databanks of international authorities or institutions on basis of information available at the date of publication.

The guide was developed in consultation with a working group, consisting of member states'representatives and international stakeholders chaired by UN Office for Disaster Risk Reduction (UNISDR) and the United Nations Environment Programme (UN Environment). Additionally, marine hazards are covered in the Sendai Framework priority 1 on "Understanding risk" in a separate section, with some case studies on marine incidents also incorporated in the sections on transport hazards.

Each combination of a Sendai Framework priority and a domain is followed by at least one case study illustrating how certain practical actions and measures have been applied in various geographic locations, to provide food for thought for Man-made. Tech community stakeholders, and give ideas on how to implement the same.

The references at the end of the WiA Guide provide more detailed information to practitioners who wish to know more about key issues. Also provided is a list of existing networks and platforms which actors may join to gain greater insights into man-made hazards and their potential effects.

The "Business Case"

Man-made hazards – when materializing as industrial, nuclear or transport accidents – have the potential to cost lives, cause injuries, impact livelihoods, jeopardize long-term wellbeing and cause environmental damage. There is therefore a strong "business case" for paying more attention to man-made hazards and integrating these into an all hazard approach for disaster risk management.

For example, in 2015 massive explosions at a chemical warehouse in Tianjin, China reportedly killed 139, injured over 700 and displaced 6,000 people. The same year, a tailings dam failure in Bento Rodrigues, Brazil, released nearly 50 million tons of toxic iron ore waste into the Doce River, affecting the lives of hundreds of thousands of people downstream. What is still considered the worst industrial accident of all time, a gas leak of methyl isocyanate (MIC) at the Union Carbide pesticide plant in Bhopal, India in early December 1984 killed an estimated 16,000 people and injured up to 560,000, with nearly 4,000 of them suffering permanent disabilities. In 1989, the Union Carbide Corporation (UCC) paid $470 million to settle litigation stemming from the disaster.

In the Tauerntunnel fire in Austria in May 1999, a lorry carrying paint crashed into surrounding cars inside the tunnel, resulting in the deaths of 12 persons, injuries to 50 others and the closure of the tunnel for three months, with an economic cost of €8,670,000 million (equivalent to approximately $9,700,000 million, May 2017) for the reconstruction and renovation of the tunnel. In 1998, a truck carrying sodium cyanide plunged off a bridge in Kyrgyzstan releasing approximately 1,800 kg of highly toxic sodium cyanide into a river upstream of several villages. Not only did hundreds of people require medical treatment due to contamination of the water, but the effects on local fauna and fauna were considered disastrous.

In the United Kingdom, the average economic costs of a major industrial accident, excluding environmental costs, have been estimated in 2016 at 95 million in injuries and fatalities, more than 3 million in building damage, and more than 4 million in business disruption and around 2 million in emergency services.

Accidental releases of radioactive material can affect millions of people and lead to major economic costs. The Chernobyl accident caused the deaths of 30 power plant

employees and firemen (including 28 deaths that were due to radiation exposure) within the first few days and weeks, brought about the evacuation of about one hundred thousand people from areas surrounding the reactor during 1986, and the relocation, after 1986, of more than two hundred thousand people from what were at that time three constituent republics of the Soviet Union: Belorussia, the Russian Soviet Federated Socialist Republic (RSFSR) and the Ukraine. In the aftermath of the Fukushima Daiichi accident in March 2011, more than one hundred thousand people were evacuated because of the release of radionuclides to the environment. Estimates of the total economic loss from the accident are still taking place and have already been noted as significant. National disaster risk reduction strategies and policies offer an opportunity both to reduce the risk and impacts of such accidents, and to mitigate their impacts when they do, by addressing man-made hazards as part of overall inclusive disaster risk management.

Means of integrating and mainstreaming Man-made/Tech Hazards in DRR

The need for focused action within and across sectors, and at multiple levels of governance (local, national, regional and global) are reflected in the four Sendai Priority Areas for Action. This section outlines key considerations within each of the four Priority Areas.

Sendai Framework Priority for Action 1: "Understanding Disaster Risk"

Disaster risk is defined as "the potential loss of life, injury, destroyed or damaged assets which could occur to a system, society or a community in a specific period of time, determined probabilistically as a function of hazard, exposure, vulnerability and capacity.

Understanding disaster risk in its various dimensions (vulnerability, capacity, exposure of persons and assets, hazard characteristics and the environment) is necessary in order for new and effective policies and practices for disaster risk management to be developed and implemented. Such knowledge can include pre-disaster risk assessments and is used for prevention and mitigation, but also for the development and implementation of appropriate preparedness and effective response to disasters.[14]

Key Considerations and activities for better understanding risk include, but are not limited to, the following:

Conducting and ensuring access to pre-disaster risk assessment[15] information:

Having a baseline for hazards, exposure, risks and vulnerability, including local sources/potential hazard sites.

Collecting information on local institutions, capacities and plans to address disasters;

Developing and regularly updating local and national maps on disaster risk, hazards, human exposure and vulnerability, including key infrastructure elements;

Engaging with communities at risk to understand community structures, involve formal and informal leaders;

Ensuring access of communities to risk information and supporting community inclusiveness;

Enhancing understanding of disaster risks among all stakeholders, including government officials at all levels, civil society and non- governmental organizations (NGOs), local communities, the private sector and responders/volunteers;

Improving the flow of disaster risk information from scientific and technical experts to policy- makers, communities and other stakeholders, and assure appropriate use of the same;

Strengthening understanding of disaster at the local level through education and awareness-raising campaigns; and

Applying risk information in all its dimensions to develop and implement DRR policies and strategies.

Understanding risk:

The case of chemical/industrial hazards.

A chemical accident is defined as "any unplanned event involving hazardous substances that causes or is liable to cause harm to health, the environment or property, such as loss of containment of hazardous substances, explosions, and fires".[16] The impact at a local level of a chemical or industrial accident can be significant for the surrounding community, and may also lead to contamination having a substantial and long-term impact on the environment and livelihoods.

Key Considerations and activities for better understanding the risk of chemical/industrial accidents· Include, but are not limited to, the following:

Identifying, understanding and prioritizing hazards and risks at national and local levels, determining what related public authority bodies and resources exist, and where gaps remain. This could be done by establishing criteria for identifying hazardous installations considered to have the potential to cause accidents, as well as a system to obtain information concerning certain specified categories of hazardous installations.

Establishing effective public governance for chemical/industrial accident prevention, preparedness and response; including land-use planning, inspection strategies, transboundary issues, involvement and communication with the public, and accident follow-up.

Ensure adequate communication on risk amongst stakeholders, including corporate management in hazardous facilities, public authorities, academia, labour unions, international organizations, NGOs, community representatives and the media;

Timely and effective sharing of data between relevant authorities and stakeholders (i.e., information on the location of hazardous facilities, residential areas, critical infrastructure including utilities, transportation routes, medical facilities, schools and vulnerable environmental sites).

Preparing and making available procedures and communication materials for relevant stakeholders such as responders, public health authorities and the public on what actions to take in case of an accident.

For industry, developing a strong operational safety culture in facilities, which is at the heart of business operations, and understanding the risks posed by organizational activities dealing with hazardous substances.

Understanding risk:

The case of nuclear or radiological hazards.

Emergency is sometimes used interchangeably with the term disaster, as, for example, in the context of biological and technological hazards or health emergencies, which, however, can also relate to hazardous events that do not result in the serious disruption of the functioning of a community or society.

The International Atomic Energy Agency (IAEA) defines an emergency as a non-routine situation or event that necessitates prompt action, primarily to mitigate a hazard or adverse consequences for human life, health, property or the environment.[20] This includes nuclear and radiological emergencies. It also includes situations for which prompt action is warranted to mitigate the effects of a perceived hazard. A nuclear or radiological emergency is an emergency in which there is, or is perceived to be, a hazard due to the energy resulting from a nuclear chain reaction or from the decay of the products of a chain reaction, or radiation exposure.

Appropriate authorities should act to ensure that arrangements are in place to provide communities and the local and regional public who are affected or potentially affected by a nuclear or radiological emergency with information that is necessary for their protection; for potential protective actions and other response actions to be taken; and to warn them promptly and to instruct them on any actions to be taken.

Key Considerations and activities for better understanding the risk of a nuclear or radiological hazard include, but are not limited to, the following:

Identify hazards and assess potential consequences of an emergency. This provides a basis for establishing arrangements for preparedness and response for a nuclear or radiological emergency, which should be commensurate with the hazards identified and the potential consequences of an emergency.

Ensure that a hazard assessment is performed to provide a basis for a graded approach in preparedness and response for a nuclear or radiological emergency;

Prepare information about the location of sites where hazardous radioactive substances are stored or used and of nuclear facilities in the area, and making this information publicly available where possible.

Use evidence-based risk analysis (estimates) and risk communication to ensure that comprehensive radiation risk management is effective and credible;

Familiarize relevant authorities with the International Nuclear and Radiological Events Scale as a tool to communicate to the public the severity of nuclear and radiological events – and applying this scale in the event of a nuclear or radiological emergency;

Include societal and risk perception factors into communication materials; and

Raise awareness for potential cross-border effects of radiological hazards and integrating this information into emergency planning.

Understanding risk: The case of transport hazards.

For the purposes of this Guide, transport accidents cover the types of accidents involving dangerous goods and hazardous substances, which occur during transport, whether by road, rail or pipeline. Maritime transport incidents are described as a separate subset of transport accidents.

The terms dangerous goods and hazardous substances are used interchangeably and encompass all materials which may, by nature or when released in specific

quantities or forms, pose an unacceptable risk to health, safety, property or the environment.

Transport of dangerous goods is regulated to prevent accidents to persons, property or the environment, the means of transport employed or to other goods. Transport regulations are, at the same time, framed so as not to impede the movement of goods, other than those too dangerous to be accepted for transport aiming to make transport feasible by eliminating risks or reducing them to a minimum. It is thus a matter of safety as well as one of facilitating transport.

Key Considerations and activities for better understanding the risk of transport accidents include, but are not limited to, the following:

Using containment systems of good quality, adapted to the danger presented by the goods to be transported and compatible with them, meeting the construction requirements and the performance tests or other tests outlined in the UN Model Regulations on the Transport of Dangerous Goods.

Understanding the safety requirements needed for various types of goods carried (e.g. tank- vehicles, holds of ships, maritime or inland navigation tankers)/

Establishing good operational practices.

Ensuring that only those dangerous goods which are properly classified, packaged, marked, labeled, placarded, described and certified on a transport document, in accordance with the applicable transport of dangerous goods regulations are accepted for transport.

Emergency responders who have to take immediate action in case of incidents or accidents. Developing and implementing effective control and enforcement by competent authorities:

Ensuring that appropriate security measures for dangerous goods in transport by all modes are considered and that applicable transport security threshold for high consequence dangerous goods are observed

Ensure adherence to the provisions of the IAEA's 'Regulations for the Safe Transport of Radioactive Material

Marine Pollution Hazards

Marine pollution incidents resulting in oil pollution or the release of other harmful substances into the marine environment can have widespread impacts, not just to the territory of individual states, but also to neighboring states. The source of marine pollution hazards events may be from fixed shoreline locations such as seaports, oil handling facilities, pipelines and offshore units, or from ships, due to collision for grounding.

The International Maritime Organization (IMO) is the global standard-setting authority for the safety, security and environmental performance of international shipping. Since it was established in 1958, IMO has adopted a wide range of measures to prevent and control pollution caused by ships and to mitigate the effects of any damage that may occur as a result of maritime operations and accidents. IMO promotes cooperation between countries through bi-lateral, multi-lateral and regional agreements to support the implementation of the provisions of the OPRC Convention and OPRC-HNS Protocol. Along with supporting agencies such as UN Environment, IMO works with several Regional Activity Centres (RACs) addressing preparedness and response

activities related to marine pollution incidents, including the Regional Marine Pollution Emergency Response Centre (REMPEC).

Several IMO Conventions are particularly relevant to marine pollution incidents, including the 1990 International Convention on Oil Pollution Preparedness, Response and Co-operation (OPRC), and the 2000 Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances (OPRC-HNS), which together provide a framework for the development of a national response system and a platform for facilitating international cooperation and mutual assistance at the time of a marine incident. In relation to marine pollution incidents, a systematic approach covering prevention and preparedness activities, as part of the risk reduction process is included.

In the event of a spill, a timely and effective response aimed at addressing immediate impacts and reducing the consequences to the environment is required. The key element in the ability to effectively respond to a marine pollution incident is the existence of an exercised and tested contingency plan that links the risk of a spill, with the ability to respond, taking into consideration the threat to the environment. The plan should be developed based on identified risk scenarios and matched to an appropriate response strategy and capability, with established procedures for mobilizing external assistance through a tiered preparedness and response approach.

Key Considerations to be taken into account include, but are not limited to the following:

Use real-time data, hazard mapping, modelling, sensitivity maps and other information and communication systems and technological innovations to build knowledge about Marine Pollution Incidents

Develop of a national system for responding promptly and effectively to pollution incidents, through the creation of a national contingency plan, the designation of national authorities responsible for preparedness and response that will act as operational contacts points and will have authority to request or render assistance to other state parties.

Development of marine pollution emergency response plans for all potential sources of pollution, coordinated with the national response system

Establishing marine pollution reporting procedures as well as a commitment to inform all states whose interests may be affected by a pollution event.

Establishing, individually or through bilateral or multilateral co-operation a minimum level of pre- positioned response equipment commensurate with the identified risk, a program of exercises and training, a mechanism for incident response, and detailed plans and communication capabilities for incident response.

Risk reduction at the international level is achieved through strengthened shipping policy of IMO conventions based on practical experience and lessons learned that is then translated by States into national legislation and programs (e.g. double hulls)

Sendai Framework Priority "Strengthening Disaster Risk Governance to Manage Disaster Risk"

Improved governance of disaster risk is vital for more effective and efficient disaster risk management at local, national and global levels. The strengthening of disaster risk governance for prevention, mitigation, preparedness, response, recovery

and rehabilitation benefits from greater collaboration across mechanisms and institutions in implementing DRR measures.

This section on Sendai Framework priority 2 - Strengthening Governance for Disaster Risk - addresses all stages of disaster risk management, from prevention to mitigation, preparedness and response to recovery. Since all levels of government and societal sectors are concerned, approaches should be designed to mainstream DRR through legal frameworks and policies, and DRR strategies and plans drawn up and implemented for man-made hazards.

Key Considerations and activities for strengthening governance include, but are not limited to, the following:

Mainstreaming DRR within and across all sectors dealing with man-made hazards, through relevant legal frameworks, policies, regulations, reporting requirements and compliance incentives, using established guidelines such as the G20/OECD Principles of Corporate Governance as guiding document for a successful implementation.

Ensuring that sectors involved in man-made risk management are involved in appropriate DRR coordination and organizational structures, including forums and platforms at local and national levels.

Ensuring that shared responsibilities of all stakeholders for DRR, disaster prevention, mitigation, preparedness, response, recovery and rehabilitation regarding man-made hazards are acknowledged and met.

Ensuring that sectors involved in man-made risk management adopts and applies national and local DRR strategies and plans, including targets, indicators and timeframes, and follow-up mechanisms to assess progress.

Assigning clear roles and tasks to relevant national and local authorities, community leaders and other stakeholders in operationalising strategies/ plans, while reinforcing the role of the appropriate national authority(-ies) as the primary authority responsible for DRR.

Mainstreaming and advancing the prevention of man-made hazards should be a central element for all actors having a stake in man-made hazard risk, requiring a comprehensive understanding of man-made hazard risk as well as its integration in existing disaster risk reduction frameworks.

Strengthening risk governance: The case of nuclear and radiological hazards

Throughout the world, but particularly in technologically-advanced countries, there are a large number of nuclear installations. Regulatory bodies require that site-specific emergency preparedness and response plans are developed and maintained for these installations. There are also many other types of facilities and activities that involve the use of radiation or radioactive material for agricultural, industrial, medical, scientific and other purposes. Such facilities and activities include, for example, the production, use, import and export of radiation sources; the transport of radioactive material; the decommissioning of facilities; or satellites carrying radioactive material.

Governments and regulatory bodies have an important responsibility to establish both standards and the regulatory framework for protecting people and the environment against the risks associated with ionizing radiation exposure. An effective legal and governmental framework for safety, including an independent regulatory body, must

be established and sustained. However, the prime responsibility for safety of the facility and radiation sources rests with the licensee. Effective national and international preparedness and response capabilities are essential to minimize the impacts from nuclear and radiological emergencies and to build public understanding of the safety and security measures for nuclear technology.

The IAEA acts as the global focal point for international emergency preparedness, communication and response to nuclear and radiological incidents and emergencies resulting from the civil use of nuclear technology. The IAEA helps maintain and strengthen effective emergency preparedness and response capabilities on a national and international level. As part of these activities, it develops safety standards, guidelines and technical tools; assists Member States in building the capacity for emergency response; and maintains the IAEA Incident and Emergency System to efficiently implement its role in response to nuclear or radiological incidents and emergencies.

Key Considerations and activities for strengthening governance for nuclear and radiological risk include, but are not limited to, the following:

Ensuring that an integrated and coordinated emergency management system for preparedness and response for a nuclear or radiological emergency is established and maintained.

Making adequate preparations to anticipate, prepare for, respond to and recover from a nuclear or radiological emergency at the operating organization, local, regional and national levels, and also, as appropriate, at the international level. These preparations include.

Adopting international obligations and standards within the legal system, as may be necessary to fulfill all national responsibilities, and ensuring their effective implementation.

Ensuring that all roles and responsibilities for preparedness and response are clearly allocated among operating organizations, the regulatory body and response organizations.

Ensuring that operating organizations, response organizations and the regulatory body establish, maintain and demonstrate leadership in relation to preparedness and response for a nuclear or radiological emergency.

Confirming that action programs are put in place to reduce radiation risks, which include emergency actions such as monitoring releases of radioactive substances to the environment and properly disposing of radioactive waste; and

Providing for control of sources of radiation for which no other organization has responsibility, such as some natural sources, ‘orphan sources’ and radioactive residues from some past facilities and activities.

Strengthening risk governance: The case of transport hazards

The transport of dangerous goods or hazardous materials can occur by various modes (air freight, road, rail and inland waterways). In case an accident occurs, these can have critical impacts on communities and the environment near to the area of an incident. In industrial areas or transport hubs there is also a risk of cascading effects, which need to be considered when managing risk. It is thus highly important to identify the actions and technologies capable of reducing accidents and improving safety.

Integrated risk management includes effective national and international preparedness and response capabilities, combined with improved monitoring and spatial planning networks. When effectively implemented, these minimize the impacts from transport accidents and serve to protect people and the environment against risks from such events.

The "Recommendations on the transport of dangerous goods, Model Regulations" developed under the umbrella of the United Nations' Economic and Social Council (ECOSOC) aim at ensuring a high level of safety by preventing accidents to persons and property and damage to the environment during transport, while providing a uniform regulatory framework that can be applied in all countries for national or international transport, by any mode of transport.

The Recommendations cover the classification of dangerous goods, their listing, the use, construction and testing and approval of packaging and portable tanks, as well as consignment procedures such as marking, labeling, placarding and documentation. They are presented as "Model Regulations", to facilitate their direct integration into all modal, national and international regulatory instruments. The International Maritime Dangerous Goods Code (IMDG Code) for maritime transport, the ICAO Technical Instructions for the Safe Transport of Dangerous Goods for air transport; the Agreements or regulations concerning the international carriage of dangerous goods by road (ADR), by rail (RID) and by inland waterways (ADN) integrate the provisions of the Model Regulations, thereby enhancing international harmonization. The Model Regulations are also extensively used worldwide as the basis for the development of national legislation on the transport of dangerous goods.

Key Considerations and activities for strengthening risk governance in the transport of dangerous goods domain include, but are not limited to, the following:

Ensuring that an integrated and coordinated emergency management system for preparedness and response to transportation accidents is established and maintained;

Making adequate preparations to anticipate, prepare for, respond to and recover from a transport accident at the organizational, local, regional and national levels, and, as appropriate, at the international level. These preparations shall include adopting legislation and establishing regulations for effectively governing the preparedness and response for a transport accident at all levels (see "C. Strengthening risk governance: The case of transport hazards" paragraph on "Model Regulations" above as well as Key Considerations under sub-section A iv Transport).

Ensuring that all roles and responsibilities for preparedness and response for a transport accident are clearly allocated in advance among operating organizations, the regulatory body and response organizations.

Sendai Framework Priority for Action 3: "Investing In Disaster Risk Reduction for Resilience"

Prevention and reduction of disaster risk can be fostered through private and public investment, including structural and non-structural measures.

Investment in the form of human and financial resources is essential for enhancing the economic, social, health and cultural resilience of persons, communities, countries and the environment. Investment are not only cost- effective, but also vital for preventing and reducing losses and saving lives.

Investing in DRR is a cross-sectoral and multi-level effort. This means that investments must be made in all sectors of the society and at all levels – including local, national to regional levels. A multi-faceted approach is required which involves many types of actions and stakeholders. In addition to prevention and preparedness, investments should also cover the recovery and rehabilitation from man-made disasters.

Key Considerations and activities for investing in DRR for man-made hazards include, but are not limited to, the following:

Ensure the allocation of financial and logistical resources to implement DRR plans, policies and strategies at national and local levels.

Promote disaster risk financial sharing/transfer and insurance mechanisms;

Strengthen public and private sector investments to prevent and reduce the impacts of man-made disasters, including their impact on critical infrastructure and other sites.

Improve building codes and standards and enforce specific standards in the construction of all technological facilities.

Invest in appropriate land use, local planning and zoning policies in relation to location of technological facilities.

Enhance the resilience of national health care systems to deal with specific hazard types and enhance local access to basic health care services and social safety-net mechanisms for post-disaster assistance for populations at risk from man-made disasters.

Protect the most disadvantaged persons, along with livelihoods and productive assets, including major earning sectors like tourism from man- made hazards.

A. Investing in DRR for resilience: The case of chemical/industrial hazards

Investing in resilience means that chemical safety should be an integral part of all phases of the development of a hazardous facility: from choosing and planning the location, design and construction, through operation and maintenance, to decommissioning/closure/demolition. This also means that

hemical accidents prevention and response should be part of sound chemicals management, not only to prevent injury, save lives and protect the environment, but also to safeguard the viability of emerging economies and to maintain the economic viability of the enterprises concerned.

Key considerations and activities for investing in resilience in the chemical/ industrial accident domain include, but are not limited to, the following:

Making resources available to capture, analyse and learn from adverse or unexpected outcomes, in order to improve prevention and response. Enhancing learning from past events and incidents, recognising that many accidents have similar underlying causes.

Advancing and improving the use of inherently safer technologies.

Investing in and conducting land-use planning assessments prior to development of infrastructure near to facilities containing hazardous substances.

Developing and using Safety Performance Indicators (SPIs) to help measure the effects of investment in resilience. SPIs are used to assessing performance related to the prevention of, preparedness for and response to chemical accidents. As such, they

improve the ability of industry, public authorities and community organizations to measure whether steps taken to reduce the preparedness and response to accidents lead to safer communities and reduced risks to human health and the environment.

Investing in DRR for resilience: The case of nuclear and radiological hazards

For an efficient national and international response to nuclear or radiological emergencies, it is important to invest in the adequate implementation of international safety standards. Harmonization of emergency preparedness and response arrangements and capabilities requires close collaboration and coordination among responsible authorities within a country and internationally.

Key considerations and activities for investing in resilience in the nuclear and radiological hazards domain include, but are not limited to, the following:

Ensuring that authorities for preparedness and response for a nuclear or radiological emergency are clearly established and adequately resourced.

Strengthen investment in response organizations, operating organizations and the regulatory body to ensure necessary human, financial and other resources, in view of their expected roles and responsibilities and the assessed hazards, to prepare for and to deal with both radiological and non- radiological consequences of a nuclear or radiological emergency, whether the emergency occurs within or beyond national borders.

Ensuring that arrangements are in place for effectively providing prompt and adequate compensation of victims for damage due to a nuclear or radiological emergency.

Investing in DRR for resilience: The case of transport hazards

Investing in DRR in the transport domain means involving actors from land- use planning, the transportation sector, and local and national governments and financial institutions. Pursuing improved land-use development, enforcing disaster-resilient infrastructure, and fostering collaboration among stakeholders is vital to building resilient transportation systems.

Key considerations and activities for investing in resilience in the transport domain include, but are not limited to, the following:

Making resources available to capture, analyse and learn from adverse or unexpected outcomes, in order to improve prevention and response. Integrate the "lessons learned" approach from past transport incidents, recognising that many accidents have similar underlying causes.

Invest in development of inspection and supervision capacity of government authorities, making regular updates to local emergency response plans possible.

Ensuring that all transport operators (international companies, private companies and government- owned enterprises) operate to the same highest standards of safety.

Promoting integration of land use planning and zoning allowing for improved development codes that are applicable within a high-population density and marginal human settlement context. Surveying and enforcing codes with a view to fostering disaster-resilient infrastructure.

Promoting the mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning and land degradation

assessments. Ensuring that follow- up tools are informed by anticipated demographic and environmental changes.

Sendai Framework Priority : Enhancing Disaster Preparedness for Effective Response and Build Back Better in Recovery, Rehabilitation and Reconstruction

Capacities for effective response and recovery at all levels should be put in place. Increasing population density, urbanization and pressures from a rapidly changing environment, including the effects of climate change, showcase need to take concrete measures that improve preparedness and ensure that capacities are in place to effectively respond and recover at the local and national level to Man-made / Tech hazard events. The concept of "Building Back Better" is to make communities and nations more resilient to disasters, including by integrating DRR into recovery, rehabilitation and reconstruction and development.

Key Considerations and activities related to enhancing disaster preparedness and building back better include, but are not limited to, the following:

Developing and updating disaster preparedness and contingency policies, plans and programs at regional, national and local levels, involving relevant authorities in a whole of government, whole of society approach.

Developing and maintaining multi-sectoral rapid alert systems and robust means of communicating warnings to the public when an incident occur.

Promoting the resilience of key infrastructure such as emergency centres, roads and water treatment plants, that are critical in preparing for and responding to man-made disasters.

Conducting targeted training for emergency workers e.g. first responders, medical staff, public service and voluntary workers who deal with specific man-made disasters and emergencies.

Organizing and conducting periodic disaster preparedness, response and recovery exercises and evacuation drills.

Promoting cooperation among multiple authorities, relevant institutions and stakeholder groups to assure a smooth and effective Man-made / Tech disaster response.

Enhancing preparedness and building back better: The case of chemical/ industrial hazards

Enhancing emergency preparedness requires cooperation among various stakeholders including, amongst other things, response personnel, health personnel, the private sector and representatives of the public and the media. For chemical accidents, industry has the primary responsibility for on-site planning, and public authorities have primary responsibility for off-site planning. The main principles to follow are available in OECD's "Guiding Principles for Chemical Accidents Prevention, Preparedness and Response" and in the chemical accidents scheme of the IOMC Toolbox.

Key Considerations and activities related to enhancing preparedness for chemical/industrial accidents and building back better include, but are not limited to, the following:

Ensuring preparedness policies, plans and programs address cascading events, such as natural- hazard triggered industrial accidents (Natechs), and other accidents that can lead to the release of hazardous substances.

Developing minimum standards and guidelines beyond the national level and ensure they are implemented (i.e., industry, international/regional environmental standards, sector-specific guidelines, or others as applicable). Information to include are the composition of response teams, type of response strategy, equipment needed and stand-by or ready-to- deploy mechanisms.

Integrating chemical / industrial accident preparedness plans into development frameworks, with focus on vulnerable areas.

Establishing appropriate communication and early warning systems between public authorities and the general public. Ensuring the general public is informed about potential chemical and industrial hazards and is engaged in emergency preparedness measures and response through, for example, a national educational campaign on specific chemical- and industry-related hazards and how to act in the event of such an accident.

Developing capacity of national governments to improve contingency planning and response to chemical and industrial emergencies.

Developing joint public and private capacity building projects to support emergency preparedness and contingency planning at the local and national level.

Liaising with organizations working in a specific domain to implement workshops aimed at strengthening preparedness for chemical and industrial accidents

Regularly review and update plans, conducting preparedness exercises and simulations. Incorporate lessons learnt from past emergencies and accident.

Increasing collaboration among private, public and government actors, where preparedness programs can be funded through a variety of national governments and civil society organizations. Pilot projects are suggested if none currently exist.

Consider possible transboundary impacts of chemical/industrial hazards, including through accidental water pollution; develop joint or harmonized contingency plans, test and update these regularly; conduct emergency preparedness and response exercises (table-top and in-field) in cooperation with neighboring and riparian countries, develop bi-or multilateral agreements on the provision of mutual assistance.

Enhancing preparedness and building back better: The case of nuclear and radiological hazards

Effective national and global preparedness and response capabilities are essential to minimize the impacts from nuclear and radiological emergencies and to build public awareness on safety and security measures related to nuclear technology.

Preparedness for a nuclear or radiological emergency may involve many national organizations (e.g., the operating organization and response organizations at the local, regional and national levels), as well as international organizations. The functions of many of these organizations may be the same for the response to a nuclear or radiological emergency as for the response to a conventional emergency, but might also require some specific knowledge, equipment and training for the same organizations.

However, the response to a nuclear or radiological emergency might also involve specialized agencies and technical experts. Thus, in order to be effective, the response to such an emergency must not only be well- coordinated, but these emergency

arrangements must also be well-integrated with response measures to a conventional emergency and with those for nuclear security and safety.

It is of utmost importance that the communities at risk are included in the preparedness and response planning to assure that local capacities and considerations are appropriately taken into account.

Key Considerations and activities related to enhancing preparedness for nuclear and radiological emergencies and building back better include, but are not limited to, the following:

Ensuring that policies, plans and procedures are in place for the coordination of preparedness, response and recovery for a nuclear or radiological emergency between the operating organization and authorities at the local, regional and national levels, and, where appropriate, at the international level.

Improving awareness and communication regarding emergency warning systems and emergency plans for nuclear or radiological emergencies, including:

Information on protective actions such as sheltering or evacuation – depending on the location and severity of the emergency.

Consistently promote resilience through careful measuring and assessing of radiological impacts arising from nuclear or radiological emergencies; covering both the emergency and post-emergency periods.

Ensuring that roles and responsibilities for preparedness and response and recovery from a nuclear or radiological emergency are clearly specified and assigned based on a multi-hazard assessment and graded approach. The available capacities and resources of local actors have to be specifically taken into account.

Developing international partnerships to support national, regional and global vocational and training institutions. This fosters relationships with professionals capable of engaging in disaster and radiation-related interventions, for example in aiding in the protection and recovery of evacuees, and in offering medical and safety support during emergencies.

Organizing and conducting regular drills and exercises with relevant personnel to ensure they are able to perform their assigned response functions effectively in a nuclear or radiological emergency.

Promoting cooperation and collaboration among relevant international organizations in preparing for a nuclear or radiological emergency.

Enhancing preparedness and building back better: The case of transport hazards

Improving preparedness and response to transport accidents involves the engagement of multiple actors, including state and local transport authorities, land-use planners and railway managers. The response to a transport accident could also include international organizations, specialized agencies and technical experts. Engaging in open communication, and encouraging flexibility among integration of emergency response and contingency planning efforts, will make national and global response capabilities most effective.

Key Considerations and activities related to enhancing preparedness for transport accidents and building back better include, but are not limited to, the following:

Encouraging adoption of national and local standards and industry best practices (i.e., hazardous material transport technology, emergency preparedness plans).

Ensuring that an integrated and coordinated emergency management system for emergency warning and communication related to a transport accident is established and properly maintained.

Increasing awareness of emergency procedures in case of an accident involving dangerous goods, such as:

- for maritime transport: the "IMO Emergency Procedures for Ships carrying dangerous goods"
- for air transport: the "ICAO Emergency Response Guidance for aircraft accidents involving dangerous goods"
- for inland transport, different systems developed nationally or regionally, some of which are very well known and applied in many countries.

In America, the "Emergency Response Guidebook"; in Europe: the "BIG emergency response system" and the CEFIC ERICARDS; In Australia/New Zealand, the HAZCHEM system used in UK, Australia, New Zealand, Malaysia and some other countries.

Promoting resilience through the consideration of communities, public facilities and infrastructure within range of risk when developing new transport, or during a post-disaster reconstruction process, and ensure consultation with people affected.

Improving capacity for preparedness and response by ensuring that roles and responsibilities to transport accidents are clearly specified and assigned based on a multi-hazard assessment and graded approach.

Training workforce and voluntary workers in disaster response related to transport accidents, including transport-specific issues (e.g., fatigue, use of navigation equipment and emergency response procedures), and strengthening logistical capacities to ensure better response during an emergency.

Promoting cooperation among multiple transport and land-use authorities and organizations, and engaging in training and/or information-sharing exercises.

3.Social conflict

Conflict is the confrontation of powers. But power takes many forms. Power can be identive and assertive, altruistic and manipulative, coercive and physical, and so on. Some are intentionally directed, as are assertive and bargaining powers; one is directed wholly towards a person's body, as is force; and others are directed through another self, as are inductive and intellectual powers. All these powers may conflict; all can manifest conflict.

My concern here, however, is social conflict. By definition, social is intentionally taking into account other selves, power is a capability to produce effects, and social power is an intentionally directed capability to produce effects through another person. *Social conflict is then the confrontation of social powers*.

What does this view imply? First, social conflict is exclusively an aspect of social power. To understand such conflict we must deal at the level of social powers and their dialectics, as power or conflict social theorists have done.

Second, social conflict is not limited to hostile or antagonistic opposition; it is not wholly a clash of coercive powers as often is implied, but of any opposing social powers.[1] Thus, the conflict of intellectual powers may be manifested through debating,

arguing, or disputing; of bargaining powers through haggling, negotiating, dickering, bartering, or exchanging; of authoritative powers through adjudicating, appealing, or documenting; of altruistic powers through accommodating, obliging, or benefitting. We do not think of altruism (or love) and conflict as joined together, but clashing inductive vectors are a common experience among lovers. For example, consider the possible exchange of lovers over the last piece of cake. "You take it." "No, that's all right, it's yours." "No, I really don't want it." Each really desires it, knows that the other does also, and selflessly tries to give it to the other. Such altruistic conflicts are a common measure of social solidarity.

And third, the existence of violence does not presume an underlying social conflict. To clarify this, some analysis of the concept of violence is required.

Violence

In general, violence connotes an intense manifestation of strength, usually involving some severe physical effects as in the violence of a thunderstorm, earthquake, explosion, stampede, and so on. Clearly, it is a manifestation of nature's balancing of powers.

What about violence between people-killing, fighting, beating, rampaging, warring? Are all such manifestations reflections of social conflict-a balancing of social powers? No, and here lies a source of confusion in the literature. We may intentionally try to produce effects through either another's self or his body. We may use threats of force or apply actual deprivations such as torture or a beating to coerce another's will to do what we want. Or we may ignore the other's will and simply use physical force on his body, such as dragging him struggling into a jail cell. Whether it is a case of coercion or of physical force depends on the intent of the user. Violence directed towards coercing another's will comprises either a threat or deprivation, and is the application of coercive power.[2] For example, twisting another's arm to make him reveal a secret is coercion, as is beating up another to show what will happen again if he does not yield to your demands. If violence, however, has some purpose aside from another's will, then it is physical power. Such is killing another to be rid of him, or a war of extermination between neighboring tribes.

Physical force is not social, in that it is not oriented towards another self. *Insofar as violence is involved in physical force, then, violence is not social and does not manifest social conflict*. Violence, of course, may be the result of emotions engendered by conflict and constitute reflex behavior, as in the lover's slap or the family quarrel ending in wild shooting. Or violence can end social conflict, as when one impatient or unhappy with the balancing of social powers resolves the opposition through murder. Thus negotiations between political factions for national leadership may end in a coup d'état or assassination.

Social conflict is an engagement of selves. Violence directed only at objects or bodies is not social. *Insofar as violence is a means towards coercing another, it is a manifestation of social conflict*.

As a phenomenon, therefore, human violence is fundamentally ambiguous; whether it constitutes a reflex behavior, physical force, or coercion, whether it manifests social or nonsocial conflict, can be determined only by reading the associated field of expressions, by assessing intentionality.

Conflicts of interest

All social conflicts involve interests. A person's interest is a vector of power; it is his attitude plus its strength towards producing effects. A social power is a social interest, that is, one oriented towards other selves. And social conflict is the opposition and balancing of such interests.

With this understanding, I can relate more specifically my treatment of conflict to prevailing definitions in the literature. Within the psychological field an interest consists of situation, actor, goal and object--an "in this situation I want to do this with that." An interest is part of the dynamic motivational calculus.[6] Its strength is generated by our needs, and its content and direction are partially learned from experience and culture, and partially rational.

Fundamentally, an interest is an "I want x," where x can refer to a positive good (I want to end poverty), which involves *positive interests*, or a negative good (I don't want to die), called *negative interests*. Coercion, for example, inextricably links two negative interests (I don't want the robber to kill me, but I don't want to give him my money).

Now, definitions of social conflict vary as to whether they emphasize antagonism, tests of power, competition, incompatibility of interests, or mutual awareness of incompatibility. Either part of or implicit in such definitions, however, is the idea of some mutually exclusive good for which two people are consciously competing against each other. The good may be a potential marriage partner, a choice piece of land, a position such as president, or the top grade in class.

There are three kinds of conflicts of interests and, recognizing conflicts as a balancing of powers, seven conditions for a balance. One kind of social conflict occurs when both individuals i and j want some x that is a mutually ungratifiable positive interest, that is, the satisfaction of the interest by one excludes the other (such as conflict over who will be mayor). Their vectors of power (interests) are opposing. Let me call this a *conflict of congruent interests*, in that both desire the same thing. This kind of conflict is often forgotten in the belief that similar interests and values help avoid conflict. This is hardly the case if interests and values involve mutually ungratifiable goods.

A second kind of social conflict consists of i wanting x and j wanting not x. A politician may want to increase social welfare payments, another to decrease them. A child may want candy; her mother may want her to have none. And a scientist may want to publish his findings in a particular journal; but the editor may want to reject them. I will call this a *conflict of inverse interests*, since the positive interest of one is the negative interest of another.

Finally, a third kind of social conflict occurs when i wants x, and j wants y, where x and y are incompatible. For example, one American may want the United States to remain capitalist while another may want it to become socialist; a husband may want to stay home and rest while his wife wants to go on a family picnic; a student wants to become a poet but his parents want him to be a lawyer. This is a *conflict of incompatible interests*.

The common ingredient of these three types is the opposition of interests, of capabilities to produce effects, and what discriminates between them is whether the interests involve the same, inverse, or incompatible goods or goals.

These two are not the same. A desire not to give up x upon demand may be quite stronger than the desire to have x to begin with. For one thing, our natural pugnacity and self-esteem are engaged by a threat, thus increasing the power of wanting not to yield x. Secondly, one realizes that *giving up x under such circumstances is a sign of weakness which may encourage other such threats in the future*. This strengthens the will to combat or endure the threat. Nonetheless, coercion is a time-honored way to resolve conflict, for if the threat of force is disproportionate to the negative interest of i in not giving up x, i will yield. It is thus that governments have always extorted taxes from their citizens.

Coercion is a polarizing solution. In an exchange, however, both parties satisfy positive interests. The resolution is satisfactory to both, otherwise an exchange could not have been voluntarily concluded. The resulting balance of powers thus stable and specific in being limited to the interests and people immediately involved. With coercion, the resulting balance is unsatisfactory to one party, who continues to harbor an interest in overturning it, and is maintained only by the continued threat of the other. The use of this threat to win x now implies its possible use against other positive interests of i. Indeed, the successful use of coercion against i creates the potential for i to ally his interests with others similarly coerced to jointly oppose j. Of course, j is encouraged to increase his power to coerce this group, which would mean also aligning with others interested in opposing i's group. Thus, coercion carries within its use the tendency to divide, to polarize society. It is the agent of class struggle.

There are many ways of resolving conflicts besides exchange and coercion. However, for one reason or another these may be undesirable or unworkable. One can then abdicate the interest. If success does not seem worth the cost, x may be left to the other person. On the other hand, one can resort to naked force. For example, if persuasion, negotiation, and threat of war do not settle a boundary dispute, then the territory may be militarily captured.

While coercive power balancing and balances do not necessarily involve force (witness the complex everyday social behavior called driving, regulated by governmental coercive power, without force), the intentional use of force is usually the result of such balancing or a breakdown in a coercive balance.

I have classified the confrontation of interests-social conflicts-into those of positive interests, inverse interests, and incompatible interests. There are two other taxonomies of conflicts, aside from types of manifest conflict such as strikes, riots, arguments, and so on.

One classifies conflict into the realistic and the unrealistic. Realistic conflict is that of interest, of power, between parties who are aware of the conflict and are intentionally trying to gratify their opposing interest. As I define it, all social conflict is realistic, involving an intentional orientation towards other selves.

Unrealistic conflict is antagonistic behavior resulting from individual frustration, aggression, or pugnacity. It is reflex behavior released along lines of antagonism, such

as a family brawl, a race riot, or a wild shooting spree. Unrealistic conflict is not social, and I will have little concern about it in this book.

A second taxonomy divides conflicts by their subject. There are conflicts of facts, of practices, of goods, and of ideas. How do these fit into my view? A disagreement over a fact, such as whether a person committed a crime on April 13, 1972, or whether Newton invented the calculus is not a conflict in my terms unless some conflict of interest is generated. It is possible for people to be jointly interested in the truth, as are the ideal scientist or scholar. And truth is not a scarce good, but can be shared without diminishing it by quality or quantity. However, a disagreement over a fact can engage opposite interests, can involve status or esteem. An arrogant style can invoke a desire to be right. Or facts can be crucial to deeply held ideas about what is right and wrong.

Conflicts of practices or rules, what is sometimes called conflicts of rights, concern the correctness or applicability of formal or informal norms. Do regulations governing television apply to cable TV?

Are anti-pornography laws constitutional? Is a part-time worker eligible for unemployment compensation? Should a significance test be applied to a correlation coefficient based on a population of cases? Disagreements as to the answers to such questions also can be decided in a disinterested fashion. However, questions of practice often are imbedded in normative frameworks, such as whether government ought to be more involved in regulating society or whether a scientist ought to be governed by methodological rules. Thus, such disagreements become conflicts of interest-conflicts between the wants, desires, and needs of the opposing parties.

Conflicts of goods are conflicts of positive, inverse, or incompatible interests. Two people want the same office; two disagree over a debt; or one wants the Democrats to win an election while the other wants the Republicans to win.

Conflicts of ideas, or ideological conflict, concerns what is right or wrong, good or bad, just or unjust. Often, what is meant here is conflict between systems of values or norms which underlie a person being Buddhist, communist, egalitarian, materialist, hedonist, and so on.

Such conflicts are always conflicts of interest. They always involve needs, sentiments, the superego, and a person's superordinate goal--always engage a person's motivational calculus and his integrated personality. Conflicts of ideas are pure conflicts of social power.

Social networks: the 5 most common dangers and which actions to take

If social media is used in a clueless way, this can have emotional, social, financial, and even legal consequences. In some cases, it can even lead to personal data being shared. Children and teenagers are especially exposed to the social media risks, but this doesn’t mean that adults, authorities, banks, and even large internet companies are not immune.

Social networks are more important than ever. From the approximate 3.43 billion internet users worldwide, 2.28 billion (almost a third of the world’s population) regularly visits social networks – and the trend is rising. As the platform with the most monthly clicks, Facebook is leading the way and is even celebrating a double victory among mobile device users with its partner, WhatsApp.

The enthusiasm for sharing sloth and cat photos may be great, but where there's more people, it makes it easier for tricksters to lurk. In real life, they are attracted by street festivals, crowded train carriages, and bustling tourist attractions; in the digital world, it's social networks that are flashing beacons for hackers and cyber criminals.

Social networks and their dangers: likes are addictive

Young people are particularly prone to becoming addicted to the internet: in a phase or life where social contact with peers plays a major role in self-esteem and identification, likes and requests for friendship tempt people to spend more and more time in front of the screen.

Similar to a gambling addiction, the high feeling when the body releases endorphins can only be felt for a fraction of a second – when the notification shows you have a message or a friend has liked your post. As soon as the smartphone is out of sight, many people start to feel uncomfortable and as if they're missing out. It's hard to imagine a time when smartphones didn't exist.

Privacy and messaging: bullying in the digital age.

While some people receive their daily dose of happiness from the internet, many have to prepare themselves for the worst when they log onto their social network: they are victims of cyber bullying or stalking. Students that are picked on in the classroom often find that this inexcusable behavior spills over into the digital world. This may include threats of violence, slander, or even leaking personal images. Victims of stalkers are often confronted with threatening messages. By uploading photos that anyone can see, users make it much easier for potential stalkers to get ammo.

Parents should therefore talk to their children about the dangers of social media before allowing them to create an account. It is particularly important to focus on the importance of privacy settings. The less personal data that is publicly accessible, the better. TrendMicro has analyzed various sources, which has shown that culprits mostly use information about their victim's school (according to 61% of users), home town (48%), or vacation plans (26%) to harass or threaten.

Facebook and the dangers of data trafficking: spreading personal information

If you navigate around the internet, you'll leave traces. Anyone who makes their Facebook timeline public and feeds the Silicon Valley giant with information on their age, favorite music/games/brands, etc. will end up leaving a digital footprint as big as Godzilla's. You can read it clearly in the general terms and conditions: Facebook not only has the rights to all the images you upload onto the platform, but it can also sell public profile data on (i.e. like a digital dossier) to its partners. However, many users do not see this as a problem: after all, a quarter of those surveyed were happy to see personal advertising based on data evaluation. This makes searching for consumer goods a lot easier.

However, everyone should be aware that this could end up with your data falling into the hands of criminals. In addition, users are rarely aware of how far their data travels on the net. Even if you download an app, you often have the choice to allow the app access to certain information. This personal data is what makes social media users interesting for companies – sometimes you can earn real money by selling this information or at least tailoring advertising to the user.

Compared to this, personalized advertising is a relatively harmless use of personal data. When so-called social engineers get hold of your data, the threat is a lot bigger. They are modern-day con artists: social engineers deceive their victims to get their data or money. They use different methods to do this: as a rule, they adopt a false identity to gain the trust of their potential victim. Either they present themselves as someone from the authorities (e.g. someone from a bank or from the government) or they impersonate friends or relatives. They do this by hacking accounts and then writing to the contacts, for example.

Baiting is a special kind of social engineering: providers of supposedly free downloads ask for your account login information, which they then use to access your e-mail. Quid Pro Quo is a method whereby fraudsters pretend to offer certain services or information if the user follows their instructions or divulges technical data beforehand.

An example: if the con artist is pretending to be from an IT company that offers a quick fix for common bugs, they might ask the victim to turn off their firewall and install an update. This update then turns out to be a virus or spyware.

Phishing attacks feed on victims' fear and their trust in authorities. For example, many phishing e-mails base their text and design on those from banks and renowned service providers. They then link to websites similar to those of respected authorities. If you enter your bank details there, they will be forwarded directly to cybercriminals. Another possibility is identity theft, where the perpetrators do business or commit crimes under your name.

Reputation damage: public content can be seen by everyone – including your boss

Are you looking for a new job or have you just got to know the love of your life? Social media offers many possibilities to leave an impression on others – both positive and negative. A good 75% of HR managers get their first impression of applications by checking Facebook and other social media platforms. If you decided to make photos of your alcohol or drug binges available to the public, this will reduce your chances of getting the job. Also, if there are many statuses bad-mouthing you, this can also hinder your chances. However, not every social media mistake is self-inflicted: blackmailers or personal enemies can easily spread posts online to damage your reputation. These social media dangers range from defamation to revenge porn. Although these platforms have rules of conduct set up as well as moderators on hand to delete any posts that break these rules, they can't always react straightaway. Juicy content can therefore be shared quite quickly. In such cases, victims can only be helped by documenting who had access to the relevant data, and then going to the police.

Tip

Learn more about the diversity of social networks and how to maintain good customer contact by reading our post on social networks:*The most important social media platforms at a glance*.

Social networks as a PR tool: poor organization jeopardizes your image.

Many companies use social networks to increase their reach and communicate with customers. However, large institutions or companies often have a large number of accounts that need to be managed. If there is no leading position that takes care of how accurate and how up-to-date topics are, this quickly makes a bad impression on

readers. This lack of content organization is one of the social media dangers that many companies underestimate. The comment column should never be left unmoderated: a discussion full of insults will deter new readers. If the company doesn't intervene, this could also damage their image. Scandals are inevitable and could lead to a PR nightmare.

Businesses should offer courses as well as implement a social media policy. It's also a good idea to have restricted access for certain employees. These can help you secure a successful online presence, but legal protection is also important. One of the biggest threats in social networks is hackers, who either falsify content or distribute viruses and worms to customers after they've taken over an unsuspecting victim's account. Phishing and redirecting users to malicious websites is also on the rise among cybercriminals. Depending on the type of attack, financial damage can occur in addition to reputational damage.

Summary

- Social networks are full of dangers, which could have profound consequences on you or your business. You can avoid many of these pitfalls just by using these networks carefully. In addition, the following measures often help:
- Set up the privacy settings so that only friends have access to your posts
- Avoid posting personal information, holiday plans, etc.
- Do not accept requests or messages from people you don't know
- Avoid clicking on shortened URLs
- Report suspect or insulting/threatening accounts
- Keep private and work accounts separate
- Organize social media training for employees, especially on data security

Social networks and their dangers: likes are addictive

Three billion people, around 40% of the world's population, use online social media – and we're spending an average of two hours every day sharing, liking, tweeting and updating on these platforms, according to some reports. That breaks down to around half a million tweets and Snapchat photos shared every minute.

With social media playing such a big part in our lives, could we be sacrificing our mental health and well-being as well as our time? What does the evidence actually suggest?

- Facebook responds to mental well-being claims.
- Is it time to rethink how we use social media? An introduction to our Like Minded season.

Since social media is relatively new to us, conclusive findings are limited. The research that does exist mainly relies on self-reporting, which can often be flawed, and the majority of studies focus on Facebook. That said, this is a fast-growing area of research, and clues are beginning to emerge. BBC Future reviewed the findings of some of the science so far:

Stress

People use social media to vent about everything from customer service to politics, but the downside to this is that our feeds often resemble an endless stream of stress. In 2015, researchers at the Pew Research Center based in Washington DC sought to find out if social media induces more stress than it relieves.

In the survey of 1,800 people, women reported being more stressed than men. Twitter was found to be a "significant contributor" because it increased their awareness of other people's stress.

But Twitter also acted as a coping mechanism – and the more women used it, the less stressed they were. The same effect wasn't found for men, whom the researchers said had a more distant relationship with social media. Overall, the researchers concluded that social media use was linked to "modestly lower levels" of stress.

Mood

In 2014, researchers in Austria found that participants reported lower moods after using Facebook for 20 minutes compared to those who just browsed the internet. The study suggested that people felt that way because they saw it as a waste of time.

A good or bad mood may also spread between people on social media, according to researchers from the University of California, who assessed the emotional content of over a billion status updates from more than 100 million Facebook users between 2009 and 2012.

Bad weather increased the number of negative posts by 1%, and the researchers found that one negative post by someone in a rainy city influenced another 1.3 negative posts by friends living in dry cities. The better news is that happy posts had a stronger influence; each one inspired 1.75 more happy posts. Whether a happy post translates to a genuine boost in mood, however, remains unclear.

Anxiety

Researchers have looked at general anxiety provoked by social media, characterised by feelings of restlessness and worry, and trouble sleeping and concentrating. A study published in the journal Computers and Human Behaviour found that people who report using seven or more social media platforms were more than three times as likely as people using 0-2 platforms to have high levels of general anxiety symptoms.

That said, it's unclear if and how social media causes anxiety. Researchers from Babes-Bolyai University in Romania reviewed existing research on the relationship between social anxiety and social networking in 2016, and said the results were mixed. They concluded that more research needs to be done.

Depression

While some studies have found a link between depression and social media use, there is emerging research into how social media can actually be a force for good.

Two studies involving more than 700 students found that depressive symptoms, such as low mood and feelings of worthlessness and hopelessness, were linked to the quality of online interactions. Researchers found higher levels of depressive symptoms among those who reported having more negative interactions.

A similar study conducted in 2016 involving 1,700 people found a threefold risk of depression and anxiety among people who used the most social media platforms. Reasons for this, they suggested, include cyber-bullying, having a distorted view of other people's lives, and feeling like time spent on social media is a waste.

However, as BBC Future will explore this month in our LikeMinded season, scientists are also looking at how social media can be used to diagnose depression, which could help people receive treatment earlier. Researchers for Microsoft surveyed

476 people and analysed their Twitter profiles for depressive language, linguistic style, engagement and emotion. From this, they developed a classifier that can accurately predict depression before it causes symptoms in seven out of 10 cases.

Researchers from Harvard and Vermont Universities analysed 166 people's Instagram photos to create a similar tool last year with the same success rate.

Sleep

Humans used to spend their evenings in darkness, but now we're surrounded by artificial lighting all day and night. Research has found that this can inhibit the body's production of the hormone melatonin, which facilitates sleep – and blue light, which is emitted by smartphone and laptop screens, is said to be the worst culprit. In other words, if you lie on the pillow at night checking Facebook and Twitter, you're headed for restless slumber.

Last year, researchers from the University of Pittsburgh asked 1,700 18- to 30-year-olds about their social media and sleeping habits. They found a link with sleep disturbances – and concluded blue light had a part to play. How often they logged on, rather than time spent on social media sites, was a higher predictor of disturbed sleep, suggesting "an obsessive 'checking'", the researchers said.

The researchers say this could be caused by physiological arousal before sleep, and the bright lights of our devices can delay circadian rhythms. But they couldn't clarify whether social media causes disturbed sleep, or if those who have disturbed sleep spend more time on social media.

Addiction

Despite the argument from a few researchers that tweeting may be harder to resist than cigarettes and alcohol, social media addiction isn't included in the latest diagnostic manual for mental health disorders.

That said, social media is changing faster than scientists can keep up with, so various groups are trying to study compulsive behaviors related to its use – for example, scientists from the Netherlands have invented their own scale to identify possible addiction.

And if social media addiction does exist, it would be a type of internet addiction – and that *is* a classified disorder. In 2011, Daria Kuss and Mark Griffiths from Nottingham Trent University in the UK have analyzed previous studies on the matter, and conclude that social media addiction is a mental health problem that "may" require professional treatment. They found that excessive usage was linked to relationship problems, worse academic achievement and less participation in offline communities, and found that those who could be more vulnerable to a social media addiction include those dependent on alcohol, the highly extroverted, and those who use social media to compensate for fewer ties in real life.

Self-esteem

Women's magazines and their use of underweight and Photo shopped models have been long maligned for stirring self-esteem issues among young women. But now, social media, with its filters and lighting and clever angles, is taking over as a primary concern among some campaigning groups and charities.

Social media sites make more than half of users feel inadequate, according to a survey of 1,500 people by disability charity Scope, and half of 18- to 34-year-olds say it makes them feel unattractive.

A 2016 study by researchers at Penn State University suggested that viewing other people's selfies lowered self-esteem, because users compare themselves to photos of people looking their happiest. Research from the University of Strathclyde, Ohio University and University of Iowa also found that women compare themselves negatively to selfies of other women.

But it's not just selfies that have the potential to dent self-esteem. A study of 1,000 Swedish Facebook users found that women who spent more time on Facebook reported feeling less happy and confident. The researchers concluded: "When Facebook users compare their own lives with others' seemingly more successful careers and happy relationships, they may feel that their own lives are less successful in comparison."

But one small study hinted that viewing your own profile, not others, might offer ego boosts. Researchers at Cornell University in New York put 63 students into different groups. Some sat with a mirror placed against a computer screen, for instance, while others sat in front of their own Facebook profile.

Facebook had a positive effect on self-esteem compared to other activities that boost self-awareness. Mirrors and photos, the researchers explained, make us compare ourselves to social standards, whereas looking at our own Facebook profiles might boost self-esteem because it is easier to control how we're presented to the world.

Well-being

In a study from 2013, researchers texted participants five times a day for 14 days, asking them how they felt and how much they'd used Facebook since the last text. The more time people spent on the site, the worse they felt later on, and the more their life satisfaction declined over time.

But other research has found, that for some people, social media can help boost their well-being. Marketing researchers Jonah Berger and Eva Buechel found that people who are emotionally unstable are more likely to post about their emotions, which can help them receive support and bounce back after negative experiences.

Overall, social media's effects on well-being are ambiguous, according to a paper written last year by researchers from the Netherlands. However, they suggested there is clearer evidence for the impact on one group of people: social media has a more negative effect on the well-being of those who are more socially isolated.

Relationships

If you've ever been talking to a friend who's pulled their phone out to scroll through Instagram, you might have wondered what social media is doing to relationships.

Even the mere presence of a phone can interfere with our interactions, particularly when we're talking about something meaningful, according to one small study. Researchers writing in the Journal of Social and Personal Relationships tasked 34 pairs of strangers with having a 10-minute conversation about an interesting event that had happened to them recently. Each pair sat in private booths, and half had a mobile phone on the top of their table.

Those with a phone in eyeshot were less positive when recalling their interaction afterwards, had less meaningful conversations and reported feeling less close to their partner than the others, who had a notebook on top of the table instead.

Romantic relationships aren't immune, either. Researchers at the University of Guelph in Canada surveyed 300 people aged 17-24 in 2009 about any jealousy they felt when on Facebook, asking questions such as, 'How likely are you to become jealous after your partner has added an unknown member of the opposite sex.

Women spent much more time on Facebook then men, and experienced significantly more jealousy when doing so. The researchers concluded they "felt the Facebook environment created these feelings and enhanced concerns about the quality of their relationship".

Envy

In a study involving 600 adults, roughly a third said social media made them feel negative emotions – mainly frustration – and envy was the main cause. This was triggered by comparing their lives to others', and the biggest culprit was other people's travel photos. Feeling envious caused an "envy spiral", where people react to envy by adding to their profiles more of the same sort of content that made them jealous in the first place.

However, envy isn't necessarily a destructive emotion – it can often make us work harder, according to researchers from Michigan University and the University of Wisconsin-Milwaukee. They asked 380 students to look at "envy-eliciting" photos and texts from Facebook and Twitter, including posts about buying expensive goods, travelling and getting engaged. But the type of envy the researchers found is "benign envy", which they say is more likely to make a person work harder.

Loneliness

Astudy published in the American Journal of Preventive Medicine last year surveyed 7,000 19- to 32-year-olds and found that those who spend the most time on social media were twice as likely to report experiencing social isolation, which can include a lack of a sense of social belonging, engagement with others and fulfilling relationships.

Spending more time on social media, the researchers said, could displace face-to-face interaction, and can also make people feel excluded.

"Exposure to such highly idealized representations of peers' lives may elicit feelings of envy and the distorted belief that others lead happier and more successful lives, which may increase perceived social isolation."

It's clear that in many areas, not enough is known yet to draw many strong conclusions. However, the evidence does point one way: social media affects people differently, depending on pre-existing conditions and personality traits.

As with food, gambling and many other temptations of the modern age, excessive use for some individuals is probably inadvisable. But at the same time, it would be wrong to say social media is a universally bad thing, because clearly it brings myriad benefits to our lives.

We'll be exploring this tension more over the next month, in a series of articles and videos in our special series Like Minded – and hopefully providing solutions that could help us all live a happier, healthier digital life.

4.Biological hazard

A *biological hazard*, or biohazard, is a biological substance that poses a threat to the health of living organisms, primarily humans. This could include a sample of a microorganism, virus or toxin that can adversely affect human health. A biohazard could also be a substance harmful to other animals.

Bio hazardous agents are classified for transportation by UN number:

- Category A, UN 2814 – Infectious substance, affecting humans: An infectious substance in a form capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans or animals when exposure to it occurs.
- Category A, UN 2900 – Infectious substance, affecting animals (only): An infectious substance that is not in a form generally capable of causing permanent disability or life-threatening or fatal disease in otherwise healthy humans and animals when exposure to themselves occurs.
- Category B, UN 3373 – Biological substance transported for diagnostic or investigative purposes.
- Regulated Medical Waste, UN 3291 – Waste or reusable material derived from medical treatment of an animal or human, or from biomedical research, which includes the production and testing.

Levels of biohazard

he United States Centers for Disease Control and Prevention (CDC) categorizes various diseases in levels of biohazard, Level 1 being minimum risk and Level 4 being extreme risk. Laboratories and other facilities are categorized as BSL (Biosafety Level) 1–4 or as *P1* through *P4* for short (Pathogen or Protection Level).

- **Biohazard Level 1:**Bacteria and viruses including*Bacillus subtilis*, canine hepatitis, *Escherichia coli*, and varicella (chickenpox), as well as some cell cultures and non-infectious bacteria. At this level precautions against the biohazardous materials in question are minimal, most likely involving gloves and some sort of facial protection.
- **Biohazard Level 2:** Bacteria and viruses that cause only mild disease to humans, or are difficult to contract via aerosol in a lab setting, such as hepatitis A, B, and C, some influenza A strains, Human respiratory syncytial virus, Lyme disease, salmonella, mumps, measles, scrapie, dengue fever, and HIV. Routine diagnostic work with clinical specimens can be done safely at Biosafety Level 2, using Biosafety Level 2 practices and procedures. Research work (including co-cultivation, virus replication studies, or manipulations involving concentrated virus) can be done in a BSL-2 (P2) facility, using BSL-3 practices and procedures.
- **Biohazard Level 3:** Bacteria and viruses that can cause severe to fatal disease in humans, but for which vaccines or other treatments exist, such as anthrax, West Nile virus, Venezuelan equine encephalitis,S ARS coronavirus, MERS

coronavirus, SARS-CoV-2, Influenza A H5N1, hantaviruses, tuberculosis, typhus, Rift Valley fever, Rocky Mountain spotted fever, yellow fever, and malaria.

- **Biohazard Level 4:**Viruses that cause severe to fatal disease in humans, and for which vaccines or other treatments are *not* available, such as Bolivian hemorrhagic fever, Marburg virus, Ebola virus, Lassa fever virus, Crimean–Congo hemorrhagic fever, and other hemorrhagic diseases, as well as Nipah virus. Variola virus (smallpox) is an agent that is worked with at BSL-4 despite the existence of a vaccine, as it has been eradicated and thus the general population is no longer routinely vaccinated. When dealing with biological hazards at this level, the use of a positive pressure personnel suit with a segregated air supply is mandatory. The entrance and exit of a Level Four biolab will contain multiple showers, a vacuum room, an ultraviolet light room, autonomous detection system, and other safety precautions designed to destroy all traces of the biohazard. Multiple airlocks are employed and are electronically secured to prevent doors from both opening at the same time. All air and water service going to and coming from a Biosafety Level 4 (P4) lab will undergo similar decontamination procedures to eliminate the possibility of an accidental release. Currently there are no bacteria classified at this level.

Biological hazards (biohazards) present the Occupational Health and Safety (OHS) professional with complex challenges due to the large number and variety of potential agents and their effects. Many biohazards are capable of coming from, or affecting, the community outside the workplace, due to the potential for infectious disease factors to be transmitted from person to person. Environmental biohazards may be frequently encountered as occupational hazards, especially for outdoor workers. In a review of occupational biohazards, Dutkiewicz, Jabloński and Olenchock (1988, p. 605) observed.

There are at least 193 important biological agents that show infectious, allergenic, toxic, or carcinogenic activities in the working population. These agents are viruses, bacteria, fungi, plant substances, invertebrate animals (mostly arthropods), and substances derived from vertebrate animals. At least 20 large occupational groups are exposed to these biohazards. The risk is greatest among health care and laboratory workers who are threatened by human pathogens and among agricultural workers who are at risk from dust-borne biological allergens and toxins and by parasitic worms in warm climates. There is growing evidence that biohazards are also important risk factors for many other professions, including woodworkers, workers of textile plants, sewage and compost workers, miners and renovators.

Because the variety of biohazards is so great, and the number of occupations that may be affected by biohazards is very large, it is not intended for this chapter to provide a comprehensive account of all biohazards that may be encountered in the workplace, or for specific occupations. Rather, the intention is to heighten awareness of the need for constant vigilance, and to provide some guidance as to the types of biohazards that can exist in Australian workplaces. Disturbingly, a recent study of biohazard exposure in Australian workplaces revealed a “general lack of information on biological risks” and concluded that “effort should be made to raise the level of knowledge about

biological hazards" (de Crespigny, 2011). Consequently, this chapter is an important one for OHS professionals.

Extent of the problem

The recently published *National Hazard Exposure Worker Surveillance* (NHEWS) report noted that Australian workers' compensation statistics indicate that each year approximately 1300 workers are compensated for diseases attributed to animal, human or biological factors. However, the report queried the accuracy of this estimate as an indication of the extent of the impact of biohazards as, "amongst other things, many workers in the Agriculture forestry and fishing industry are not covered by workers' compensation schemes".

The NHEWS study, undertaken to gain a more accurate picture of the impact of biological hazards, found that:

- 19% of workers surveyed reported they worked in places where there were biological materials. These workers were considered exposed to biological hazards.
- 75% of exposed workers were exposed to human bodily matter.
- 30% of exposed workers were exposed to live animals or animal products.
- Between two and four percent of exposed workers were exposed to laboratory cultures and biohazard waste, sewerage or rubbish
- Workers in the Health and community services and the Agriculture, forestry and fishing industries were most likely to report exposure to biological hazards .

The main types of biological materials that workers were potentially exposed to in Australian workplaces were:

- human bodily matter (blood, tissues, vomit, urine, faeces, saliva and breast milk etc.) – 75% of exposed workers;
- animal products (meat, offal, skins, bones, blood, milk and eggs) – 18% of exposed workers
- live animals (mammals, birds, fish, invertebrates and their urine or faeces) – 12% of exposed workers
- biohazard waste, sewerage and rubbish – 3.4% of exposed workers, and
- laboratory cultures – 2.8% of exposed workers.

Understanding biohazards

The nature of biohazards

The UK Health and Safety Commission (as cited in Aw & Harrison, 1998) and the US Center for Disease Control and Prevention (CDC, 2009) define biological hazards as "infectious agents or products of such agents that cause human disease," and biological agents as "any microorganism, cell culture, or human end parasite, including any which have been genetically modified, which may cause any infection, allergy toxicity, or otherwise create a hazard to human health." However, biological agents capable of creating a hazard to human health are not limited to microorganisms, plants, fungi or invertebrate animals as, depending on the nature of the occupation, workers also may be at risk of harm from vertebrates.

Additionally, biohazards encompass biological substances including medical waste, or samples of body tissues or fluids from a biological source, which may contain microorganisms, viruses or toxins that can adversely affect human health. Biohazards classified by the United Nations as Dangerous Goods for transportation by UN number include all substances infectious to humans and animals, and medical waste (UNECE, 2001). The available evidence indicates that biological hazards may exist in almost any occupation.

Biohazards may exert an effect on a human, either by direct contact by the causative agent (e.g. a bite from a venomous snake) or transmission of zoonotic agents through contact with animals, animal matter or animal products (e.g. brucellosis). Some diseases can be transmitted directly or indirectly (e.g. toxoplasmosis). Some parasitic diseases are zoonotic (e.g. hydatid disease). However, diseases such as malaria (where the protozoan parasite is transmitted by *Anopheles* spp. mosquito bites), leishmaniosis (where the protozoan parasite is transmitted by the bite of phlebotomize sandflies) and dengue are technically speaking not zoonotic, despite being transmitted by insects or intermediate host vector, as they depend on the human host for part of their lifecycle. *Aides* spp. prefer to feed from humans rather than other vertebrates, and live in close proximity to humans. Leishmaniosis, dengue and malaria also may be transmitted through infected blood products and through organ donation. Such diseases are referred to as anthroponoses.

Unless generalist OHS professionals work in an industry or geographical area where biohazards are a recognized issue, their involvement in identifying and assessing the associated risk may be limited; however, they still require a basic understanding of biohazards and their mechanisms of action. Thus this section addresses biohazard classification, mode of transmission, and virulence and infectivity.

Classification by type of agent

Individual biohazards may be classified in several ways. For example, the fungal disease coccoid mycosis may be classified by type of organism (mold/fungus), mode of transmission (inhalation of windborne arthrosporic from soil), susceptible occupational grouping, method of environmental contact or location (areas of endemic). One method of classification – type of agent is considered in this section.

Infectious agents

As observed by Aw and Harrison (1998), “Infectious agents are capable of causing disease and can be classified according to size, properties, and morphological characteristics (e.g. viruses, rickettsia, bacteria, fungi, protozoa, and helminths. Appendix 2 provides a summary of types of infectious agents, including examples of associated diseases and relevant control measures.

Plant and plant products

Contact with certain plants, plant materials or fungi may cause non-infectious poisoning, stinging, allergic reactions (e.g. anaphylaxis, mushroom workers’ lung in the sugar cane industry), and irritant-contact or allergic-contact dermatitis. Fungi may be responsible for a variety of diseases such as ringworm or tinea, which may affect, for example, athletes, military personnel in barracks, and staff of gymnasiums, veterinary practices and laundries.

Fungi such as molds and yeasts can cause allergies that result in hypersensitivity or asthma among farm workers and food process workers. Aspergillus (a fungi) can cause aspergillus's among farm workers, handlers of veterinary waste, and workers in recycling and composting facilities. Absorption of toxic plant components may occur; for example, green tobacco sickness in tobacco plant workers.

Animals and animal products

Zoonosis are infectious diseases that can be vector-borne or transmitted directly from wild or domestic animals (e.g. babesiosis, Lyme disease, plague, tularemia, West Nile virus and Ross River virus). Other forms of transmission of zoonosis include those due to exposure to bacteria (e.g. leptospirosis, brucellosis and anthrax) or viruses (e.g. bat lyssavirus).

Also, a wide range of workers, especially outdoor workers, are potentially at risk of envenomation by venomous terrestrial animals (e.g. snakes, spiders and scorpions) or aquatic animals (e.g. stinging fish, jellyfish, stingrays and sea snakes). Occupational groups that may be affected include farm workers, military personnel, forestry workers, divers, fishers and zoo workers.

Mode of transmission

Knowledge of mode of biohazard transmission – another way of categorizing biological hazards in the workplace – is vital to breaking the infection cycle. While some diseases can be transmitted in a variety of ways (e.g. hepatitis A can be transmitted through food, as a result of poor hygiene or by occupational exposure through working in sewers), other diseases have very specific modes of transmission. Transmission of infection may be either:

- Direct, which requires physical contact between an infected person and a susceptible person
- Indirect, where the susceptible person is infected by contact with a contaminated surface, food-borne, droplet/airborne transmission or by vectors.

Direct human-to-human transmission

Workers with a relatively high risk of direct human-to-human infection transmission are those exposed to blood or bodily secretions (e.g. medical and nursing staff, emergency workers, prison workers and sex workers). An example is needle stick injury which may cause percutaneous inoculation of blood-borne pathogens, such as HIV or hepatitis B.

Indirect transmission

Surface contact

Some infectious agents can survive on surfaces for extended periods of time. For example infectious rhinovirus, responsible for about half of all colds has been demonstrated as transmittable from surfaces for as long as 24 hours after surface contamination, highlighting the importance of surface disinfection (Winther, McCue, Ashe, Rubino & Hendley, 2011).

Food-borne/water-borne toxins

Food-borne infections contracted through occupational exposure can affect, for example, food service workers, medical and hospital personnel, prison officers, military personnel and child-care workers. These infections are usually the result of faucal contamination of food through poor food handling, poor hygiene, contaminated

water or contamination of the food chain, or by poor food storage allowing the multiplication of bacteria and the production of toxins.

While occupational exposure to water-borne infections may be low the potential for infection from intentional or unintentional ingestion of water should be identified. One example is the infection of swimming pool water with *Cryptosporidium partum*, a parasite excreted in the faces of infected humans, cattle, and other mammals causing diarrhea. The infectious form of the parasite (the 'oocyst') is too small to be seen without a microscope and is resistant to common forms of disinfection (Victorian Government Health Information, 2010).

Droplet/airborne contamination

Droplets or aerosol infection may occur from human or environmental sources. Mucus secretions emitted when a person coughs or sneezes – are generally more contagious than infectious agents spread by direct contact (University of Arizona, 2009). Droplets can travel up to a meter in the air and can enter the respiratory tract. Diseases such as tuberculosis and measles are transmitted in this manner.

Droplet infection from environmental sources such as water or soil sources may cause respiratory diseases such a legionella. Water-based cooling towers as part of air conditioning systems are known to be source of *Legionella* bacteria from which the bacteria can be dispersed through aerosolized drift or may enter the air conditioning systems. (CCOHS, 2006). Occupational gardeners may be exposed to a species of *Legionella, L. longbeachae* which has been found to cause clinical conditions indistinguishable from other *Legionella* species in people who are regular gardeners with a common feature of their gardens being the presence of ferneries with hanging baskets (O'Connor et al., 2007).

Vector-borne diseases

A vector is an organism that carries disease-causing microorganisms from one host to another. As vectors are mobile, they can increase the range of the disease; removing the vector, either by elimination or protecting the person from the vector, prevents infection. Arthropod vectors (e.g. mosquitoes and sandflies) can transmit diseases, including parasitic diseases (e.g. malaria), alphaviruses (e.g. Ross River virus), flaviviruses (e.g. dengue fever) and bunya viruses (e.g. Rift Valley fever virus). Susceptibility to such diseases depends on a variety of factors, including endemic, location, specific arthropod species, populations of host species and protective measures. Some animals are capable of causing or transmitting more than one disease. For example, while the bite of an iodide tick may result in tick paralysis due to the effect of the tick's venom, some iodide ticks are capable of transmitting vector-borne diseases including rickettsia (e.g. Queensland tick typhus), viral (e.g. Crimean- Congo hemorrhagic fever), bacterial (e.g. Lyme disease) and protozoan (e.g. babesiosis) diseases. (For detailed information, see, for example, Breslow, 2002; Cook & Zumla, 2003.)

Virulence and infectivity

Risks due to infectious biohazards depend not only the nature of the agent, but also on its virulence (which encompasses the ability of the organism to survive outside the human body), its infectivity, and the resistance of the body. Greater virulence does not necessarily mean greater infectivity.

For example, although Hendra virus is a potentially life-threatening hazard for people who work with horses, the chances of contracting this virus are far less than the chances of contracting a range of other, less-virulent infections within the workplace, such as salmonellosis, cryptosporidiosis and leptospirosis. Some microorganisms, such as tetanus spores, can survive in the soil for long periods, and some viruses can survive outside the human body for hours (e.g. hepatitis B and HIV).

Furthermore, while only a small dose of some biohazards (e.g. the highly infectious Marburg virus) can cause infection, a much larger dose of the causative agent of some others (e.g. leprosy) is required to cause infection. (For detailed information on infectious diseases, see, for example, AFOEM, 1999; FDA, 2009.)

Occupational factors affecting impact of biohazards

The OHS professional should be aware of biological hazards likely to affect workers in specific workplaces. These will vary according to the type of occupation, the location, the season, the nature of the work, species known to occur in the region and the environment. Research and liaison with specialist advisors may be required to document the type and extent of the biohazards relevant to a workplace, and to prepare a risk assessment and mitigation plan based on that assessment. The impact of occupation type and the environment on the risk of biohazard exposure is discussed below.

Type of occupation

Occupational contact with biohazards may be:

- *intrinsic to the specific occupation*, e.g. construction and maintenance workers at sewage treatment or wastewater plants are at increased risk of exposure to bacterial infection (see, for example, Garvey, 2005)
- *incidental to work* (i.e. not an integral part of the work process), e.g. upper respiratory infections, infections due to contaminated water, or through food consumed at the workplace (see, for example, OSHA, 2009)
- *contracted during the course of work* especially when living in, or travelling to or from, areas where there is an increased incidence of infectious or other diseases (see Mangili & Gendreau, 2005)
- *not occupationally specific*, e.g. Legionella bacteria, responsible for Legionnaires' disease, is widely distributed in water and soil, and can, therefore, affect workers in a wide variety of occupations, such as water-system maintenance workers and air- conditioned office workers (see, for example, Compare, 2008).

It has been demonstrated that workers in the Health and Community Services, and Agriculture Forestry and Fishing industries face a relatively high risk of exposure to biological hazards (de Crisping, 2011). The potential for exposure to some work-intrinsic hazards are briefly considered below. However, generalist OHS professionals in all industries should ensure that knowledge of the nature and source of biohazards informs their hazard identification activities.

Outdoor workers

Outdoor workers, such as wildlife rangers, forestry workers, gardeners, farm workers, construction workers, archaeologists and military personnel, may be exposed to a range of biohazards specific to their occupation and the environment in which they

work, including local species of microorganisms, animals, plants and fungi, and the nature of the work.

Although there may be some common features (e.g. exposure to venomous snakes and spiders), generally the nature of these biohazard exposures will vary from location to location. Forestry workers may face a variety of environmental /occupational hazards, including stinging plants and insect vectors of disease, which will vary from location to location depending upon the endemic species.

People who work with animals

People who work directly with, or are exposed to, animals or animal products are at risk of a wide range of possible biohazards. These occupations include abattoir workers, animal handlers, animal pound workers, aviary workers, customs officers, meat workers, police officers, farmers, grazers, customs inspectors, laboratory workers, pet shop and quarantine kennel personnel, ranchers, shepherds, stockmen, veterinarians, wildlife rangers, wool sorters and zoo personnel. Biohazards for these occupations include bacterial diseases (e.g. anthrax), viral diseases (e.g. orf), Newcastle disease in poultry workers, rickettsia (e.g. *Coxiella brunette,* Q fever), diseases transmitted by bites (e.g. lyssavirus).

Workers exposed to human blood and bodily fluids

Occupational groups that may be at increased exposure to human blood and body fluids include medical and hospital personnel, pathology and other laboratory workers, emergency workers, autopsy and mortuary workers, prison workers, professional sportspersons and sex workers. Sewerage workers and plumbers should also be considered in this category as they may be at risk from a range of pathogenic microorganisms carried in human faces.

Exposure to biohazards due to particular work environments

There may be an increased incidence of infectious or other diseases that can be contracted by occupational groups working within a specific locality or type of environment. The type of biohazard may be specific to the particular work environment; for example, fishing trawler crew, professional divers, marine biologists and lifeguards might be at risk from physical injury from shark bites, as well as fish or stingray stings, sea snake bites or venomous jellyfish stings, or infection of cuts and grazes by marine pathogens. Roofers, tilers, insulation layers and electricians who work in roof spaces may be indirectly exposed to animals or animal products that may result in infection (e.g. respiratory infections such as psittacosis). Sewer and municipal workers, plumbers, miners and forestry workers are likely to be at risk from infected urine from rodents and other animals.

Location and environment

Location is an obvious predisposing factor for certain vector-borne diseases (e.g. rabies and malaria) that are endemic to particular regions, and for dangerous animals (e.g. crocodiles and venomous snakes). The diversity of biohazard distribution is related to species distribution and the environmental and social characteristics of specific geographic locations. For example, the parasitic disease schistosomiasis, caused by exposure to liver fluke in infested water, is associated with freshwater rice farming and fishing environments.

Furthermore, exposure to some types of biohazards may have significantly worse outcomes in some parts of the world than in others. For example, although there is the potential for agricultural workers in Australia to be bitten by a highly venomous elapid snake, the outcome is unlikely to be death or permanent disability (as is often the case for rural workers in developing countries) because of the availability of high-quality specific antivenins, modern hospitals, highly trained medical personnel, generally well-resourced medical and laboratory facilities, and efficient transport, road systems and communications. Australian medical workers will have a much different hazard profile if they travel to a disaster area in a developing country.

Legislation and guidance

The general duty under s 19 of the national model *Work Health and Safety Act* (WHSA) requires a person conducting a business or undertaking (PCBU) to ensure, so far as is reasonably practicable, the health and safety of workers and others who may be put at risk by the conduct of the business or undertaking (Safe Work Australia, 2011). This duty applies to all hazards including biohazards. The model WHS regulations are silent on biohazard control and de Crisping (2011) has identified a dearth of Australian policy interventions relevant to biological hazards. However the following codes of practice and guidelines are available:

- National Code of Practice for the Control of Work-related Exposure to Hepatitis and HIV (Blood-borne) Viruses (NOHSC, 2003)
- AS/NZS 2243.3 Safety in Laboratories: Microbiological Safety and Containment (SA/SNZ, 2010)
- Health care industry standards, including AS/NZS 3816:1998 Management of Clinical and Related Wastes (SA/SNZ, 1998)
- Diseases Acquired from Animals (NOHSC, 1989)
- Australian Department of Health and Ageing Infection Control Guidelines (DHA, 2010)
- Jurisdiction-specific guidelines, including Guidelines for Assessing the Risk of Exposure to Biological Contaminants in the Workplace (Workover NSW, 2003).

In the US, the Centers for Disease Control and Prevention (CDC), and the Department of Health and Human Services periodically publish several national publications on Biosafety, including Biosafety in Microbiological and Biomedical Laboratories (BMBL) and its associated appendix, Primary Containment for Biohazards: Selection, Installation and Use of Biosafety Cabinets (CDC, 2009). While these documents are US national guidelines they have relevance in promoting the safety and health of workers in biological and medical laboratories in Australia.

Control of biological hazards

The NHEWS study found that of five biohazard-control-measure categories – protective clothing; engineering; warnings; waste disposal; and training – Australian workplaces were most likely to provide workers exposed to biohazards with protective clothing and least likely to provide training. Also, "workers exposed to living animals were least likely to be provided with any control measures" (de Crisping, 2011). Of the two industries with the highest likelihood of exposure to biohazards, Health and Community Services had a higher level of control provision than Agriculture, Forestry and Fishing. Control provisions for biohazards were revealed to be relatively "high for

workers exposed to human bodily matter, laboratory cultures and biohazard waste, sewerage and rubbish but relatively low for workers exposed to animals and animal products" (de Crisping, 2011). The study's recommendations included relevant policy development and improvement of training in the safe handling of biohazards.

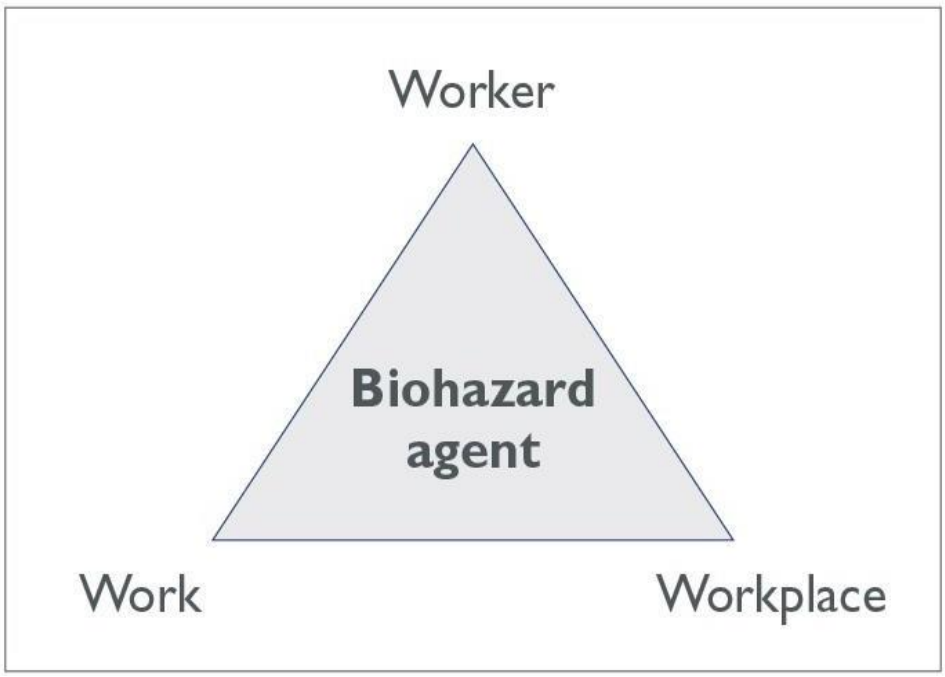

Figure 1: Points for intervention for control of biohazards

Biohazards should be addressed by an analytical and preventive approach. The complexity of the transmission and mechanism of action of biohazards means that the biohazard needs to be considered in the context of the workplace, the work and the worker. The nature of the controls will depend on the type of agent: its mode of transmission, virulence and infectivity; the nature of the task and the methods of exposure; the number of people potentially exposed and their susceptibility to the biohazard. This can be represented as in Figure 1 which highlights that intervention for control can occur at different points in the triangle,

As with other hazards the priority for control is elimination of the biohazard. This may be by eliminating the source of the biohazard (e.g. design of air conditioners to eliminate water as a reservoir for *Legionnella*); eliminating the biohazard agent (e.g. use of pesticides to eliminate pest species); eliminating the vector (e.g. elimination of vector species such as birds who act as vector for psittacosis). Where elimination is not possible then the hierarchy of control with engineering, administrative and PPE controls can be applied. Table 4.1. provides an example of a hierarchy of control for biohazards developed for the health industry.

Implications for OHS practice

Recent Australian research has highlighted the general inadequacy of relevant policy, procedures and training, and indicated that "poor understanding of biological hazards leads to poor risk assessments in workplaces" (de Crisping, 2011, p. 21). While the management of biohazards is often the domain of the occupational health physician,

the generalist OHS professional should have a good understanding of biohazards and their control measures, and be cognizant of the necessity for ongoing vigilance.

Table 4.1. Hierarchy of control as applied to Biohazards (modified from Work Safe Alberta.

Engineering/Bioengineering controls	• Vaccines • Prophylactic anti-viral medications • Ventilation systems • Engineered safe needle devices • Automated equipment
Administrative controls	• Policies and procedures • Routine practices such 'universal infection control procedures' and other safe work procedures • Immunisation programs • Training • Quarantine and isolation procedures
Personal Protective Equipment (PPE)	• Gloves • Protective clothing • Eye protection • Face protection • Respiratory protection

The generalist OHS professional needs to ensure that the appropriate data gathering and research has been conducted to enable identification of biohazard-exposure risks in their particular workplace. This may require liaison with an occupational hygienist who may undertake assessments to clarify the nature of the biohazard and to identify the presence of any other hazards that may have synergistic or confounding effects.

The resultant information provides a foundation for liaising with the medical practitioner or occupational health physician to conduct hazard identification and characterization and risk assessments.

The development and implementation of appropriate strategies for prevention and harm minimization may require a team approach with an occupational hygienist providing advice on prevention and monitoring, health advice provided by a medical practitioner, and the generalist OHS professional ensuring the integration of the prevention, mitigation and monitoring strategies into the OHS management system.

Summary

Biohazards include infective agents such as viruses, bacteria, protozoa and other microorganisms as well as animals and animal products, and plants and plant products that can cause infections, allergy, toxicity or otherwise create a hazard to human health. While potential risk is highly variable, biohazards should be considered in the hazard profile for workplaces.

Outdoor workers, those who work with animals, healthcare workers and others exposed to human body fluids are likely to be at higher risk of exposure to biohazards than workers in other occupations. Control of biohazards requires systematic, analytical application of a hierarchy of control that takes account of the nature of

biohazard agent, the workplace, the nature of the work and the workers. The generalist OHS professional has an important role in the management of biohazards by working with healthcare and occupational health personnel to ensure that biohazards are systematically addressed in OHS management processes.

5. Fundamentals of occupational safety legislation

5.1. The concept, purpose and tasks of occupational safety

The Verkhovna Rada of Ukraine adopted the Law of Ukraine "On Occupational Safety" (in the wording of the Law No. 229-IV of 21.11.2002 - VVR. -2003., No. 2. - page 10).

This Law defines the basic provisions for the implementation of the constitutional rights of workers to protect their life and health in the process of work, on appropriate, safe and healthy working conditions, regulates, with the participation of the relevant state authorities, the relationship between the employer and the worker on safety, occupational health and the production environment and establishes a unified procedure for the organization of occupational safety in Ukraine.

According to Art. 1 The Law of Ukraine "On Occupational Safety" defines concepts and terms.

Occupational safety is a system of legal, socio-economic, organizational and technical. sanitary-hygienic. therapeutic and preventive measures and means aimed at preserving the life, health and efficiency of a person in the process of labor activity.

The employer is the owner of an enterprise, institution, organization or authorized body, regardless of ownership, type of business, management, and an individual who uses hired labor.

An employee is a person who works in an enterprise, organization, institution and performs duties or functions in accordance with an employment contract (contract).

The action of this Law applies to all legal entities and individuals who, in accordance with the law, use hired labor, and all employees.

The legislation on occupational safety consists of the Law "On Occupational safety", the Code of Labor Laws of Ukraine, the Law of Ukraine "On Compulsory State Social Insurance against Accident at Work and Occupational Disease that Caused Disability" and the regulatory-legal acts.

Occupational safety has three main components: the legal norms of labor legislation in this area, industrial sanitation, hygiene and safety of production processes, as well as fire protection.

The purpose of the occupational safety is to provide safe, harmless and favorable working conditions through solving many complex tasks, the main of which are:

- design of enterprises, technological processes and designing of equipment with obligatory fulfillment of occupational safety requirements;
- finding optimal correlations between different factors of the production environment, which allows to ensure a minimum of adverse effects of their on the health of workers;
- establishment, legal regulation of certain norms of each of the adverse or dangerous factors, systematic king of their use;
- development of concrete measures to improve working conditions and ensure their safety through the application of the latest achievements in science and technology;
- application of rational means of protecting workers from the influence of unfavorable factors of the production environment, as well as the implementation of

organizational measures that neutralize or weaken the degree of their impact on the human body;

- development and application of methods and means of assessing the effectiveness of planned work and safety measures.

Successful resolution of these tasks involves the use of scientific and technological achievements that directly or indirectly provide occupational safety, in addition to social and legal disciplines, and economics, technical aesthetics, engineering and social psychology, physiology. The assimilation of safety rules is based on the profound knowledge of machines, mechanisms, production processes that are used in the tourist complex. Modern production requires that occupational safety is based on a scientific and technical basis. Increasing the level of mechanization and the application of automation of production processes, which are the main means of technical progress, have not only economic but also social significance and are in the interests of the workers.

They greatly facilitate the work of the workers, make it comfortable. To do this, there are great opportunities and reserves at the enterprises of the city economy, energy, the hotel-tourist complex and construction organizations. The methodological basis of occupational safety is a scientific analysis of labor conditions, production and technological processes, production equipment, in terms of the possibility of hazardous harmful production factors. On the basis of such analysis, institutional, technical, sanitary and hygienic socio-economic and other measures are being developed to prevent these factors from affecting the working people.

Basic legislation on occupational safety

The state policy of Ukraine on occupational safety proceeds from the constitutional right of every citizen to the proper safe and healthy working conditions and the priority of the employee's life and health in relation to the results of the production activity. The implementation of this policy should ensure continual improvement of conditions and safety of work, reduction of levels of injuries and occupational disease.

In Ukraine, the National Program for the Improvement of the Condition of Safety, Occupational Health and Work Environment was adopted and implemented, which was approved by the Cabinet of Ministers on 10.10.2001 (Order No. 1320), on the basis of which sectoral and regional programs for improving the state of health protection were developed.

On October 22, 2001, the Ministry of Labor № 432 approved and implemented the Concept of Management of Occupational Safety, which defines the ways of reforming the management of occupational safety in Ukraine.

Ukraine has laws that define the rights and responsibilities of its inhabitants, as well as the organizational structure of the authorities and industry. The Constitution - the main law of the state - was adopted by the Verkhovna Rada of Ukraine on June 28, 1996. It declares equal rights and freedoms to all inhabitants of the state: to free choice of work, which corresponds to safe and healthy conditions, to rest, to social protection in case of disability and old age, and some others. All laws and regulations must be consistent, based and consistent with the articles of the Constitution.

In the main law of Ukraine - the Constitution - the issues of occupational safety are devoted to three articles: 43, 45 and 46.

Article 43 of the Constitution declares that everyone has the right to work, which includes the possibility of earning a living for work, which a person freely chooses or freely agrees. Everyone has the right to safe and healthy working conditions, for wages, not lower than the statutory. It is also emphasized that the use of labor for women and adolescents for work dangerous for their health is prohibited.

Article 45 of the Constitution guarantees workers the right to rest by establishing an annual basic and additional leave, providing mandatory weekly rest days, reduced working hours in harmful conditions and night time

The text of article 46 of the Constitution refers to the right of citizens to social protection in the case of full or temporary disability, survivors, unemployment, old age and other cases stipulated by law.

The specified articles of the Constitution are specified by the relevant legislative acts.

The general laws of Ukraine, which define the main provisions of occupational safety, are:

• Code of Labor Law (Labor Code).

• Law of Ukraine "On Occupational Safety" of 01.01.2003

• The legislative framework in the field of occupational safety also includes the Laws of Ukraine:

• "On compulsory state social insurance against accidents at work and occupational diseases that caused disability"

• "On Compulsory Social Insurance in Connection with Temporary Disability and Expenses Caused by Birth and Burial"

• "On health care",

• "On fire safety",

• "On the Use of Nuclear Energy and Radiation Safety",

• "On ensuring the sanitary and epidemiological well-being of the population",

• "About traffic".

5.2. Basic principles of state policy in the field of occupational safety

The basic legislative document in the field of occupational safety is the Law of Ukraine "On Occupational Safety". It formulates the basic principles of state policy in the field of occupational safety. They are as follows:

• The priority of workers' lives and health in relation to the results of production activities;

• Full responsibility of the employer for creating safe and healthy working conditions;

• Increasing the level of industrial safety by ensuring continuous technical control over the state of production, technologies and products;

• Compulsory social protection of workers, full compensation for losses suffered as a result of accidents at work or occupational diseases;

• Use of economic methods of management of occupational safety;

• Comprehensive solution of the tasks of occupational safety on the basis of national, sectoral and regional programs on this issue, taking into account economic and social policies, using the achievements of science and technology;

• Establishment of uniform labor safety standards for all enterprises, regardless of the form of ownership and activities;

• Informing the population, conducting training, training and professional development of specialists in occupational safety and health issues;

• Cooperation and consultation between employers and employees in making decisions on occupational safety issues;

• International cooperation in the field of occupational safety, use of world experience in organizing work on improving conditions and improving labor safety.

In practice, the state policy in the field of occupational safety is implemented by the relevant state bodies:

• National Council for Safe Life at the Cabinet of Ministers;

• State Labor Service of Ukraine and its territorial bodies, Experimental and technical centers;

• Social Insurance Fund for Accidents;

• National Research Laboratory of Jccupational Safety and Training Centers;

• Appropriate subdivisions in local executive bodies.

5.3. Public administration of occupational safety. Powers of the State Service of Ukraine for Labor (State Labor)

According to Article 31 of the Law of Ukraine on Occupational Safety, the state administration of occupational safety in Ukraine carries out the following bodies:

• **Cabinet of Ministers of Ukraine.** He is the supreme state body exercised by the state management of occupational safety;

• State Service of Ukraine for Labor (State Labor) - the central executive body of Ukraine;

• Ministries and other central executive bodies;

• Local state administration, local councils of people's deputies and local self-government bodies.

The law contains rules of direct action, which determine the rights, responsibilities and powers of each body.

Cabinet of Ministers of Ukraine:

• Ensures the implementation of state policy in the field of occupational safety;

• Submit a national security improvement program to the Verkhovna Rada for approval;

• Coordinates the work of ministries and other central bodies;

• Set up a single statistical report on occupational safety issues

The State Service of Ukraine for Labor (State Labor) is formed in accordance with the requirements of the Cabinet of Ministers Resolution dated September 10, 2014. No. 442 "On the optimization of the system of central executive authorities" as a result of

reorganization by merging the State Service for Mining Supervision and Industrial Safety and the State Labor Inspectorate, as well as transferring functions of the State Sanitary and Epidemiological Service on the implementation of state policy in the field of occupational hygiene and workplace dosimetry and exposure doses of workers. The work of the State Labor Organization is directed and coordinated by the Cabinet of Ministers of Ukraine through the Minister of Social Policy. The Provision on the State Service of Ukraine on Labor was approved on February 11, 2015.

The State Labor Organization exercises its powers through territorial bodies established in the established manner by the Resolution of February 11, 2015.

The State Labor Office is headed by the Head, who is appointed and dismissed by the Cabinet of Ministers of Ukraine on the proposal of the Prime Minister of Ukraine, made on the basis of proposals of the Minister of Social Policy.

State Service of Ukraine for Labor (State Labor):

• implements state policy in the areas of industrial safety, occupational safety, occupational health, handling of explosives, the implementation of state mining supervision, as well as supervision and control over the observance of labor legislation, employment of the population, compulsory state social insurance in terms of destination , accrual and payment of assistance, compensation, provision of social services and other types of material support in order to respect the rights and guarantees of insured persons;

• carries out integrated management of occupational safety and industrial safety at the state level;

• carries out state regulation and control in the field of activity related to objects of high danger;

• organizes and carries out state supervision (control) in the field of functioning of the natural gas market in the part of maintaining the proper technical state of the systems, units and devices of accounting for natural gas at its facilities and ensuring the safe and reliable operation of the facilities of the Unified Gas Transportation System.

The main functions of the Department of Labor at the State Service of Ukraine for Labor (State Labor):

• Participation in the integrated management of occupational safety;

• Participation in exercising control over the performance of the functions of the state management of occupational safety by executive authorities and local self-government bodies;

• Improvement of normative base on occupational safety, including on issues of functioning of the system of management of occupational safety;

• Participation in the implementation of state supervision and control over the observance of legislation in the field of occupational safety, including the organization of conducting training (including special) and testing of knowledge on occupational safety issues;

• control over the implementation of the tasks and measures of the National Social Program for the improvement of the state of safety, occupational health and working environment, sectoral and targeted regional programs for the improvement of the state of safety, occupational health and working environment, as well as occupational safety

and health measures in the programs of socio-economic and cultural development regions;

The decisions of the **State Labor Organization** in the field of occupational safety adopted within its competence are mandatory for all executive authorities, legal entities and individuals who use hired labor.

To accomplish its tasks, the **State Labor Organization** forms its territorial offices in the regions. Expert evaluation and training in the field of Occupational Safety are performed by the Occupational Safety Technical Experts and Technical Centers.

State supervision and public control over occupational safety

In accordance with the Law of Ukraine on occupational safety (Article 38), state supervision over observance of legislative and other normative acts on occupational safety is carried out by:

The Civil Service of Ukraine on Labor as a specially authorized body of executive power for the supervision of the Occupational Safety:

• State Committee of Ukraine for Nuclear and Radiation Safety

• Bodies of state fire supervision of the fire department of the Ministry of Emergency Situations;

• Bodies and institutions of the sanitary and epidemiological service of the Ministry of Health;

The supreme supervision over the observance and correct application of the legislation on occupational safety is carried out by the Prosecutor General's Office and the prosecutors subordinate to it.

Officials of state supervision of occupational safety (inspectors) *have the right*:

• *Unhindered to visit* controlled enterprises (objects), production with hired labor, and to carry out, in the presence of the employer or his representative, the compliance with Occupational Safety Law

• *Obtain from the employer*, officials written and oral explanations, materials, information, expert opinions, audits, reports on the state of preventive work, the causes of violations of legislation, etc.

• *To issue, in accordance with the established procedure, employers*, heads of enterprises and institutions, officials obliged to comply with the requirements for elimination of violations and shortcomings in the field of occupational safety

• *To prohibit, stop, restrict the operation of* production, workshops, polling stations, workplaces, perform certain work to eliminate violations and defects that pose a threat to the life and health of workers, to cancel and terminate the permits and licenses issued

• *To bring to administrative responsibility* those guilty of violating the Occupational Safety Law

• *To demand the payment of a fine by legal entities or individuals* for violating the law on occupational safety in the part of safe conduct of work and for non-compliance with the instructions of officials of the State Labor Organization

• *To send employers and managers of enterprises and institutions* a statement on the inconsistency of officials in the position, to transfer to the prosecutor's office materials on bringing these persons to justice

In the system of control over the protection of labor, in addition to public oversight, public control plays an important role

In accordance with the Law of Ukraine on Occupational Safety (Article 41), public control is exercised by:

• labor collectives through their authorized representatives;

• unions represented by their elected bodies and representatives (central, oblast, local, and trade union committees);

• a public (public) labor inspector, who is usually elected by the union.

The activity of the authorized person from the labor collective on occupational safety issues is carried out on the basis of a standard provision approved by the general meeting of the labor collective. Authorized representatives are elected at a general meeting of experienced and competent employees for the term of office of the election body of the labor collective meeting. Their number is determined depending on the specific conditions of production.

Authorized officers perform their duties without interruption from the main work, report on work at least once a year at the general meeting of the staff.

The Authorized Officers exercise control over:

- compliance with the requirements of the Occupational Safety Law;

- providing workers with instructions, provisions on labor occupational safety protection;

- providing workers with overalls and Personal Protective Equipment;

- Timely and proper investigation and documentation of accidents and occupational diseases;

- use of the Occupational Safety Fund by appointment.

Authorized persons are involved in the development of the provisions of the section " Occupational Safety " of the collective agreement.

Authorized (controllers) must be trained in occupational safety and labor legislation. At the time of studying and exercising control, they are exempted from their direct labor duties with the preservation of the average wage, which is indicated in the collective agreement.

Authorized labor collective shall have the right:

- to freely check the state of the Safety and Occupational Health and Safety, Labor Code;

- To submit in a special journal obligatory consideration by the employer of proposals on elimination of violations;

- to demand from the officials elimination of the threat and termination of work of employees in the event of a threat to life or health;

- To make proposals on bringing the perpetrators to justice in violation of the Occupational Safety Law.

Due to the special nature of the responsibilities of the Occupational Safety Officer, guarantees for him on issues of dismissal, prosecution should be provided for in a collective agreement.

Credentials and trade union rights in exercising control over the observance of occupational safety legislation.

The law of Ukraine on occupational safety on trade unions entrusted many powers:

- to participate in the development of sectoral, state, regional programs on occupational safety;
- to participate in the elaboration of normative legal acts on occupational safety issues;
- in working out by the employer complex measures for achievement of the established norms from the Occupational Safety;
- in the investigation of accidents;
- in developing proposals for inclusion of labor occupational safety protection issues in the collective agreement;
- in the organization of social insurance against accidents and occupational diseases in accordance with the procedure and on the terms stipulated by the legislation and the collective agreement;
- in the Cabinet of Ministers definition of the revision of social insurance rates for accidents at work;
- take part in the work of the commissions on occupational safety at the enterprise, certification of officials, acceptance of facilities in production, work in the commission for the certification of workplaces.

The credentials and rights of trade unions and the occupational safety authority are often similar, but trade unions have more rights. Thus, the trade union committee has the right (in accordance with Article 45 of the Occupational Safety Act) to seek termination of an employment contract with a leader who has signed a collective agreement and violates labor laws and occupational safety legislation.

5.4. Obligations of employees for compliance with occupational safety requirements

The provision of safe and healthy working conditions at work is impossible without the knowledge and compliance of employees with all requirements of the Occupational Safety and Health Acts on their work, rules of handling machines, mechanisms, equipment, use of means of protection, compliance with the rules of the internal labor regulations of the enterprise, cooperation with an employer in occupational safety.

The duty of the employee is primarily a diligent attitude to all types of training (instructing) conducted by the employer to study the requirements of regulations on occupational safety, rules of handling machines, mechanisms, equipment and other means of production. Every worker should know that the Law "On Occupational Safety" prohibits the admittance of persons who have not received training, instruction and testing of knowledge on occupational safety issues. If the employer does not adhere to the terms of conducting regular training (instructing), then the employee has the right to remind the relevant supervisor, and at the request of the employee is given additional training on occupational safety issues. After training (instructing), an employee must receive a manual on occupational safety.

A guarantee of the prevention of most accidents and accidents at work is the strict observance by workers of the requirements of safety of labor. Violations of the technological process, traffic rules, non-use of individual or collective protection or non-compliance with other labor safety requirements will sooner or later result in serious consequences. Therefore it is no accident in Art. 34 of the Law "On Compulsory State Social Insurance against Accident at Work ..." states that if an accident occurs as a result of violations of occupational safety regulations, the amount of one-time assistance may decrease to 50 per cent.

Moreover, the Code of Ukraine on Administrative Offenses includes amendments to the imposition of a fine on employees for violating the requirements of the Occupational Safety and Health Acts or failure to comply with the legal requirements of the ombudsmen of the supervisory authorities to eliminate violations of the legislation on occupational safety.

During work, employees must use the appropriate Personal Protective Equipment. The employer is obliged not to allow employees who refuse to use the necessary means of individual or collective protection to work.

Workers must be familiar with the collective agreement.

As a rule, a collective agreement contains the obligation of employees to carefully study the requirements of the Occupational Safety and Health Acts, to comply with the established procedure for the safe execution of works in accordance with the specific duties and professions, as well as the rules of conduct in the enterprise and in the workplace; take an active part and take an initiative in implementing measures to increase the level of occupational safety, make innovative and other proposals on these issues, etc.

Failure by an employee to comply with the requirements of the Occupational Safety and Health Acts is a violation of labor discipline, which entails application to the offender disciplinary penalties (reprimand, dismissal from work).

According to Art. 17 of the Law "On the Occupational Safety" and Art. 169 Labor Code of Ukraine, during recruitment and during work in difficult work, work with harmful or hazardous working conditions or those where there is a need for professional selection, must undergo a preliminary and periodic medical examinations. The list of occupations whose employees are subject to medical examination are approved by the Resolution of the Cabinet of Ministers of Ukraine dated May 23, 2001 No. 559, and the term and procedure for conducting it - by order of the Ministry of Health of March 31, 1994, No. 45, with the consent of the State Committee for Industrial Safety, the Ministry of Labor and Social Policy and the Federation trade unions of Ukraine.

All persons under the age of eighteen years, regardless of the jobs in which they will be employed, will be recruited only after a previous medical examination and subsequently, until they reach the age of 21, are subject to mandatory medical examination every year.

If an employee considers that the deterioration of his health is due to working conditions, an extraordinary medical examination may be made at his request or at the initiative of the employer.

Employees who refuse to undergo compulsory medical examination may be subject to disciplinary liability and detained without wage arrears.

The cooperation of the employee with the owner of the occupational safety is, above all, personally taking personal measures to eliminate any threatening industrial situation that may cause an accident or accident, the requirement for the relevant services of the enterprise to provide the workers with means of individual and collective protection, conduct repair of the equipment, notification of its head or other official about the danger to the life and health of workers, other citizens, the environment, etc.

The futile and initiative cooperation of the employee with the employer in the organization of safe and harmful working conditions, the perfect compliance with the requirements of regulations on occupational safety, the obligations under a labor and collective agreement may be the basis for encouraging the employee, giving him benefits and benefits provided by the rules of the internal a labor agreement, a collective agreement, an existing system of management of occupational safety at the enterprise.

Training on occupational safety

Training, systematic and systematic increase of knowledge of not only workers, but of the entire population of Ukraine on occupational safety issues is one of the main principles of state policy in the field of occupational safety, a fundamental basis of occupational safety and sanitation, a condition for improving the management of occupational safety and providing effective preventive work on the prevention of accidents, occupational diseases and industrial accidents.

The main normative document that establishes the procedure and types of training and examination of knowledge on occupational safety is the Typical Regulations on the procedure for conducting training and verification of knowledge on occupational safety issues, approved by the order of the State Committee for Observation and Interrogation on occupational safety dated January 26, 2005, No. 15. This order is aimed at realization in Ukraine Continuous training on occupational safety issues.

The typical situation determines the order:

- study of the bases of occupational safety at educational institutions and during vocational training of employees at the enterprise;
- Organization of training and verification of knowledge on occupational safety at the enterprise;
- special training and examination of knowledge on occupational safety issues;
- training and checking knowledge on occupational safety issues of officials;
- organization of briefing on occupational safety issues;
- internships, duplication and admission of workers to work.

In vocational schools there is a compulsory study of the subject "Occupational Safety", and in higher educational institutions studying disciplines "Fundamentals of occupational safety " and "Occupational safety in the industry" are studied. This training is conducted on the basis of standard curricula and programs approved by the Ministry of Education in agreement with the State Committee for Labor and Social Affairs (State supervision of occupational safety).

Some specific issues of occupational safety are studied in courses of special and general technical disciplines.

During the professional training of employees at the enterprise, the theoretical part of the subject "Occupational Safety" is studied in the volume of not less than 10 hours, and during retraining and advanced training - not less than 8 hours.

Employees involved in high-risk jobs are trained only in educational institutions. In this case, the theoretical part of the subject "Occupational Safety" is studied in a volume of at least 30 hours, and during retraining and advanced training - at least 15 hours. Specific occupational safety issues for specific professions are studied in courses of special and general technical disciplines.

In enterprises, based on the Typical Regulations, taking into account the specifics of production and the requirements of the Occupational Safety and Health Acts, the relevant regulations of enterprises on training on occupational safety issues are developed and approved, and plans are drawn up for the training and testing of knowledge on occupational safety issues that should be familiar with the workers.

Employees are hired and periodically in the process of work, and pupils, students and students during the educational process are trained and tested knowledge of occupational safety, first aid to victims of accidents, rules of conduct in the event of an accident, as well as appropriate instructions . Persons who combine occupations receive training and instruction on occupational safety, both in their main occupations and in part-time occupations. Admission to work (implementation of educational practical tasks) without training and verification of knowledge on occupational safety is prohibited.

Responsibility for the organization and implementation of training and verification of workers' knowledge on occupational safety is the responsibility of the employer.

Officers and employees engaged in high-risk jobs and at work where there is a need for professional selection undergo annual special training and knowledge testing of relevant Occupational Safety and Health Acts.

There are following forms of training on occupational safety and health:

- *Coursework* for engineering workers is planned and unscheduled.
- *Special training* for workers involved in work with high-risk.

After these types of training, the staff pass the exam and receive a certificate

- *Tutorial*

Employees at enterprises of all forms of ownership during hiring and during work are instructed, trained and tested for knowledge on occupational safety issues, providing first aid to victims, rules of conduct in emergencies. Without such training, the admission of workers to work is prohibited

At enterprises, depending on their specifics and on the basis of the "typical situation", their positions on education, curricula and schedules of its conducting are formed. Responsible for this work is the head of the company, and in the divisions - their leaders.

As a rule, the organization of training is carried out by the personnel of the service of personnel and occupational safety.

For verification of knowledge a commission is created, the head of which is the head or his deputy to the production. The commission consists of employees of the Occupational Safety Service, the legal, industrial, technical services, the labor safety authority, and a representative of the state supervision body may also be involved.

Before checking the knowledge of employees, training is organized in the form of lectures, seminars, consultations. Verification is carried out by the normative legal acts required by the employee in the work. The results of the check are drawn up by protocols

Workers who have passed the exam get a certificate. If the exam results are unsatisfactory, an employee must undergo a re-training within a month and work is not allowed.

For engineers and technicians who are included in the "List of officials who must undergo a preliminary and periodic examination of knowledge of occupational safety", before entering the work and then at least once in 3 years, *courses are conducted.*

The heads of enterprises and their deputies on occupational safety issues, specialists of occupational safety services, heads of departments and teachers of occupational safety of universities, regional and industrial training centers on lab occupational safety or protection, and other leading employees undergo training and examination of knowledge at the Main Training and Methodological Center of the State Committee of Industrial Safety, Safety and Mining Supervision of the Ministry of Emergencies.

Officials of rayon state administrations on issues of occupational safety, specialists of design and development research, production and technological departments are trained in institutions that, in accordance with the established procedure, received permission from the State Labor Organization.

The training is paid, the payment is provided by the owner of the enterprise, or at the expense of the budget for the budget organization.

Coursework is planned and unscheduled. Planned training and examination - once every three years according to the schedule. Unplanned - in two cases:

- if an official moves to another post requiring additional knowledge
- in the event of an accident or an industrial disaster at the enterprise, the relevant officials must undergo extra-curricular training and examination of labor safety knowledge within a month.

Officials and employees engaged in work with increased risk during recruitment and periodically but at least once a year undergo *special training and examination of knowledge* on occupational safety issues in relation to specific production conditions.

Students are trained in occupational safety regardless of the level of the institution and its subordination and forms of ownership. The content and scope of the training program is approved by the Ministry of Education in agreement with the State Labor Office.

Students of vocational schools study discipline "Occupational Safety", universities - a complex of educational disciplines "Life Safety", "Fundamentals of Occupational Safety" and "Occupational Safety in the Industry". The volume of the program and the number of hours to study it can not be reduced without the approval

of the State Labor Office. The form of final knowledge control is an exam, diploma projects and graduates work should provide a section of occupational safety.

Another form of training in the field of occupational safety is instruction.

By character and time, they are divided into introductory, primary, repeated, unscheduled and targeted:

- *An introductory* training is provided by a specialist of the Occupational Safety Service or, in the absence of the Occupational Safety Service, another worker appointed by an order that has passed the relevant training and knowledge test.

Such instruction is given *to those who are employed* by other enterprises *who arrived to perform work* with students and *students who arrived to practice* in the event of a tour of the company, with all students when enrolling in the training

The instruction is carried out in the Office of the Guard or another special room. At the same time, come here to get acquainted with:

- Rules of labor regulations
- Rules of conduct on the territory
- Hazardous and harmful production factors
- Fire prevention
- The work of the gas and radiation service
- Rules for providing first aid to victims

About the instruction there is an entry in the log of instructions for registration signed by the instructor and the instructor.

- of occupational safety in the following cases: when the new or revision of *The primary* instruction is carried out before the work starts directly at the workplace with the employee: newly accepted, either at the transfer to another job, or at the assignment of a new job, as well as with an employee who is seconded from another enterprise to participate in the production process.

Primary instruction is also carried out with students, students and cadets before the beginning of labor and vocational training and before each academic task is completed using mechanisms and equipment.

- *Repeated* instruction is carried out within the timeframe defined by the regulations of the industry, taking into account the specific working conditions, but *at least once every three months* at work with increased danger and *once every six months* - for the rest of the work.

- *Unscheduled* instruction is conducted with employees in the workplace or in the office existing regulatory acts is introduced, with the change of technology, modernization and replacement of equipment, raw materials and materials in violation of the requirements of the employees of the Occupational Safety and Health Acts, which resulted in injuries and accidents, with interruptions in the work of the performer more than 30 days in a place of high danger and more than 60 days in other workplaces.

The scope and content of unscheduled instruction are determined in each individual case, depending on the reason for its conduct and the nature of the violations

- *Targeted* instruction is carried out with employees in the following cases: in the elimination of accidents and natural disasters, in carrying out works for which the law is issued outfit-tolerance.

Primary, repetitive, unscheduled and targeted instructance are conducted by the head of the work individually or with a team of employees for the operating instructions of the occupational safety at the enterprise. Instructions are completed for verifying the knowledge instructed in the form of oral questioning, or by automated means of verification. If unsatisfactory results of testing the knowledge, skills and abilities of safe work *within 10 days after the initial, repeated, unscheduled* briefings additionally conducted instruction and re-examination of knowledge. If unsatisfactory knowledge of the target instruction, the employee is not allowed to perform work.

About the instruction is an entry in the log of registration of briefings on occupational safety at the workplace signed by the instructor and instructed. The magazine's pages should be truncated, numbered and sealed.

By a decision of the employer, part of the employees whose work is not directly related to the operation of the equipment may be exempted from re-briefing, which is fixed in the list approved by him of the professions and positions that are not subject to repeated instructing.

5.5. Fundamentals of occupational safety legislation

The Verkhovna Rada of Ukraine adopted the Law of Ukraine "On Occupational Safety" (in the wording of the Law No. 229-IV of 21.11.2002 - VVR. -2003., No. 2. - page 10).

This Law defines the basic provisions for the implementation of the constitutional rights of workers to protect their life and health in the process of work, on appropriate, safe and healthy working conditions, regulates, with the participation of the relevant state authorities, the relationship between the employer and the worker on safety, occupational health and the production environment and establishes a unified procedure for the organization of occupational safety in Ukraine.

According to Art. 1 The Law of Ukraine "On Occupational Safety" defines concepts and terms.

Occupational safety is a system of legal, socio-economic, organizational and technical. sanitary-hygienic. therapeutic and preventive measures and means aimed at preserving the life, health and efficiency of a person in the process of labor activity.

The employer is the owner of an enterprise, institution, organization or authorized body, regardless of ownership, type of business, management, and an individual who uses hired labor.

An employee is a person who works in an enterprise, organization, institution and performs duties or functions in accordance with an employment contract (contract).

The action of this Law applies to all legal entities and individuals who, in accordance with the law, use hired labor, and all employees.

The legislation on occupational safety consists of the Law "On Occupational safety", the Code of Labor Laws of Ukraine, the Law of Ukraine "On Compulsory State Social Insurance against Accident at Work and Occupational Disease that Caused Disability" and the regulatory-legal acts.

Occupational safety has three main components: the legal norms of labor legislation in this area, industrial sanitation, hygiene and safety of production processes, as well as fire protection.

The purpose of the occupational safety is to provide safe, harmless and favorable working conditions through solving many complex tasks, the main of which are:

- design of enterprises, technological processes and designing of equipment with obligatory fulfillment of occupational safety requirements;
- finding optimal correlations between different factors of the production environment, which allows to ensure a minimum of adverse effects of their on the health of workers;
- establishment, legal regulation of certain norms of each of the adverse or dangerous factors, systematic king of their use;
- development of concrete measures to improve working conditions and ensure their safety through the application of the latest achievements in science and technology;
- application of rational means of protecting workers from the influence of unfavorable factors of the production environment, as well as the implementation of organizational measures that neutralize or weaken the degree of their impact on the human body;
- development and application of methods and means of assessing the effectiveness of planned work and safety measures.

Successful resolution of these tasks involves the use of scientific and technological achievements that directly or indirectly provide occupational safety, in addition to social and legal disciplines, and economics, technical aesthetics, engineering and social psychology, physiology. The assimilation of safety rules is based on the profound knowledge of machines, mechanisms, production processes that are used in the tourist complex.

Modern production requires that occupational safety is based on a scientific and technical basis. Increasing the level of mechanization and the application of automation of production processes, which are the main means of technical progress, have not only economic but also social significance and are in the interests of the workers.

They greatly facilitate the work of the workers, make it comfortable. To do this, there are great opportunities and reserves at the enterprises of the city economy, energy, the hotel-tourist complex and construction organizations.

The methodological basis of occupational safety is a scientific analysis of labor conditions, production and technological processes, production equipment, in terms of the possibility of hazardous harmful production factors. On the basis of such analysis, institutional, technical, sanitary and hygienic socio-economic and other measures are being developed to prevent these factors from affecting the working people.

Basic legislation on occupational safety

The state policy of Ukraine on occupational safety proceeds from the constitutional right of every citizen to the proper safe and healthy working conditions and the priority of the employee's life and health in relation to the results of the

production activity. The implementation of this policy should ensure continual improvement of conditions and safety of work, reduction of levels of injuries and occupational disease.

In Ukraine, the National Program for the Improvement of the Condition of Safety, Occupational Health and Work Environment was adopted and implemented, which was approved by the Cabinet of Ministers on 10.10.2001 (Order No. 1320), on the basis of which sectoral and regional programs for improving the state of health protection were developed.

On October 22, 2001, the Ministry of Labor № 432 approved and implemented the Concept of Management of Occupational Safety, which defines the ways of reforming the management of occupational safety in Ukraine.

Ukraine has laws that define the rights and responsibilities of its inhabitants, as well as the organizational structure of the authorities and industry. The Constitution - the main law of the state - was adopted by the Verkhovna Rada of Ukraine on June 28, 1996. It declares equal rights and freedoms to all inhabitants of the state: to free choice of work, which corresponds to safe and healthy conditions, to rest, to social protection in case of disability and old age, and some others. All laws and regulations must be consistent, based and consistent with the articles of the Constitution.

In the main law of Ukraine - the Constitution - the issues of occupational safety are devoted to three articles: 43, 45 and 46.

Article 43 of the Constitution declares that everyone has the right to work, which includes the possibility of earning a living for work, which a person freely chooses or freely agrees. Everyone has the right to safe and healthy working conditions, for wages, not lower than the statutory. It is also emphasized that the use of labor for women and adolescents for work dangerous for their health is prohibited.

Article 45 of the Constitution guarantees workers the right to rest by establishing an annual basic and additional leave, providing mandatory weekly rest days, reduced working hours in harmful conditions and night time

The text of article 46 of the Constitution refers to the right of citizens to social protection in the case of full or temporary disability, survivors, unemployment, old age and other cases stipulated by law.

The specified articles of the Constitution are specified by the relevant legislative acts.

The general laws of Ukraine, which define the main provisions of occupational safety, are:

• Code of Labor Law (Labor Code).

• Law of Ukraine "On Occupational Safety" of 01.01.2003

• The legislative framework in the field of occupational safety also includes the Laws of Ukraine:

• "On compulsory state social insurance against accidents at work and occupational diseases that caused disability"

• "On Compulsory Social Insurance in Connection with Temporary Disability and Expenses Caused by Birth and Burial"

• "On health care",

• "On fire safety",

• "On the Use of Nuclear Energy and Radiation Safety",
• "On ensuring the sanitary and epidemiological well-being of the population",
• "About traffic".

5.6. Obligations of employees for compliance with occupational safety requirements

The provision of safe and healthy working conditions at work is impossible without the knowledge and compliance of employees with all requirements of the Occupational Safety and Health Acts on their work, rules of handling machines, mechanisms, equipment, use of means of protection, compliance with the rules of the internal labor regulations of the enterprise, cooperation with an employer in occupational safety.

The duty of the employee is primarily a diligent attitude to all types of training (instructing) conducted by the employer to study the requirements of regulations on occupational safety, rules of handling machines, mechanisms, equipment and other means of production. Every worker should know that the Law "On Occupational Safety" prohibits the admittance of persons who have not received training, instruction and testing of knowledge on occupational safety issues. If the employer does not adhere to the terms of conducting regular training (instructing), then the employee has the right to remind the relevant supervisor, and at the request of the employee is given additional training on occupational safety issues. After training (instructing), an employee must receive a manual on occupational safety.

A guarantee of the prevention of most accidents and accidents at work is the strict observance by workers of the requirements of safety of labor. Violations of the technological process, traffic rules, non-use of individual or collective protection or non-compliance with other labor safety requirements will sooner or later result in serious consequences.

Therefore it is no accident in Art. 34 of the Law "On Compulsory State Social Insurance against Accident at Work ..." states that if an accident occurs as a result of violations of occupational safety regulations, the amount of one-time assistance may decrease to 50 per cent.

Moreover, the Code of Ukraine on Administrative Offenses includes amendments to the imposition of a fine on employees for violating the requirements of the Occupational Safety and Health Acts or failure to comply with the legal requirements of the ombudsmen of the supervisory authorities to eliminate violations of the legislation on occupational safety.

During work, employees must use the appropriate Personal Protective Equipment. The employer is obliged not to allow employees who refuse to use the necessary means of individual or collective protection to work.

Workers must be familiar with the collective agreement.

As a rule, a collective agreement contains the obligation of employees to carefully study the requirements of the Occupational Safety and Health Acts, to comply with the established procedure for the safe execution of works in accordance with the specific

duties and professions, as well as the rules of conduct in the enterprise and in the workplace; take an active part and take an initiative in implementing measures to increase the level of occupational safety, make innovative and other proposals on these issues, etc. Failure by an employee to comply with the requirements of the Occupational Safety and Health Acts is a violation of labor discipline, which entails application to the offender disciplinary penalties (reprimand, dismissal from work).

According to Art. 17 of the Law "On the Occupational Safety" and Art. 169 Labor Code of Ukraine, during recruitment and during work in difficult work, work with harmful or hazardous working conditions or those where there is a need for professional selection, must undergo a preliminary and periodic medical examinations. The list of occupations whose employees are subject to medical examination are approved by the Resolution of the Cabinet of Ministers of Ukraine dated May 23, 2001 No. 559, and the term and procedure for conducting it - by order of the Ministry of Health of March 31, 1994, No. 45, with the consent of the State Committee for Industrial Safety, the Ministry of Labor and Social Policy and the Federation trade unions of Ukraine.

All persons under the age of eighteen years, regardless of the jobs in which they will be employed, will be recruited only after a previous medical examination and subsequently, until they reach the age of 21, are subject to mandatory medical examination every year.

If an employee considers that the deterioration of his health is due to working conditions, an extraordinary medical examination may be made at his request or at the initiative of the employer.

Employees who refuse to undergo compulsory medical examination may be subject to disciplinary liability and detained without wage arrears.

The cooperation of the employee with the owner of the occupational safety is, above all, personally taking personal measures to eliminate any threatening industrial situation that may cause an accident or accident, the requirement for the relevant services of the enterprise to provide the workers with means of individual and collective protection, conduct repair of the equipment, notification of its head or other official about the danger to the life and health of workers, other citizens, the environment, etc.

The futile and initiative cooperation of the employee with the employer in the organization of safe and harmful working conditions, the perfect compliance with the requirements of regulations on occupational safety, the obligations under a labor and collective agreement may be the basis for encouraging the employee, giving him benefits and benefits provided by the rules of the internal a labor agreement, a collective agreement, an existing system of management of occupational safety at the enterprise.

Training on occupational safety

Training, systematic and systematic increase of knowledge of not only workers, but of the entire population of Ukraine on occupational safety issues is one of the main principles of state policy in the field of occupational safety, a fundamental basis of occupational safety and sanitation, a condition for improving the management of

occupational safety and providing effective preventive work on the prevention of accidents, occupational diseases and industrial accidents.

The main normative document that establishes the procedure and types of training and examination of knowledge on occupational safety is the Typical Regulations on the procedure for conducting training and verification of knowledge on occupational safety issues, approved by the order of the State Committee for Observation and Interrogation on occupational safety dated January 26, 2005, No. 15. This order is aimed at realization in Ukraine Continuous training on occupational safety issues.

The typical situation determines the order:

- study of the bases of occupational safety at educational institutions and during vocational training of employees at the enterprise;
- Organization of training and verification of knowledge on occupational safety at the enterprise;
- special training and examination of knowledge on occupational safety issues;
- training and checking knowledge on occupational safety issues of officials;
- organization of briefing on occupational safety issues;
- internships, duplication and admission of workers to work.

In vocational schools there is a compulsory study of the subject "Occupational Safety", and in higher educational institutions studying disciplines "Fundamentals of occupational safety " and "Occupational safety in the industry" are studied. This training is conducted on the basis of standard curricula and programs approved by the Ministry of Education in agreement with the State Committee for Labor and Social Affairs (State supervision of occupational safety).

Some specific issues of occupational safety are studied in courses of special and general technical disciplines.

During the professional training of employees at the enterprise, the theoretical part of the subject "Occupational Safety" is studied in the volume of not less than 10 hours, and during retraining and advanced training - not less than 8 hours.

Employees involved in high-risk jobs are trained only in educational institutions. In this case, the theoretical part of the subject "Occupational Safety" is studied in a volume of at least 30 hours, and during retraining and advanced training - at least 15 hours. Specific occupational safety issues for specific professions are studied in courses of special and general technical disciplines.

In enterprises, based on the Typical Regulations, taking into account the specifics of production and the requirements of the Occupational Safety and Health Acts, the relevant regulations of enterprises on training on occupational safety issues are developed and approved, and plans are drawn up for the training and testing of knowledge on occupational safety issues that should be familiar with the workers.

Employees are hired and periodically in the process of work, and pupils, students and students during the educational process are trained and tested knowledge of occupational safety, first aid to victims of accidents, rules of conduct in the event of an accident, as well as appropriate instructions . Persons who combine occupations receive training and instruction on occupational safety, both in their main occupations and in part-time occupations. Admission to work (implementation of educational

practical tasks) without training and verification of knowledge on occupational safety is prohibited.

Responsibility for the organization and implementation of training and verification of workers' knowledge on occupational safety is the responsibility of the employer.

Officers and employees engaged in high-risk jobs and at work where there is a need for professional selection undergo annual special training and knowledge testing of relevant Occupational Safety and Health Acts.

There are following forms of training on occupational safety and health:

- *Coursework* for engineering workers is planned and unscheduled.
- *Special training* for workers involved in work with high-risk.

After these types of training, the staff pass the exam and receive a certificate

- *Tutorial*

Employees at enterprises of all forms of ownership during hiring and during work are instructed, trained and tested for knowledge on occupational safety issues, providing first aid to victims, rules of conduct in emergencies. Without such training, the admission of workers to work is prohibited

At enterprises, depending on their specifics and on the basis of the "typical situation", their positions on education, curricula and schedules of its conducting are formed. Responsible for this work is the head of the company, and in the divisions - their leaders.

As a rule, the organization of training is carried out by the personnel of the service of personnel and occupational safety.

For verification of knowledge a commission is created, the head of which is the head or his deputy to the production. The commission consists of employees of the Occupational Safety Service, the legal, industrial, technical services, the labor safety authority, and a representative of the state supervision body may also be involved.

Before checking the knowledge of employees, training is organized in the form of lectures, seminars, consultations. Verification is carried out by the normative legal acts required by the employee in the work. The results of the check are drawn up by protocols

Workers who have passed the exam get a certificate. If the exam results are unsatisfactory, an employee must undergo a re-training within a month and work is not allowed.

For engineers and technicians who are included in the "List of officials who must undergo a preliminary and periodic examination of knowledge of occupational safety", before entering the work and then at least once in 3 years, *courses are conducted.*

The heads of enterprises and their deputies on occupational safety issues, specialists of occupational safety services, heads of departments and teachers of occupational safety of universities, regional and industrial training centers on lab occupational safety or protection, and other leading employees undergo training and examination of knowledge at the Main Training and Methodological Center of the State Committee of Industrial Safety, Safety and Mining Supervision of the Ministry of Emergencies.

Officials of rayon state administrations on issues of occupational safety, specialists of design and development research, production and technological departments are trained in institutions that, in accordance with the established procedure, received permission from the State Labor Organization.

The training is paid, the payment is provided by the owner of the enterprise, or at the expense of the budget for the budget organization.

Coursework is planned and unscheduled. Planned training and examination - once every three years according to the schedule. Unplanned - in two cases:

- if an official moves to another post requiring additional knowledge
- in the event of an accident or an industrial disaster at the enterprise, the relevant officials must undergo extra-curricular training and examination of labor safety knowledge within a month.

Officials and employees engaged in work with increased risk during recruitment and periodically but at least once a year undergo *special training and examination of knowledge* on occupational safety issues in relation to specific production conditions.

Students are trained in occupational safety regardless of the level of the institution and its subordination and forms of ownership. The content and scope of the training program is approved by the Ministry of Education in agreement with the State Labor Office.

Students of vocational schools study discipline "Occupational Safety", universities - a complex of educational disciplines "Life Safety", "Fundamentals of Occupational Safety" and "Occupational Safety in the Industry". The volume of the program and the number of hours to study it can not be reduced without the approval of the State Labor Office. The form of final knowledge control is an exam, diploma projects and graduates work should provide a section of occupational safety.

Another form of training in the field of occupational safety is instruction.

By character and time, they are divided into introductory, primary, repeated, unscheduled and targeted:

- ***An introductory*** training is provided by a specialist of the Occupational Safety Service or, in the absence of the Occupational Safety Service, another worker appointed by an order that has passed the relevant training and knowledge test.

Such instruction is given *to those who are employed* by other enterprises *who arrived to perform work* with students and *students who arrived to practice* in the event of a tour of the company, with all students when enrolling in the training

The instruction is carried out in the Office of the Guard or another special room. At the same time, come here to get acquainted with:

- Rules of labor regulations
- Rules of conduct on the territory
- Hazardous and harmful production factors
- Fire prevention
- The work of the gas and radiation service
- Rules for providing first aid to victims

About the instruction there is an entry in the log of instructions for registration signed by the instructor and the instructor.

- *The primary* instruction is carried out before the work starts directly at the workplace with the employee: newly accepted, either at the transfer to another job, or at the assignment of a new job, as well as with an employee who is seconded from another enterprise to participate in the production process.

Primary instruction is also carried out with students, students and cadets before the beginning of labor and vocational training and before each academic task is completed using mechanisms and equipment.

- *Repeated* instruction is carried out within the timeframe defined by the regulations of the industry, taking into account the specific working conditions, but *at least once every three months* at work with increased danger and *once every six months* - for the rest of the work.

- *Unscheduled* instruction is conducted with employees in the workplace or in the office of occupational safety in the following cases: when the new or revision of existing regulatory acts is introduced, with the change of technology, modernization and replacement of equipment, raw materials and materials in violation of the requirements of the employees of the Occupational Safety and Health Acts, which resulted in injuries and accidents, with interruptions in the work of the performer more than 30 days in a place of high danger and more than 60 days in other workplaces.

The scope and content of unscheduled instruction are determined in each individual case, depending on the reason for its conduct and the nature of the violations

- *Targeted* instruction is carried out with employees in the following cases: in the elimination of accidents and natural disasters, in carrying out works for which the law is issued outfit-tolerance.

Primary, repetitive, unscheduled and targeted instructance are conducted by the head of the work individually or with a team of employees for the operating instructions of the occupational safety at the enterprise. Instructions are completed for verifying the knowledge instructed in the form of oral questioning, or by automated means of verification. If unsatisfactory results of testing the knowledge, skills and abilities of safe work *within 10 days after the initial, repeated, unscheduled* briefings additionally conducted instruction and re-examination of knowledge. If unsatisfactory knowledge of the target instruction, the employee is not allowed to perform work.

About the instruction is an entry in the log of registration of briefings on occupational safety at the workplace signed by the instructor and instructed. The magazine's pages should be truncated, numbered and sealed.

By a decision of the employer, part of the employees whose work is not directly related to the operation of the equipment may be exempted from re-briefing, which is fixed in the list approved by him of the professions and positions that are not subject to repeated instructing.

To sum up, we note that the accuracy of this assessment increases with the number of respondents, depending on occupation, age and gender of the person.

Forecast of possible increase of life expectancy under the conditions of elimination of certain causes of death makes it possible to identify the most dangerous factors for life. According to the forecast of scientists, the elimination of the key cardio - vascular and renal diseases will increase life expectancy to 10.9 years, heart disease - 5.9 years, malignancies - 2.3 years, accidents (excluding automobile accidents) - 0.6

years, automobile accidents - 0.6 years, infectious diseases - 0.2 years, tuberculosis - 0.1 years.

It is important to note that the awareness of the existence of dangerous and harmful factors for human life is only the first step to a secure life. It is necessary to establish the conditions under which these factors cause unwanted effects and avert the possibility of these conditions.

Questions. Tasks:

1. What is the essence of life safety? On the achievement of which fundamental sciences is it based?
2. Identify the basic principles of human life support.
3. Define the concepts of "life" and "activity".
4. Name the main problems of life providing.
5. Identify and classify the dangerous factors.
6. Name the subgroups of physical dangerous factors.
7. What are the chemical dangerous factors.
8. Charactirize the biological dangerous factors.
9. Classify the psychophysiological dangerous factors.
10. What is the life safety risk?
11. What is the quantitative risk assessment?
12. Name the types of environmental risk.
13. Give the definition of anthropogenic risk.
14. What is social risk?
15. What is the calculation of social risk?
16. Name structuring features of social risk.
17. What is subjective risk?
18. What are the types of compensation for risk tolerance?
19. What is the qualitative characteristics of risk?
20. What is the statistical assessment of dangerous factors?
21. What is occupational safety?
22. Name the causes of fatal occupational injuries.
23. What privileges are prescribed by the Law of Ukraine "On occupational safety" for women, minors, working invalids.?
24. What are the sectoral normative documents on occupational safety?
25. For whom are the sectoral legislative acts being developed?
26. Is it possible to eliminate the occupational safety service?
27. Name the obligations of employees on compliance with occupational safety requirements.
28. What document is the main normative document that establishes the order and types of training and verification of knowledge on occupational safety?
29. What are the basic principles of accident insurance?
30. What is an insurance risk and an insurance case?
31. At what expense is the Fund for Social Insurance against Accidents financed?
32. What rights does the insured employee have?

Tests for self-control and control of knowledge acquisition

1) Who is the head of the commission of investigation for accidents at the enterprise?	
1	Head of the trade union committee of the enterprise
2	Head of the enterprise
3	Technical Inspector of State supervision of occupational safety
4	Specialist of the company's occupational safety service

2) What is the instruction should be provided before performing a one-time work which is not related to the obligations of the employee?	
1	Repeated
2	Unscheduled
3	Primary
4	Targeted

3) Which of the documents does not apply to occupational safety laws?	
1	Constitution of Ukraine
2	Law of Ukraine "On Occupational Safety"
3	Instruction on occupational safety for workers
4	The Labour Code

4) Specify who does make compensation for damage to health?	
1	The ministry, the department to which the enterprise belongs
2	Social Insurance Fund for Accidents
3	Employer

5) Insurance case is:	
1	Accident by traveling by public transport
2	Accident or occupational disease in the workplace
3	Violation of work rules
4	Accident in everyday life

6) Indicate the correct classification of the main causes of occupational injuries	
1	Violation of safety requirements; industrial sanitation; fire safety
2	Organizational; technical; professional; administrative
3	Organizational; technical; sanitary-hygienic; psychophysiological
4	Violation of requirements of legislative and normative acts; internal labor regulations; safety and fire safety instructions

7) What is the object of insurance against accidents at work?	
1	The employee`s family life and health
2	Employee`s realty
3	Employee`s life and health
4	Employee`s capital

8) What is the term for storing acts of investigation of an accident at work?	
1	20 years
2	25 years
3	45 years
4	5 years

9) Who is the head of the commission for investigation the causes of chronic occupational disease?	
1	Trade union representative
2	Representative of the Social Insurance Fund for Accident
3	Specialist in Sanitary and Epidemiological Service
4	Representative of the Therapeutic and Prophylactic institution

10) Which of the documents does not apply to occupational safety laws?	
1	Constitution of Ukraine
2	Law of Ukraine "On Occupational Safety"
3	Instruction on occupational safety for workers
4	The Labour Code

6. NATURAL ENVIRONMENT OF HUMAN LIFE

Man as a natural being is a part of the environment – a source of resources for sustaining life. Its safety depends on the conditions in which it interacts with the nature.

The components of human environment. Biosphere covers part of the atmosphere, hydrosphere, and upper part of lithosphere interconnected by complex biogeochemical cycles of migration of matter and energy.

Atmosphere. It is a gaseous envelope of the Earth, which rotates along with it. The atmosphere consists of nitrogen (70%), oxygen (21%) and inert gases (2%).

According to the nature of changes as to the various parameters the Earth's atmosphere is divided into the following layers: the troposphere (9-18km), where the air is fit to breathe; stratosphere (50-55km), where the air is thin and the temperature at the bottom is 55°C, in the upper – 0°C; mesosphere (80-90 km), where the temperature decreases and reaches – 80-90°C; thermosphere (90 to 800-1,000km), where the temperature rises up to 1000°C, and the exosphere (above 800-1,000 km), where the air is extremely thin.

The main constituents of air, affecting the livelihoods of people are:

1) atmospheric oxygen (O2) required for breathing of humans, animals, most plants and microorganisms. The source of its creation is a green plant photosynthesis (up to 70 billion tons of oxygen within the year). Approximately 80% of marine phytoplankton produces oxygen, 20% – by the ground vegetation. Oxygen is also formed from water vapor which in the upper layers of the atmosphere decomposes into H^+ and O^- by the impact of UV radiation;

2) carbon dioxide, which is a mandatory component of photosynthesis of plants. It enters the atmosphere from volcanic eruptions, decomposition of organic substances, respiration of living organisms, vapors from the ocean surface;

3) water vapor. Its content in the atmosphere is defined by the processes of evaporation, condensation and horizontal transfer. On the surface of the vapor concentration is usually between 0,1-0,2% in the polar latitudes, up to 3% - in the equatorial latitudes. Water vapor is the source of the formation of clouds, fog, rain, and along with carbon dioxide (CO^2) it protects Earth's surface from excessive cooling, ensuring the greenhouse effect. If there were no atmosphere, the average surface temperature would be 23°C and not +15°C.

The atmosphere regulates the heat transmission between the Earth and the outer space, affects its radiation and water balances.

Hydrosphere. It is a water shell of the Earth. The above-ground part of the hydrosphere, which covers 70% of the Earth includes the oceans, seas, lakes, rivers and glaciers, where water is in the solid form. The high polarity of water molecules causes strong ability to dissolve other substances, namely polar ones (salts). Therefore, chemically pure water does not exist in the nature. Depending on the amount of dissolved substances natural waters are divided into: fresh (1g of salt per 1 liter of water); brackish (salt 1 to 25g of salt per 1 liter of water); salt (25 to 50g of salt per 1 liter of water); brines (over 50g of salt per 1 liter of water).

Lithosphere. It is the outer solid shell of the Earth, which covers part of the crust and upper mantle and is composed of sedimentary, igneous and metamorphic

rocks. The lithosphere includes all mineral resources and is one of the main subjects of human activity. Soil is located in the upper part of the continental crust. Current geographical processes (landslides, mudflows, erosion, etc.) that impact on the environment in different regions are periodically occurring within the lithosphere.

Biosphere. It is the shell of the Earth formed by the living organisms or a set of creatures that inhabit Earth, area of organic life which covers the sphere of interaction between the atmosphere, lithosphere and hydrosphere.

Modern interpretation of biosphere suggested by V.Vernadsky: "Biosphere is the shell of life, region of existence of the living substances."

The most important function of the biosphere lies in maintaining a stable life. A fundamental condition for this function is physiological variability of the living organisms.

Hygienic characteristic of the environment factors. Hygienically significant environmental factors include radiation, air, fresh water, soils.

Solar radiation. It affects all the physiological processes in the body, altering metabolism, overall tone and working capacity. Under the influence of ultraviolet rays biologically active substances that stimulate the body's physiological processes are produced in the body.

Lack of sunlight is often revealed through the malfunctioning of physiological balance in the body and the development of pathological phenomena – solar or light ("UV") strike. The body of a child that is growing suffers a lot from the lack of sunlight, because of vitamin D shortage producing, leading to the development of rickets. Sunlight has a positive effect on emotional interaction, psychophysical, anti rickets, immunological effect, increases body resistance to external conditions, accelerates the self-purification processes that occur in the air.

Upon the influence of UV-radiation are the enzymatic processes, formation and absorption of physiologically active substances (including vitamin D) are enhanced, metabolism normalizes, immune reactivity, tone of the nervous and muscular systems increases.

Visible light (waveband ranges from 400 to 760nm) has generally a biological effect. Although the physiological level of the eye sight is individual, it always depends on the intensity of natural light, hence, its suitable amount in the rooms is hygienically important. The greatest labor productivity, including mental, causes sufficient natural (not artificial) lighting. The appropriate hygiene standards are set according to the physiological characteristics of visual function. Light also affects the functional state of the central nervous system.

Infrared radiation with the wavelengths from 760 to 25000nm is the only thermal effects, which is largely determined by the absorption of the radiation by skin. The smaller the wavelength, the more radiation penetrates the tissue. The specific reaction upon high intensity of the infrared radiation sunstroke caused by overheating of the cerebral cortex of the brain may occur.

Air. Its hygienic role is determined by the properties such as temperature, humidity, velocity, pressure, electric, chemical and bacteriological composition, the

presence of aerosols.

The temperature significantly affects the life processes through changing the speed of biochemical reactions. According to Van't Hoff equation, the rate of all chemical reactions increases with the increasing temperature. To maintain thermal homeostasis a person uses the mechanism of thermoregulation, providing a stable body temperature upon significant fluctuations in the air temperature.

The body receives warmth as a result of metabolism (oxidation of nutrients) and release of heat during exercising as well as from the surrounding objects (hot air, hot food, solar radiation). The intensity of metabolism is crucial in the accumulation of heat in the body.

Humidity also affects the heat transfer of the body. A degree of saturation of the air with water vapor, ie relative humidity also bears a hygienic value. High relative humidity (over 90%) slows the evaporation of sweat and , upon high temperatures, may contribute to overheating. The optimal humidity ranges between 40-60%.

With the increase of *air velocity* the efficiency of heat through convection and sweating increases, subsequently, a man goes through low temperature state easier upon calm weather. Strong wind invades the respiratory rate and the long one may even depress a person.

Electric air condition is characterized by the ionization of air, the presence of electric and magnetic fields of the Earth and natural radioactivity.

Gazes of the air have different meanings for living substances on the Earth. Reduction of the amount of oxygen in the air to 14% is critical, to 8% - incompatible with life. Increasing the oxygen amount in the air (over 28%) leads to the development of pathological processes in the body, including the reduction of lung capacity and pneumonia.

Nitrogen and inert gases are indifferent to living organisms, and to solar radiation. However, increase of nitrogen to 93% is lethal due to the reduced oxygen content. Air nitrogen is absorbed by only certain bacteria of soil and blue-green algae.

Water. Its physiological significance for humans is preconditioned by the fact that it is a part of all body tissues: from the tooth enamel containing 0.2% and the vitreous (99%). On average, the water content in the body reaches 60-70%, loss of its third part may be lethal. Water is a major part of the blood, secretions and excreta of the body. One of its significant functions is the transportation function: the delivery of nutrients to the cells and detoxification and toxic substances from the body through sweat, urine and saliva. Water plays an important role in thermoregulation of the body by evaporation of sweat.

***Natural threats and the nature of their symptoms and effects on humans, animals, plants, objects economy*.** Emergency situations of the natural origin in Ukraine are divided into geological, meteorological, hydrological, natural fires. Their occurrence is fostered by the geographical features, atmospheric processes, the presence of mountains, proximity to the warm seas, etc. Natural disasters are caused by a variety of climatic conditions, from excessive moisture in the western Polissya to dry one in the southern steppe zone. Exceptional climatic conditions also exist in

the southern coast of Crimea, in the mountains of the Ukrainian Carpathians and Crimea.

Typically, the natural phenomenon are caused by endogenous and exogenous hydrometeorological factors.

Natural disasters are classified as simple, with one element (e.g., strong wind, landslide, earthquake) and the complex ones formed by several processes (negative atmospheric and geodynamic processes exogenous, endogenous and exogenous meteorological processes combined with man-made ones).

Geologically hazardous phenomena. These include earthquakes, volcanoes, mud flows, landslides, avalanches, debris, erosion, etc.

Hydrological dangerous phenomenon. These are dangerous rises and falls of the sea level, flooding (in the river basins), mud flows (in the Carpathian and Crimean mountains), oligohydramnios.

6.1. Traumatism and occupational diseases in the industry. Accident Investigation

Working conditions are the aggregate of the factors of the industrial environment and the labor process, which affect the health and efficiency of man in the process of his professional activities.

Industrial injury is a violation of the anatomical integrity of the human body or his functions as a result of the influence of production factors.

Accident at work is a sudden impact on the employee of an unsafe production factor or environment, resulting in harm to health or death.

Occupational disease is a pathological condition of a person caused by work and is associated with excessive strain on the organism or adverse effects of harmful production factors.

People, tools, environment, and tasks which are solved in the process of work represent a dynamic system, the change in which any of the components leads to a change in others, and the resulting impact on security can sometimes be difficult to assess in advance.

The purpose and objectives of the investigation of accidents

According to Article 22 of the Law of Ukraine "On Occupational Safety and Health", the employer must organize an investigation and record of accidents, occupational diseases, and accidents in accordance with the provisions approved by the Cabinet of Ministers of Ukraine in agreement with all-Ukrainian union unions. According to the results of the investigation, the employer is required to draw up an appropriate action, one copy of which must be given to the victim or another interested person no later than three days after the end of the investigation.

Currently, the Procedure for Investigation and Record-keeping of Accidents, Occupational Diseases and Accidents at Work, approved by the Decree of the Cabinet of Ministers of Ukraine dated November 30, 2011 No. 1232, is in force.

This Procedure determines the procedure for investigation and record keeping of accidents, occupational diseases and accidents that have occurred with employees at enterprises, institutions and organizations, regardless of the form of ownership, or their affiliates, representative offices, and other separate units (hereinafter - enterprises).

This Order applies to:

1) owners of enterprises or their authorized bodies (hereinafter - employers);

2) workers, including foreigners and stateless persons, who, in accordance with the law, have concluded an employment contract (contract) with the employer or are actually admitted to work by the employer;

3) individuals - entrepreneurs;

4) members of a farm, members of a private peasant farm, persons working under an agreement concluded in accordance with the law (hereinafter - persons providing self-employment).

The operation of this Procedure also applies to diplomatic staff while working in a foreign diplomatic institution of Ukraine and persons who, in accordance with the labor legislation, work under an employment contract (contract) in military units (divisions) or in enterprises, institutions and organizations belonging to the sphere of management of the Ministry of Defense, the Ministry of Internal Affairs, the State Service of the Interior, the SBU, the Foreign Intelligence Service, the Administration of the State Border Guard Service, the DPTs, the Ministry of Emergencies, the State Service of Communications, and the State Technology Security. Occupational injuries and occupational diseases (poisoning) are an undesirable consequence of human interaction with the production environment.

Accidents are caused by injuries, which are sudden (unexpected) events caused by external factors and are harmful to a person. Sometimes, at the household level, these two concepts - an accident and injury - are identified, but in the protection of labor, each of them has its own meaning.

The injuries include injuries to the body, cuts, injuries, bone fractures, burns, frostbite, drowning, electric shock, lightning and ionizing radiation, the consequences of contact with representatives of flora and fauna, and others like that.

Accidents are divided:

- by the number of victims of those that occurred with one employee, and group accidents that occurred simultaneously with two or more employees;

- by the degree of severity of damage to health-without loss of disability, with loss of ability to work for 1 business day and more, with severe consequences, with a permanent loss of working ability (injury) and fatal (lethal);

- in connection with production - to those related to production and not related to production.

Associated with the production are recognized accidents that occurred with employees during the performance of their duties, including on business trips, as well as those that occurred during the period:

- staying in the workplace, in the enterprise or in another place of work during working hours;

- putting in order the tools of production, means of protection, clothing before and after the work, and the implementation of personal hygiene measures;

- passage to work or from work on a vehicle of the enterprise;

- use of own vehicle in the interests of the enterprise with permission or on behalf of the employer;

- conduct of actions in the interests of the enterprise;

- liquidation of accidents, fires, and consequences of natural disaster;

- provision of assistance to the company;

- stay in a vehicle or at its parking place, in the territory of a duty settlement, including during a resting place, if the cause of the accident is connected with the performance of the victims of labor (official) duties or the action of dangerous or harmful production factors on it or environment;

- directing an employee to (between) the facility (s) of service on the approved routes or to any object on behalf of the employer;

- travel to the place of a business trip and in the opposite direction in accordance with the assignment for a business trip.

Cases related to production are also recognized:

- sudden deterioration in the health of the worker or his death due to acute cardiovascular failure while undergoing underground work or after leaving the worker on the surface with signs of acute cardiovascular failure;

- committing a suicide by a crew member in case of exceeding the term stipulated by the collective agreement for the duration of stay in the flight or his death during a flight as a result of the influence of psycho-physiological, dangerous or harmful production factors.

Not recognized as a result of manufacturing accidents that have occurred with workers:

- by the place of permanent residence in the territory of the field and the duty settlements;

- when using them for private purposes vehicles, machines, machinery, equipment, tools owned or used by the enterprise (except for cases that have occurred due to their malfunction);

- as a result of poisoning with alcohol, narcotics, toxic or poisonous substances, if it is not related to the use of such substances in production processes or in violation of the safety requirements for their storage and transportation, or if the victim who was in a state of alcohol, toxic or narcotic sp ' jarring, to an accident was suspended from work in accordance with the requirements of the rules of the internal labor regulations of the enterprise or a collective agreement;

- in the case of alcohol, toxic or narcotic intoxication, not caused by the production process;

- in the course of committing them a crime, established by a conviction of a court;

- in case of death or suicide (except for the cases specified above).

Accidents that have occurred with employees during the performance of labor duties and recognized as related to the production of an Act on an accident at work (Form H-1).

An occupational disease is caused by the influence of harmful substances, certain types of work and other production factors.

The cause of the occupational disease may be: dusty or airborne contamination of the working area with harmful substances; elevated and lowered temperatures of the surface of equipment, materials, air of the working zone; increased noise, vibration, infrasonic oscillation, ultrasound, electromagnetic radiation; ionizing radiation; elevated or lowered level of barometric pressure, humidity and air mobility; contact with sources of infectious diseases; level of physical overload; other production factors according to the hygienic classification of labor.

Occupational diseases arise in the absence of the rules of the production process; violations of operating conditions of technological equipment, devices, working tools; emergency situations; absence, inefficiency of work or damage to protective devices and mechanisms, ventilation systems, shielding, signaling, lighting, air conditioning; violation of the rules of industrial safety, occupational health; because of the lack (non-use) of personal protective equipment; imperfection of technology, mechanisms, working tool; the absence of measures and means of salvation, etc.

In some industries, due to the use of monotonous, often repetitive movements and physical activity, an increase in the level of morbidity of the nervous and cerebral apparatus is observed. In addition, in recent years there has been the emergence of new types of morbidity due to the widespread use of computer technology.

Occupational diseases caused by inhalation of toxic chemicals, absorption through the skin or ingestion into the body through the gastrointestinal tract are commonly called *professional poisoning.*

Occupational diseases and poisonings that occur during a short period of time (one change per day) are called acute, and those that require a long-term for *chronic diseases.*

The primary documents bearing complete information on each occupational disease are the medical records of occupational diseases in the form P-5, which constitute the institutions of the State Sanitary and Epidemiological Service on the basis of the investigation of accidents (in the case of acute occupational diseases) and on the basis of the investigation of occupational diseases (in case of chronic diseases).

One of the most important reasons causing occupational injuries and occupational diseases is accidents - dangerous events of an anthropogenic nature that create a threat to the life and health of people at the site, territory or water and lead to the destruction of buildings, structures, equipment and transport means, violation of the production process or damage to the environment.

Accidents are divided into two categories.

Category I includes accidents, resulting in:

- 5 or injured 10 or more people;

- there was a release of poisonous, radioactive and dangerous substances outside the sanitary protection zone of the enterprise;

- increased concentration of pollutants in the environment more than 10 times;

- the buildings, constructions or main structures of the object were destroyed, which created a threat to the life and health of a significant number of employees of the enterprise or population.

Category II includes accidents resulting in:

- 5 or 4 to 10 people were injured;

- the buildings, constructions or main structures of the object were destroyed, which created a threat to the life and health of the workers of the shop, the area with a population of 100 people and more.

Industrial facilities, in which one or more hazardous substances or categories of substances are produced, processed, stored or transported in quantities equal to or greater than the prescribed threshold masses, as well as other objects that constitute a real threat of an emergency technogenic and natural, are called *high-risk objects.*

Organization of investigation and accounting of accidents at enterprises

Investigations are subject to sudden deterioration of health, injuries, injuries, including those resulting from bodily injuries inflicted by another person, acute illness and acute poisoning, heat stroke, burns, frostbite, drowning, electric shock, lightning and ionizing radiation, others injuries resulting from accidents, fires, natural disasters, contact with animals, insects, etc., which led to the loss of work capacity for one working day or more, or the need for a victim to be transferred about another (easier) work for a term not less than one working day, as well as cases of death at the enterprise (hereinafter - accidents).

For each accident, the witness, the employee who discovered him or the victim himself should immediately inform the direct manager of the work or another authorized person of the enterprise and take measures to provide the necessary assistance.

The head of the work (the authorized person) in turn is obliged:

- urgently arrange the provision of medical care to the victim, if necessary, deliver him to a health care institution;

- to inform about what has happened, the employer, the corresponding trade union organization;

- keep the situation of the workplace and equipment in the state in which they were at the time of the event (if it does not endanger the life and health of other workers and will not lead to more serious consequences) before the arrival of the investigation commission, and also take measures to preventing such cases.

The medical and prophylactic institution about each treatment of the victim referring to an accident at work without sending the enterprise must notify within 24 hours in the prescribed form:

- the enterprise where the victim operates;

- the relevant working body of the Executive Directorate of the Social Insurance Fund for Accidents;

- the relevant institution (medical institution) - in the case of acute occupational disease (poisoning).

An employer receiving notice of an accident, except for cases of fatal, group, severe consequences, natural death or disappearance of an employee during work:

- informs about an accident the relevant working body of the Executive Directorate of the State Social Insurance Fund; if the victim is an employee of another enterprise - it is an enterprise; in the case of an accident that has occurred as a result of a fire - relevant state fire protection authorities, and in case of the diagnosis of acute occupational disease (poisoning) - the relevant institutions (institutions) of the state SES;

- forms the commission of an accident investigation company.

A group accident, an accident with a grave or fatal outcome, a death in the enterprise, and also the disappearance of an employee during the performance of his employment duties, the employer is obliged to immediately communicate by means of communication messages in the prescribed form:

- the territorial body of the State Labor Organization;

- the prosecutor's office at the place of an accident;

- the relevant working body of the Executive Directorate of the Social Insurance Fund for Accidents;

- the body to which this enterprise belongs (in case of its absence - to the relevant local state administration);

- appropriate SES in case of acute occupational diseases (poisonings);

- trade union organization, the member of which is the victim;

- to the relevant body for the protection of population and territories from emergencies and other bodies (if necessary).

Such accidents are subject to a special investigation.

Investigation of an accident by an enterprise commission

The composition of the commission created by the employer's order includes:

- the head (specialist) of the labor protection service or an official performing the functions of a specialist in occupational safety (the chairman of this commission);

- the head of the structural unit, in which the case occurred;

- FSNN expert (with his consent);

- a representative of the organization of trade, the member of which is the victim, or an authorized labor collective on labor protection issues, if the victim is not a member of the trade union;

- other persons, based on the circumstances of the accident.

The head of the work, which is directly responsible for the protection of labor in the place where the accident occurred, is not included in the commission.

In the case of the diagnosis of acute occupational disease (poisoning), the commission also includes a medical specialist.

The victim or his authorized representative is not included in the commission but has the right to participate in the investigation.

In the event of an accident with a person who provides himself with work on his own, subject to the voluntary payment of his contributions to the state social insurance against an accident at work, the investigation shall be organized by the relevant working body of the Executive Directorate of the State Social Insurance Fund. The head of the investigation commission is appointed by the representative of the relevant working body of the Executive Directorate of the State Social Insurance Fund, and this commission includes the victim or his authorized representative, the labor protection specialist of the relevant local state administration or executive body of local self-government, the representative of the trade union organization, the member of which is the victim.

The Investigation Commission is required within three days:

- Investigate the place of an accident, question witnesses and those involved in it, and receive an explanation of the victim, if possible;
- to determine the compliance of conditions and labor safety with the requirements of the NSAID;
- to find out the circumstances and the reasons that led to an accident;
- determine whether or not this connection is related to production;
- to identify persons who have violated the NSAID and to develop measures to prevent such accidents;
- to draw up an act of investigation of an accident in the form of H-5 in three copies, as well as an act in the form of H-1 (in the case of an accident involving production) or an act in the form of an NPV (if the accident is not related to production) in six copies and pass it on to the employer's approval;

In the case of an acute occupational disease (poisoning), in addition to an act in the form of H-1, a record of occupational disease (poisoning) in the form of P-5 is also compiled.

To the first copy of the act of investigation in the form of H-5, which is stored in the enterprise, an act in the form of H-1 or NIP, a P-5 form, explanation of the witnesses, the victim, extracts from the operational documentation, schemes, photographs and other documents characterize the state of the workplace (equipment, machinery, equipment, etc.), and, if necessary, also a medical report on the presence of alcohol, poisonous or narcotic substances in the body of the victim.

Two other copies of the act of investigation in the form of H-5 together with the act of the form H-1 (or NIP), an instance of the card P-5 form for three days sent to the victim and to the Social Insurance Fund for Accidents.

In addition, a copy of an act of form H-1 for three days is sent:

- the head of the structural unit of the enterprise where the accident took place, to take measures to prevent such cases;
- the territorial body of the State Labor Organization;
- a trade union organization, the member of which is a victim, or a person authorized by hired employees.

At the request of the victim, the chairman of the commission is obliged to acquaint the victim or his authorized person with the materials of the investigation.

A copy of the act in the form of H-1 is sent to the authority to which the company belongs. In the case of acute occupational disease, a copy of the act in the form of H-1 and a record of acute occupational disease in the form P-5 is also sent to the SES.

Accidents, about which acts in the form of H-1 or NPV are made, are registered and registered by the employer in a special journal. Accident Investigation Acts (Form H-5), acts in the form of H-1 or NPV, together with the investigation materials, are to be stored for 45 years at the enterprise, the employee of which was (was) the victim.

Upon expiration of the period of temporary disability or in case of death of the victim, the employer who takes account of an accident reports on the consequences of an accident in the form of H-2 and sends it to the organizations and officials to whom the act was sent in the form of H-1 in the ten-day period. NIP Notice of the consequences of an accident is necessarily attached to an act in the form of H-1 or NIP and is to be kept with it.

In case of refusal by the employer to draw up or approve the relevant acts or disagreement of the victim with the content of these acts, receipt of complaints or disagreement with the conclusions of the investigation or concealment of an accident, the official of the State Labor Organization has the right to issue a ruling on conducting an investigation (re-investigation), approval or revision of the approved act (H -5, H-1, НПВ), recognition or non-recognition of an accident involving production.

A special investigation of an accident is carried out in the event of a group accident, an accident with a serious or fatal outcome, a death in the enterprise, and also the disappearance of an employee during the performance of his employment duties.

The investigation is conducted by a special investigation commission (special commission), which is appointed by the order of the head of the territorial body of the State Labor Organization in agreement with the authorities whose representatives are members of this commission. The employer (if the employer himself suffered - the authority to which the company owns the management, and in the absence thereof - the relevant local state administration) is obliged to provide proper conditions and facilitate the work of the special commission.

The composition of the special commission includes: an official (inspector) of the State Labor Organization - the chairman of the commission, a representative of the State Social Insurance Fund, a representative of the body to whose management the enterprise belongs, and in the absence thereof - the relevant local state administration or executive body of local self-government, the manager (specialist) labor of the enterprise, representative of the trade union organization, the member of which is the victim, representative of a higher trade union body or an authorized labor collective on labor protection issues, if the victim is not a member of the union, and if the investigation of the detection of acute occupational disease (poisoning) is also relevant specialist SES.

Depending on the specific circumstances (number of dead, nature and possible consequences of the accident, etc.) the special commission may include specialists of

the relevant body for the protection of population and territories from emergencies, representatives of health authorities and other bodies. In special cases, a special commission for investigation of an accident is created by the Cabinet of Ministers of Ukraine.

A special investigation is conducted within 10 business days. If necessary, the term of a special investigation may be extended by the body that appointed the special commission.

According to the results of the investigation an act of special investigation in the form of H-5 is drawn up, as well as other materials provided for in the Investigation Procedure, including a record of occupational disease (poisoning) for each victim in the form P-5, if the accident is connected with the acute occupational disease (poisoning).

A special investigation report is signed by the chairman and all members of the special investigation commission. In case of disagreement with the content of the act, the member of the commission in writing sets out his separate opinion.

The act in the form of H-1 or NIP is drawn up in accordance with an act of special investigation for each victim.

To establish the causes of accidents and to develop measures to prevent such cases, the commission for a special investigation has the right to demand from the employer the establishment of an expert commission involving

her work at the expense of the enterprise of experts - specialists of scientific research, design and other organizations, executive authorities and state supervision of labor protection.

Medical institutions, forensic medical examinations, prosecution and internal affairs bodies, as well as other bodies, are obliged, according to the law, to provide, upon request, officials of the State Labor Organization or the State Social Insurance Fund, which are members of the special investigation commission relevant materials and findings on the accident.

During an investigation, the employer must:

- make photographs of the place of accident, damaged object, equipment, instrument, as well as provide technical documentation and other necessary materials, if necessary;
- to create the proper conditions for the work of the special commission, to provide it with vehicles, communication facilities, office premises;
- to organize in the case of investigation of cases of the detection of acute occupational disease (poisoning) conducting a medical examination of employees of the relevant enterprise section;
- to ensure the necessary laboratory tests and tests, technical calculations and other works;
- to organize printing, reproduction, and registration in the necessary quantity of materials of special investigation.

The employer, whose work the victim is, compensates for expenses related to the activities of the special investigation commission and the specialists involved in its

work. The employer, in the five-day period from the date of signing the act of a special investigation into an accident, or receipt of an order of the official of the State Labor Inspection regarding registration of an accident, is obliged to consider these materials and issue an order on the implementation of the proposed measures to prevent the occurrence of such cases and to bring to justice workers who have violated the legislation on labor protection.

The first copy of the investigation materials remains in the enterprise. The victim or members of his family (the trustee) sends an approved activity in the form of H-1 or NPL, together with a copy of the act of a special accident investigation.

Reporting, information about accidents and analysis of their causes.

The employer, based on the acts of the form H-1, compiles the state statistical reports on the victims in the form approved by the State Statistics Committee, and submits it to the relevant organizations in accordance with the established procedure, and also bears responsibility for its reliability.

The employer is obliged to conduct an analysis of the causes of accidents in the quarter, half year and year and to develop and implement measures to prevent such cases.

Bodies whose sphere of management includes enterprises, local state administrations, executive bodies of local self-government are obliged to analyze the circumstances and causes of accidents on the basis of the results of the six months and a year, to bring the results of this analysis to the attention of enterprises belonging to their management, as well as to develop and to take measures to prevent such cases.

The bodies of state administration, state supervision of labor protection, Social Insurance Fund for Accidents and trade union organizations within their competence check the effectiveness of the prevention of accidents, take measures to identify and eliminate violations. Enterprises, bodies to which the enterprises belong as well as Social Insurance Fund for Accidents keep records of all production-related accidents.

Investigation and registration of occupational diseases and poisonings at work

All cases of chronic occupational diseases and poisonings (hereinafter referred to as "occupational diseases") shall be investigated for the first time.

The occupational nature of the disease is determined by an expert committee composed of specialists of the medical and preventive institution, which is given such a right to the Ministry of Health.

In case of necessity, the expert committee (representatives) of the enterprise, the working body of the Executive Directorate of the State Social Insurance Fund, a trade union organization, the victim of which is a member, is involved in the work of the expert commission.

Classification of a disease to a professional is carried out in accordance with the Procedure for establishing a connection between the disease and the working conditions. The connection of the occupational disease with the worker's conditions of work is determined on the basis of clinical data and sanitary and hygienic characteristics of labor conditions, which is formed by the appropriate institution with

the participation of specialists (representatives) of the enterprise, trade unions and the working body of the Executive Directorate of the State Social Insurance Fund.

The sanitary-hygienic characteristic is issued upon request of the head of the treatment-and-prophylactic institution, which serves the enterprise or a specialist on the occupational pathology of the city (oblast), the head of the department of occupational pathology of the city (oblast) hospital.

If during the preparation of the sanitary and hygienic characteristics of the working conditions the victim was not subject to the factors of the working environment that could cause occupational disease, the account is taken of his previous work related to the effect of adverse production factors.

For each patient clinics of research institutes, departments of occupational diseases of treatment-and-prophylactic establishments a message is made on the form P-3.

Within three days after the final diagnosis is established, the message shall be sent to the employer or the head of the enterprise, the harmful production factors that led to the occurrence of a professional disease, the relevant institution (institution) of the state sanitary and epidemiological service and the treatment and care institution serving the enterprise, to the relevant working body of the executive directorate Social Insurance Fund for Accidents.

The employer will organize an investigation of each case of the detection of an occupational disease within ten working days of receipt of the notice.

Investigation of a case of occupational disease is conducted by the commission consisting of representatives:

- the relevant institution (institution) of the State Sanitary and Epidemiological Service (chairman of the commission);
- medical and preventive institution;
- enterprises;
- a trade union organization, the member of which is a patient; or an authorized labor collective on labor protection if the patient is not a member of the union;
- the relevant working body of the Executive Directorate of the Social Insurance Fund for Accidents.

Representatives of other bodies may be involved in investigations if necessary.

The employer is obligated to submit to the investigation commission the data of laboratory investigations of the harmful factors of the production process, the necessary documentation (technological regulations, requirements, and norms of safety of work, etc.), provide the commission with premises, vehicles and means of communication, organize printing, reproduction and registration in necessary amount of investigation materials.

The Investigation Commission is obliged:

- to draw up a program of investigation of the causes of occupational disease;
- to distribute functions among the members of the commission;
- consider the need to involve experts;
- to investigate the circumstances and causes of occupational disease;

- To draw up an inquiry into the form P-4, in which to indicate measures to prevent the development of occupational disease, to ensure the normalization of working conditions, as well as to identify persons who have not complied with the relevant requirements (rules, hygiene regulations).

An act of investigation of the causes of occupational disease is made up by a commission in six copies within three days of the end of the investigation and is sent by the employer to the patient, the treatment-and-prophylactic institution that serves the enterprise, the working body of the Executive Directorate of the Social Insurance Fund and the trade union organization, the member of which is sick. One copy of the act is sent to the appropriate SES for the analysis and monitoring of the implementation of the measures.

The first copy of the act of investigation remains in the company, which is stored for 45 years.

In case of loss of workability due to occupational disease, the employer sends the victim to the Medical and social expert commission considers the issue of further his ability to work.

6.2. Prevention of occupational injuries and occupational diseases

The initial methodological basis of labor protection as a scientific discipline is the concept of activity. *Activity* is a specific, peculiar to man, a form of active attitude to the outside world. Every activity consists of the purpose, means, result and the actual process of the activity. Activity is a real driving force of social progress and a pledge of society's existence.

In the historical aspect of the development of human labor can be distinguished three basic stages of labor: manual mechanized and automated. These types of work activities vary in size of physical activity and nervous-emotional stress, which affects the physical and mental capabilities of man.

Of importance in terms of the physiology of labor is the study of the occurrence of mental and physiological processes during the work of man, which can be divided into physical and mental.

Physical activity is determined, basically, by the work of the muscles, to which the process of labor intensively enters the blood, ensuring the supply of oxygen and the removal of oxidation products. This is facilitated by the active work of the heart and respiratory organs. At the same time, there is energy consumption.

The intellectual activity of man is determined, mainly, in the labor process of the central nervous system and the senses. In spite of significant differences, a division of labor into physical and mental is very conditional. With the development of science and technology, automation and mechanization of labor processes, the boundary between them are getting closer.

In intense and long-term work, fatigue may occur, the characteristic of which is fatigue. Under fatigue understand the combination of temporary changes in the

physiological and psychological state of man. It is important that fatigue, accumulated, does not go into fatigue, as this may lead to pathological changes in the human body and the development of diseases of the central nervous system.

In accordance with the State sanitary norms and regulations

"Hygienic classification of labor on the indicators of harmfulness and danger factors of the production environment, the severity and intensity of the labor process" (Order of the Ministry of Health of Ukraine as of 08.04.2014 No. 248) physiological peculiarities of the labor process depend on:

- Safety of labor is the state of working conditions, in which the effect of working dangerous and harmful production factors is eliminated (DSTU 2293-99).

- The severity (severity) of labor is a characteristic of the labor process, which reflects the level of total energy consumption, the predominant load on the musculoskeletal system, cardiovascular, respiratory and other systems.

The severity of labor is characterized by the level of total energy consumption of an organism or the physical dynamic load, the weight of the cargo being lifted and displaced, the total number of stereotypical working movements, the magnitude of the static load, working posture and movement in space.

Categories of work on gravity: light, moderate, heavy and very difficult.

- Labor intensity - characteristic of the labor process, reflecting the load mainly on the central nervous system, organs of sensation, the emotional sphere of the worker.

- The indicators characterizing the intensity of work include intellectual, sensory, emotional load, the degree of the monotony of loads, mode of operation.

Conditions and the nature of labor

Based on the principles of the Hygienic Classification, labor or production activities (working conditions) are divided into 4 classes:

Class 1 (optimal working conditions) - conditions under which not only the health of workers is preserved, but also the preconditions for maintaining a high level of disability.

The optimal hygienic standards of production factors are set for the microclimate and indicators of the severity of the labor process. For other factors, for the optimal conditional acceptance of such working conditions, in which the adverse factors of the production environment do not exceed the levels viewed as safe for the population.

Class 2 (acceptable working conditions) - conditions characterized by such levels of factors of the production environment and the labor process that do not exceed the established hygienic standards (and possible changes in the functional state of the organism are restored during the time of the regulated rest or before the beginning of the next change) and should not be unfavorable the impact on the health of workers and their descendants in the near and distant periods.

Class 3 (harmful working conditions) - conditions characterized by such levels of harmful production factors that exceed the hygiene norms and can have an adverse effect on the organism of the worker and/or his descendants.

Class 3 (harmful working conditions) by the level of exceeding hygienic standards and the severity of possible changes in the body of workers is divided into 4 degrees:

1 degree (3.1) - working conditions characterized by such levels of harmful factors in the production environment and the work process that cause functional changes beyond the limits of physiological oscillations (the latter is restored at a longer than the beginning of the next change, the interruption of exposure to harmful factors), and increase the risk of deterioration of health, including the occurrence of occupational diseases;

2nd degree (3.2) - working conditions characterized by such levels of harmful factors in the production environment and labor process, which can cause persistent functional disorders, in most cases lead to an increase in production-related morbidity and the emergence of individual cases of occupational diseases that arise after prolonged exposures;

3 degree (3.3) - working conditions characterized by such levels of harmful factors of the industrial environment and labor process, which, in addition to the growth of chronic morbidity (caused by production and morbidity with a temporary disability), lead to the development of occupational diseases;

4 degree (3.4) - working conditions characterized by such levels of harmful factors of the industrial environment and labor process, which can lead to a significant increase in chronic pathology and levels of incidence with a temporary disability, as well as the development of severe forms of occupational diseases;

Class 4 (hazardous working conditions) - conditions characterized by such levels of harmful factors in the production environment and labor process, the impact of which during the working change (or its part) creates a threat to life, a high risk of acute occupational injuries, including severe forms:

1.2. Particularly harmful working conditions are the state of the working conditions and/or the level of production load, which according to clause 1.1 of this section relate to 3 classes, 3, 4 degrees of harmfulness and 2, 3 degrees of severity (tension).

1.3. A special type of work - work performed with a high level of neuro-emotional and intellectual load, in particular, natural geographic and geological conditions and conditions of increased risk to health.

Hygienic assessment of working conditions by the severity and intensity of the labor process

The severity and tension of the labor process are determined and evaluated according to the indicators given in the annexes 2, 3, 4 to this Hygienic Classification of Labor.

The severity and intensity of work are determined by the main and auxiliary indicators that are specific to a particular workplace.

The main indicators of the severity of work are physical dynamic load, stereotypical working movements, static load, movement in space.

The main indicators of labor intensity are the duration of the concentration of attention or density of signals, the degree of risk to their own lives and the lives of others or the degree of responsibility for the lives of others, the variability when working exclusively in the night shift.

The hygienic estimation of gravity and labor intensity is carried out by adding ratios of measured or calculated indicators to their permissible levels multiplied by the coefficient of the significance of the indicator (1.0 for the main indicators, 0.15 for the auxiliary ones).

The grade and degree of gravity and labor intensity are determined according to the calculated points (the sum of the ratios of the main and auxiliary indicators to their normative levels, multiplied by the corresponding coefficient) according to Appendix 3 to this Hygienic classification of labor.

The highest class and degree by factors of "severity" or "tension" of the labor process - Grade 3, Grade 3 (especially heavy or especially tense work).

“The norms of lifting and moving heavy things by minors are established in accordance with the Limit norms of lifting and moving heavy things by minors”, approved by the order of the Ministry of Health of Ukraine dated March 22, 1996, No. 59, registered with the Ministry of Justice of Ukraine on April 16, 1996, No. 183/1208.

“The list of heavy work and work on harmful and hazardous working conditions, which prohibits the use of minors”, is approved by the order of the Ministry of Health of Ukraine of March 31, 1994, No. 46, registered with the Ministry of Justice of Ukraine on July 28, 1994, under No. 176/385.

The potential or direct threat of harm to the health of workers for a particular nature of work is not a regulated factor in the production environment or labor process. In accordance with the Hygienic Classification, the assessment of the severity of work in the certification of workplaces is carried out according to the following criteria:

- dynamic work:
- static load, kg • s;
- working position (stay in a sloping position, % of the duration changes);
- body tilt (number of times per shift);
- movement in space (km / shift).

Labor tension in the certification of workplaces is assessed by the following factors:

- attention (duration of concentration,%; density of signals in 1 hour);
- the intensity of functions of analyzers (vision, hearing);
- emotional and intellectual tension;
- monotony;
- variability.

Depending on the assessment, that is, the comparison with the criteria of the Hygienic classification of labor or working conditions in terms of gravity and intensity belong to one or another class.

General hygienic assessment of working conditions

1. If in the workplace the actual values of the levels of harmful factors are within the optimal or permissible levels, the working conditions in this workplace meet the hygienic requirements and are classified according to classes 1 or 2.

If the level of at least one factor exceeds the permissible value, then the working conditions at such a workplace (depending on the amount of excess and in accordance with the hygienic criteria of this Hygienic classification of labor) both as a separate factor and in their combined action, can be classified as 1-4 grades of grade 3 hazardous or 4 classes of hazardous working conditions.

2. The attribution of factors to a particular class is determined by the actual measured parameters of the production environment and labor process.

In order to establish a class of working conditions, exceeding the maximum allowable limits, the admissible concentration limits can be installed within one day (change), typical (s) for a particular process.

When atypical or occasional exposure (during certain days, weeks, months), the hygienic assessment of working conditions is performed on the equivalent exposure and/or at the maximum level of the factor depending on the purpose of the research.

3. Hygienic assessment of working conditions taking into account the combined and combined effects of production factors:

- on the basis of the results of measurements, the working conditions for certain factors are estimated in accordance with the Hygienic Labor Classification, which takes into account the effects of summation and potentiating in the combined action of chemical substances, biological factors, different frequency ranges of electromagnetic radiation, etc. Results of hygienic assessment of harmful factors in the production environment and labor process are included in Appendix 5 to this Hygienic classification of labor;

- general hygienic assessment of working conditions by the degree of harmfulness and danger is determined by the highest class and degree of harm.

4. When reducing the time of exposure to harmful factors (time protection), the use of effective personal protective equipment reduces the occupational risk of damage to health, resulting in the conditions of work being assessed as less harmful (according to the Personal protective equipment compliance certificate) but not lower Degree 3.1 Class 3.

5. In difficult cases, the working conditions of employees are assessed taking into account the indicators of occupational disease, functional state of the organism and morbidity according to the records of the medical records of the worker. The results of the previous (periodic) medical (s) review (s) of workers are recorded in the employee's card, which is subject to the preliminary (periodic) medical examination, given in Annex 7 to the Procedure for medical examinations of certain categories of workers, approved by the order of the Ministry of Health of Ukraine from 21 May 2007 No. 246, registered in the Ministry of Justice of Ukraine on July 23, 2007 under No. 846/14113, and forms of primary registration document No. 025 / o "Medical Card of Outpatient Patient No. ___", approved by order of the Minister on February 14, 2012, No. 110,

registered in the Ministry of Justice of Ukraine on the 28th of April, 2012, No. 661/20974.

Complex cases include:

- special forms of organization of work (duration of the change of more than 8 or 9 hours, shift method, etc.);
- work related mainly to displacements and employee impact factors, varying in intensity, time of action and nature;
- work that worsens the functional state of the worker and requires the provision of it with special means of personal protection;
- complex combinations of factors of the production environment and labor process (including the combination of several factors).

6.3. General sanitary and hygienic requirements for enterprises, industrial premises and work organization in the workplace

Placement of the territory of the enterprise. According to the requirements of SN245-71 ("Sanitary norms of industrial designing") and DSN 173-96 ("State sanitary rules of planning and development of settlements") enterprises are placed on the territory of settlements in specially designated industrial areas or outside settlements at a certain distance from them (depending on the release of harmful substances).

The sanitary protection zone is created between the enterprise and the residential area, that is, the territory between the places of release to the atmosphere of industrial hazards and residential or public buildings, the width of which depends on the class of enterprises, industries, and facilities.

Sanitary norms have established five classes of enterprises, industries and objects depending on the capacity of the enterprise, the conditions of the technological process, the nature and amount of emissions into the environment of harmful substances and substances with bad odor, or harmful physical influences, as well as taking into account the planned measures to reduce their adverse effects on the environment.

For the first class, for example, there is powerful production related to the smelting of pig iron, steel, non-ferrous metals, and foundries. To the second class - less powerful metallurgical and casting production, production of lead batteries; to the third class - low-power metallurgical and casting production, cable production, plastics, building materials; up to the fourth class - the production of the metalworking industry and appliances of the electrical industry, and to the fifth class include the manufacture of devices for the electrical industry, building materials, compressed and liquefied air separation products, etc.

Within the sanitary protection zone, it is allowed to place less harmful industrial enterprises, as well as fire depots, sanitary facilities, garages, warehouses, and more. The territory of the sanitary protection zone should be arranged and landscaped.

Industrial enterprises that produce industrial hazards (gases, smoke, soot, dust, odors, and noise) are not allowed to be placed in relation to the residential area with a windward side for winds of predominant direction.

Planning of enterprise territory. General plans of industrial enterprises are developed in accordance with sanitary-hygienic requirements and requirements of safety of work and fire safety. It takes into account factors such as natural ventilation and lighting. The site of the industrial enterprise should have a relatively flat surface and a slope of 0,002% for the runoff of surface waters.

By functional purpose, the site of the enterprise is divided into zones: in front of the factory (outside the fence or the boundary of the enterprise), industrial, utility and warehouse.

The width of the sanitary protection zone, depending on the class of production, is: Class I - 1000 m; Class II - 500 m; III class - 300 m; Class IV - 100 m; V

class - 50 m.

The development of an industrial site can be solid or separate buildings, single-, or multi-story. It is forbidden to build solid buildings with a closed courtyard because in this case the ventilation and natural lighting of buildings deteriorate.

Sanitary gaps between buildings lighted up through window openings are taken at least the highest elevation to the top of the cornice of buildings located opposite.

Production and warehouse facilities can be of any shape and size, due to production requirements, but based on sanitary conditions (lighting, ventilation), the most appropriate buildings are in the form of a rectangle. The construction of industrial buildings, the number of floors and area are determined by technological processes, the category of explosion and fire safety, the presence of harmful and dangerous factors. The central entrance to the territory of the enterprise should be foreseen by the main approach or the entrance of employees.

The territory of the enterprise should have well-organized walking paths (sidewalks) from the central and additional passage points to all buildings and structures. For buildings and structures throughout their length should provide for the entrance of fire vehicles. Electricity, water supply, and sewerage networks are foreseen for buildings.

The area of the enterprise should be greened; the area of these areas should be at least 10% of the area of the enterprise.

Water supply. Depending on the purpose of the building and technology production provides for the system of external and internal water supply. Depending on the requirements of the technological process, such systems of technological water supply are used: recyclable, reuse, cooled, distilled softened water, etc. In order to reduce the flow of water for technological needs, it is necessary to use systems of repeated and circulating water supply.

Devices of drinking water supply (fountains) are recommended to be placed in the passages of industrial premises, lobbies and recreation rooms, outdoor areas of the enterprise and, as an exception, in production workshops. Networks of household and

drinking water supply should be separated from networks supplying non-drinking water.

The rates of water consumption for household needs are 45 liters in hot shops and 25 liters per employee in exchange for ordinary shops.

Sewerage. Sewerage for sewage is divided into productive, household fecal and drainage. Sewer systems consist of receiving devices (trays, sinks), sewage networks, pumping stations, treatment plants and auxiliary devices.

The descent of household fecal and industrial sewage in drainage wells is prohibited, in order to prevent contamination of the aquifers of the soil.

Whenever possible, it is considered expedient to use a reversible water supply system in which contaminated industrial water after purification is again supplied to the needs of technological processes. The descent of untreated industrial wastewater (for example, from the cooling system) is allowed in the drainage sewage system, which is intended for the drainage of atmospheric precipitation.

For many enterprises, desalting of wastewater containing harmful substances, after appropriate treatment, into the city sewage network is allowed, if the concentration of harmful substances in a mixture of sewage of the enterprise and urban sewage does not exceed the established norms.

The organization of work in the workplace is a set of measures that ensure the labor process and the effective use of implements and labor.

A workplace is an area equipped with technical equipment and in which the work of an employee or group of employees takes place.

The organization of work in the workplace is to choose the working position and the system of work movements, to determine the size of the working area and to place in it control bodies, tools, workplaces, materials, devices, etc., as well as in choosing the optimal mode of work and rest.

Workplace properly selected workplace helps to reduce fatigue and maintain a worker's ability to work. The work platform can be free or set.

Free out of work means working alternately sitting and standing. This is the most convenient posture since it allows you to alternate muscle loading and reduce overall fatigue.

The "sitting" seat is most convenient; it can be used for work with small physical effort, with a moderate pace, requiring great accuracy. Outside "standing" is the hardest because it requires the energy to work and to support the body in a vertical or sloping position, which causes rapid fatigue.

The system of working movements. The basic principle when choosing a system of worker movements is the principle of "saving of movements", which contributes to increasing labor productivity and, at the same time, reducing fatigue, the number of errors and injuries.

The principles of "saving motions" are under the following provisions: both hands must start and end the movement simultaneously; hands should not be idle except for periods of rest; hand movements must be performed simultaneously in opposite and symmetric directions; the best is a sequence of actions that contains the

smallest number of elementary movements; hands should be free from all work that can be successfully performed by legs or other parts of the body; if possible, the object of work should be secured with the help of special devices, so that the hands are free to perform operations.

The work should be organized so that the rhythm of work operations is, if possible, clear and natural, and the sequence of movements so that one movement is easy to pass to others. The movement is less tiring if it occurs in a direction that coincides with the direction of gravity. Sharp fluctuations in speed and small breaks in motion should be eliminated.

It is also necessary to take into account a number of provisions on the speed of movement of human hands: where a rapid reaction is required, you should use the movement "to yourself"; the speed from left to right for the right hand is larger than in the opposite direction; rotary motions are 1.5 times faster than translational ones; smoothly curved hand movements faster than straight lines with instantaneous direction change; movements with big swings faster; movements oriented mechanisms, faster than movements, oriented "on the eye"; Movements should be limited by limiter wherever possible.

Also, movements should be avoided whose purpose is to precisely set up manually, for example, the coincidence of two micrometers; free, non-strain movements are performed faster, easier and more accurately than forced movements determined by certain limiters; it is better to perform precise movements by sitting rather than standing. The maximum frequency of hand movements (with bending and unscrewing) - about 80; legs - 45, cases - 30 times per minute, and a finger - 6 times and palms - 3 times per second.

Equipping the workplace. Equipment and equipment of the workplace depend on the work performed (technological operations), on the nature of work (mental, physical, hard, monotone) and on working conditions (comfortable, normal, unfavorable).

In the information field of visual observation, three zones are distinguished: in zone 1, means of displaying information that is used very often and requires accurate and fast reading of information are placed in zone 1; in zone 2 - means of information that are used frequently and require less accurate and fast reading of information; in zone 3 - means of displaying information that is rarely used.

Information equipment and control systems, as well as technological equipment (supporting elements, high-speed clamps, hinged mounting heads, table bins and cassettes with jacks, etc.), should be provided directly at the workplace. additional equipment (work desk, operator seat, footrest, tool cabinet, etc.); vehicles (conveyors, hanging conveyors, etc.); devices for making materials, billets, finished products; signaling devices; safety equipment.

The workplace of the worker (especially the operator) characterizes two fields: the information field (space with the means of displaying information) and the motor field (space with the control bodies and the object of work).

The total length of rest is set as a percentage of the duration of the replacement: in the physical work, it should be 4 ... 20%, when working with nervous tension - 14 ... 25%, and in mental labor - up to 10 ... 12%.

Requirements for production premises. The choice of the type of room is determined by the technological process and the ability to combat noise, vibration and air pollution. Production premises in accordance with the requirements of the applicable standards should be provided with sufficient natural lighting. It is also obligatory to arrange effective environmental and sanitary hygiene indicators of ventilation.

The height of the production premises should be not less than 3,2 m, and the volume and area - 15 m^3 and 4,5 m^2, respectively, for each employee (for users of computers according to DSANPin 3.3.21007-98 "State Sanitary Rules and Norms of Work with visual display terminals of computers "per worker must be at least: an area of 6 m^2 and a volume of 20 m^3).

Places or sections of production with excess heat, as well as significant emissions of harmful gases, steam or dust should usually be placed near the outer walls of buildings, and in multistory buildings - on the upper floors.

The floor in workplaces should be even, warm, dense and resistant to impact, have a non-slip and easy to clean surface; be resistant to the effects of chemicals and not absorb them.

The walls of industrial and residential premises must meet the requirements of noise protection and thermal protection; easy to clean and instantly clean; have a coating that eliminates the possibility of absorption or deposition of toxic substances (ceramic tile, oil paint).

The premises where production with the release of harmful and aggressive substances (acids, alkalis, mercury, benzene, lead compounds, etc.) should be located must have walls, ceilings and structures, made and decorated in such a way that there is no adsorption of these substances and the possibility of purification and washing these surfaces.

In areas with high dust emissions (grinding, sharpening, etc.), cleaning should be provided by means of vacuum cleaners or hydraulic drainage. The color of the interiors of the premises must meet the requirements of technical aesthetics.

Requirements for auxiliary premises and buildings. The auxiliary includes premises and buildings for administrative, sanitary, public catering, health care, cultural services, design bureaus, for educational classes and public organizations.

Auxiliary premises of different purpose should be placed in one building with production premises or annexes to them in places with the least influence of harmful factors, and if such placement is impossible, then they can be placed in separate buildings.

The height of the floors of individual buildings, annexes or entrances must be not less than 3.3 m, the height from floor to floor of the ceiling is 2.2 m, and in places of irregular people, displacement is 1.8 m. The height of the auxiliary premises located in industrial buildings must be not less than 2.4 m.

The area of auxiliary premises should be not less than 4 m^2 for one workplace in the room of offices and 6 m^2 - in the design bureau; 0.9 m^2 for one place in the conference room; 0,27 m^2 per employee in lobbies and dressing rooms.

The group of sanitary facilities includes walk-in closets, showers, toilets, rooms for washing and smoking, decontamination rooms, drying and dusting of work clothes, women's personal hygiene facilities and infant feeding, facilities for the heating of workers. In sanitary facilities, floors should be moisture-resistant, with a non-slip surface, light tones, walls, and partitions - lined with moisture-resistant, light tone materials to a height of 1.8 m. In wardrobe rooms for storing clothes should be cabinets in size: height 1650 mm, width 250 ... 400 mm, depth 300 mm. The number of cabinets must correspond to the number of employees.

Technical aesthetics of industrial premises. It has been scientifically established that the color of surrounding objects and subject groups affect emotions (positive or negative), that is, on the mood of people: some colors are calming, others - irritating, excite.

So, for example, the red color is exciting, hot and energetic. The yellow color is also perceived as hot; it heats up, invigorates and stimulates active activity. Yellow - warm, cheerful, attracts good mood. Green - the color of rest and freshness calms the nervous system, in combination with the yellow gets soft tones and positively affects the mood. Blue and blue colors are reminiscent of distances, water, cold, they are fresh and transparent, seem light and airy, with their action decreases physical activity, they can regulate the rhythm of breathing, calm the pulse. White - cold, monotonous; capable of causing apathy. Black is gloomy and heavy, dramatically worsens the mood. Gray - business, sad, gloomy, in industrial conditions it is not recommended to use it.

Therefore, the general scheme of using color or group of colors to reduce the employee's fatigue is as follows: if the production process or environmental factors affect workers' excitement, soothing colors should be used, and if workers have any depressing factors, then they must be opposed to the excitement color environment.

Design of color solutions for the interior of industrial premises should be performed in accordance with CH 181-70 ("Guidelines for the design of color furnish of interiors of industrial buildings of industrial enterprises"). For work that requires concentration, it is advisable to choose non-vivid, slightly contrasting shades that would not disperse attention, and at work that requires intense physical or mental stress, the shades of warm colors that stimulate activity are recommended.

This design of interiors of industrial premises helps to neutralize the tedious influence of the production process and relieve the feeling of tiredness and, with the rest, increase the efficiency and reduce injuries.

Theme. Quantitative and qualitative hazard assessment.
Practical class №.1. Statistical evaluation of dangerous and harmful factors for human life

Objective. To become familiar with the general concepts of risk - quantitative assessment of risks; learn to identify the different types, levels and categories of risk, as well as statistical evaluation of dangerous and harmful factors for human life.

Task:

1. Defining the types, levels, various categories of risk situations (part 1).

2. Statistical evaluation of dangerous and harmful factors for human life (part 2).

Part 1.

General provisions

1.1.General assessment and characteristics of hazards

The result of a display of the dangers are the accidents, disasters. They are accompanied by deaths, reduced life expectancy, damage to human health or the environment, etc.

Consequences or quantification of damages, caused by the danger, depend on many factors, such as the number of people, located in the danger zone, the quantity and quality of material values placed there, natural resources, perspective areas, etc.

In order to standardize any consequences are defined as damage. Each individual kind of damage has its own quantitative determination. For example, the number of dead, wounded or diseased, the area of infected territory, the area of forest that had burned, the cost of destroyed buildings, etc. The most versatile method of quantitative determination of an injury is valuable; hence, its establishment in monetary equivalent.

Another, not less important characteristic of a danger, more specifically, the level of possible hazard, is the frequency with which it can occur, or the **risk**:

Risk (R) is defined as the ratio of the number of events with undesirable consequences (n) to the maximum of their number (N) for a specific period of time

$$R = \frac{n}{N}$$

The given formula allows you to calculate the size of the total and group risk. While assessing the ***total risk,*** value N determines the maximum number of the events, and while assessing ***group risk*** **-** the maximum number of events in a particular group, selected from the total number according to a particular feature. In particular, the group

may include people belonging to the same profession, age and sex; group can comprise of vehicles of the same type; one class of economic activity [1].

Tasks for independent work.

Example 1: *The town is a residence to 35 thousand of people. There operates a chemical plant, which employs 3,000 people. An accident occurred - 67 people wounded; 5 - died; poisoned by the chemical vapor 140 residents. Calculate the total and the group risk of the affected people.*

Example 2. *In the farm, which owns 800 hectares of forest, a fire occured. 45 hectares of forest were burned. Calculate the total and group risk of the occurred event. (Total forest area in Ukraine - 9.6 million ha; in the Kyiv region - 800 thousand ha).*

1.2. Levels and categories of hazards

To determine the seriousness of the hazards, there are different criteria. Categories of the hazards' seriousness presented in Table 1.1, establish a quantitative value of the relative seriousness of the possible consequences of hazardous conditions. The application of categories of the hazards' is very useful for determining the relative importance of taking preventive measures to ensure life safety. For example, a situation, belonging to the category I (catastrophic hazard), requires more attention than those, categorized IV (minor hazard).

1.1. Criteria for hazards' seriousness

Type of hazard	Category	Description of an accident
Catastrophic	I	Death or destruction of the system
Critical	II	Serious injury, sustained disease
Limited	III	Minor trauma, shorttime disease
Insignificant	IV	Less significant injuries, disease than those categorized III

1.2. Levels of hazard probability

Type	Level	Description of the consequences
Frequent	A	High chances are that the event will be held
Probable	B	It may happen several times during a lifetime
Probable	C	Sometimes it can occur during a lifetime
Remoted	D	It is an unlikely, but possible event
Impossible	E	So much unlikely that it can be assumed that the hazard will never occur

The levels of hazard probability is a qualitative reflection of the relative probability that undesired event, which is a result of uneliminated or uncontrollable hazard. Based on the high probability of hazard of any system, we can come to a conclusion concerning specific types of activity. Therefore, using both methodologies for determining the likelihood and seriousness of the hazard, the hazards can be determined, assigned to a certain class and solved, as based on the seriousness of the hazards' potentially possible consequences, if any occur.

1.3. The concept of reasonable (acceptable) risk

According to the degree of risk acceptability is rejected, affordable, maximum allowable and excessive.

1. Rejected risk level is so small that it is within the tolerance of the natural (background) level.

2. An acceptable risk is considered the one that society can accept (allow, permit), including technical, economic and social opportunities at this stage of development.

3. Maximum allowable risk is a maximum risk, which should not be exceeded despite the expected result.

4. Excessive risk is characterized by exceptionally high level, which in most cases leads to negative consequences. Rejected risk today is also impossible to be provided due to the lack of technical and economic prerequisites for this. Therefore, modern life safety concept is based on achieving a reasonable (acceptable) risk.

It is easy to see that a serious hazard may be acceptable if its probability is very low, as well as the probable event can be proved that its result is insignificant. These considerations give reasons to believe that the probability of the hazard risk is inversely proportional to its seriousness.

1.3. Risk Assessment Matrix

The frequency with which an event occurs	Hazard category			
	I. Catastrophic	II. Critical	III. Limited	IV. Insignificant
(A) Often	1A	2A	3A	4A
(B) Probably	1B	2B	3B	4B
(C) From time to time	1C	2C	3C	4C
(D) Remoted	1D	2D	3D	4D
(E) Impossible	1E	2E	3E	4E
Hazard risk index				

Risk classification	Risk criteria
1A, 1B, 1C,2A, 2B, 3A	Unacceptable (excessive)
1D, 2C, 2D, 3B, 3C	Undesirable (the maximum allowable)
1E, 2E, 3D, 3E, 4A, 4B	The permissible with verification (acceptable)
4C, 4D, 4E	The permissible without verification (neglected)

Table 1.3 shows an example of the hazard risk matrix, which includes elements of tables 1.1 and 1.2 in order to provide an effective tool for approximating the acceptable and unacceptable levels of risk or probability for each category of seriousness and probability, to deeper classify and assess the risk according to its degree. The use of this matrix facilitates the assessment of risk.

Tasks for independent work.

Example 1. *Carbon monoxide caused three people poisoned. Owing to the timely assistance provided people could be rescued. Determine the category of seriousness of hazard.*

Example 2. *The collision of aircrafts in the air. Identify classification and and criteria for this event accrding to the hazards risk.*

Example 3. *Define the risk level of person's crossing the road on a red light.*

Example 4. *Identify risk from lightning hitting a person.*

Example 5*. Car accident on the road. 2 people died, 3 injured. Calculate the total and group risk and identify the classification and criteria of the event according to the hazards risk index (based on the statistics, in 2010 4,7 thousand people died, 40 thousand were injured on the roads of Ukraine).*

Example 6. *Calculate the numerical value of the total risk of household accidents with fatal consequences. According to the statistics, in 2010 73111 people died in the domestic sphere in Ukraine. Identify classification and criteria of this dangerous situation according to the hazards risk index.*

Part 2

Task. On the basis of sociological approach, conduct statistical evaluation of hazards to human life, using a point scale system.

Students are offered to assess the hazard to a life of a resident of Ukraine of 35 factors listed in Table 1.4, according to the following scale: the most dangerous factor (according to the students' opinion) is estimated at 35 points, and then 34, 33, 32 and until the last one, which is considered the least dangerous – 1 point.

Of course, having unequal life experiences, students assess the hazard of a factor differently; hence, the obtained results should be statistically processed. Each factor is calculated with the number of points provided by the students, that amount is divided by the number of students surveyed and the obtained value is the average rating of a danger factor: the higher it is, the more dangerous the factor is. Central hazard assessment of j- factor of Śi is defined by the formula

$$\acute{S}_{ij} = \sum_{i=1}^{n} S_i / n ,$$

Where Si j are individual assessments of the students for j factor, n - the number of students surveyed. If we assume that the factors listed include all dhazards to a human life, we can also assess the relative proportion (percentage) of each factor qj in the total number of undesirable consequences according to the formula

$$q_j = \frac{S_{ij}}{630} \times 100 = \frac{\acute{S}_i}{6{,}30}, \%$$

The results are put in Table 1.4.

1.4. Statistical evaluation of hazards and harmful factors for human life

№	Factors	Individual assessment, Si	The average assessment, Sij	The relative share qj
1	2	3	4	5
1	Air transport			
2	Automobile transport			
3	Nuclear energy			
4	Unemployment			
5	Consumption of alcoholic drinks			
6	Industrial injuries			
7	The use of low-quality food			
8	Lack of necessary food products			
9	Killings and intentional injury			

Continuation of the table 1.4

1	2	3	4	5
10	Ponds (swimming, rest)			
11	Diagnostic radiation			
12	Electric current			
13	Railway transport			
14	Infections			
15	Smoking			
16	Medicines			
17	Narcotic substances			
18	National conflicts			
19	The presence of radioactive substances in the air, water, soil			
20	The presence of radioactive substances in food products			
21	The presence of chemicals in air, water, soil			
22	The presence of chemicals in food products			
23	Domestic injury			
24	Increase of prices			
25	Fires			
26	Suicide			
27	AIDS			
28	Sports and mass events			
29	Natural disasters			
30	Personal issues and concerns			
31	Terrorism			
32	Food poisoning			
33	Surgery			
34	Diseases associated with the presence of radioactive substances in the environment			
35	Diseases associated with the presence of chemicals in the environment			

To sum up, we note that the accuracy of this assessment increases with the number of respondents, depending on occupation, age and gender of the person.

Forecast of possible increase of life expectancy under the conditions of elimination of certain causes of death makes it possible to identify the most dangerous factors for life. According to the forecast of scientists, the elimination of the key cardio - vascular and renal diseases will increase life expectancy to 10.9 years, heart disease - 5.9 years, malignancies - 2.3 years, accidents (excluding automobile accidents) - 0.6 years, automobile accidents - 0.6 years, infectious diseases - 0.2 years, tuberculosis - 0.1 years.

It is important to note that the awareness of the existence of dangerous and harmful factors for human life is only the first step to a secure life. It is necessary to establish the conditions under which these factors cause unwanted effects and avert the possibility of these conditions.

QUESTIONS:

1. Identify and classify dangerous factors.
2. What are subgroups of physical factors of danger?
3. What are the factors of chemical hazards?
4. Describe the biological factors of danger.
5. Provide the classification of physiological factors of danger.
6. What is the risk in the life safety?
7. What is concluded quantitative risk assessment?
8. What is the axiom of danger?
9. What are the types of risk?
10. Name the kinds of environmental risk.
11. What methods of risk used in medical and environmental research?
12. Provide a definition of anthropogenic risk.
13. What is social risk?
14. What is social risk calculation?
15. Name the signs of structuring social risk.
16. What is a subjective risk?
17. What are the types of compensation acceptability of risk?
18. What are the qualitative characteristics of risk?
19. What is the statistical evaluation of hazards?
20. What is Noise?
22. What are the main characteristics of the work with the PC?
23. Name the preventive measures when working with PC.

7. THE NATURAL ENVIRONMENT OF HUMAN LIFE

Man as a natural being is a part of the environment – a source of resources for sustaining life. Its safety depends on the conditions in which it interacts with the nature.

The components of human environment. Biosphere covers part of the atmosphere, hydrosphere, and upper part of lithosphere interconnected by complex biogeochemical cycles of migration of matter and energy.

Atmosphere. It is a gaseous envelope of the Earth, which rotates along with it. The atmosphere consists of nitrogen (70%), oxygen (21%) and inert gases (2%).

According to the nature of changes as to the various parameters the Earth's atmosphere is divided into the following layers: the troposphere (9-18km), where the air is fit to breathe; stratosphere (50-55km), where the air is thin and the temperature at the bottom is 55°C, in the upper – 0°C; mesosphere (80-90 km), where the temperature decreases and reaches – 80-90°C; thermosphere (90 to 800-1,000km), where the temperature rises up to 1000°C, and the exosphere (above 800-1,000 km), where the air is extremely thin.

The main constituents of air, affecting the livelihoods of people are:

1) atmospheric oxygen (O2) required for breathing of humans, animals, most plants and microorganisms. The source of its creation is a green plant photosynthesis (up to 70 billion tons of oxygen within the year). Approximately 80% of marine phytoplankton produces oxygen, 20% – by the ground vegetation. Oxygen is also formed from water vapor which in the upper layers of the atmosphere decomposes into H^+ and O^- by the impact of UV radiation;

2) carbon dioxide, which is a mandatory component of photosynthesis of plants. It enters the atmosphere from volcanic eruptions, decomposition of organic substances, respiration of living organisms, vapors from the ocean surface;

3) water vapor. Its content in the atmosphere is defined by the processes of evaporation, condensation and horizontal transfer. On the surface of the vapor concentration is usually between 0,1-0,2% in the polar latitudes, up to 3% - in the equatorial latitudes. Water vapor is the source of the formation of clouds, fog, rain, and along with carbon dioxide (CO^2) it protects Earth's surface from excessive cooling, ensuring the greenhouse effect. If there were no atmosphere, the average surface temperature would be 23°C and not +15°C.

The atmosphere regulates the heat transmission between the Earth and the outer space, affects its radiation and water balances.

Hydrosphere. It is a water shell of the Earth. The above-ground part of the hydrosphere, which covers 70% of the Earth includes the oceans, seas, lakes, rivers

and glaciers, where water is in the solid form. The high polarity of water molecules causes strong ability to dissolve other substances, namely polar ones (salts). Therefore, chemically pure water does not exist in the nature. Depending on the amount of dissolved substances natural waters are divided into: fresh (1g of salt per 1 liter of water); brackish (salt 1 to 25g of salt per 1 liter of water); salt (25 to 50g of salt per 1 liter of water); brines (over 50g of salt per 1 liter of water).

Lithosphere. It is the outer solid shell of the Earth, which covers part of the crust and upper mantle and is composed of sedimentary, igneous and metamorphic rocks. The lithosphere includes all mineral resources and is one of the main subjects of human activity. Soil is located in the upper part of the continental crust. Current geographical processes (landslides, mudflows, erosion, etc.) that impact on the environment in different regions are periodically occurring within the lithosphere.

Biosphere. It is the shell of the Earth formed by the living organisms or a set of creatures that inhabit Earth, area of organic life which covers the sphere of interaction between the atmosphere, lithosphere and hydrosphere.

Modern interpretation of biosphere suggested by V.Vernadsky: "Biosphere is the shell of life, region of existence of the living substances."

The most important function of the biosphere lies in maintaining a stable life. A fundamental condition for this function is physiological variability of the living organisms.

*Hygienic characteristic of the environment factors***.** Hygienically significant environmental factors include radiation, air, fresh water, soils.

Solar radiation. It affects all the physiological processes in the body, altering metabolism, overall tone and working capacity. Under the influence of ultraviolet rays biologically active substances that stimulate the body's physiological processes are produced in the body.

Lack of sunlight is often revealed through the malfunctioning of physiological balance in the body and the development of pathological phenomena – solar or light ("UV") strike. The body of a child that is growing suffers a lot from the lack of sunlight, because of vitamin D shortage producing, leading to the development of rickets. Sunlight has a positive effect on emotional interaction, psychophysical, anti rickets, immunological effect, increases body resistance to external conditions, accelerates the self-purification processes that occur in the air.

Upon the influence of UV-radiation are the enzymatic processes, formation and absorption of physiologically active substances (including vitamin D) are enhanced, metabolism normalizes, immune reactivity, tone of the nervous and muscular systems increases.

Visible light (waveband ranges from 400 to 760nm) has generally a biological effect. Although the physiological level of the eye sight is individual, it always depends on the intensity of natural light, hence, its suitable amount in the rooms is hygienically important. The greatest labor productivity, including mental, causes sufficient natural (not artificial) lighting. The appropriate hygiene standards are set according to the physiological characteristics of visual function. Light also affects the functional state of the central nervous system.

Infrared radiation with the wavelengths from 760 to 25000nm is the only thermal effects, which is largely determined by the absorption of the radiation by skin. The smaller the wavelength, the more radiation penetrates the tissue. The specific reaction upon high intensity of the infrared radiation sunstroke caused by overheating of the cerebral cortex of the brain may occur.

Air. Its hygienic role is determined by the properties such as temperature, humidity, velocity, pressure, electric, chemical and bacteriological composition, the presence of aerosols.

The temperature significantly affects the life processes through changing the speed of biochemical reactions. According to Van't Hoff equation, the rate of all chemical reactions increases with the increasing temperature. To maintain thermal homeostasis a person uses the mechanism of thermoregulation, providing a stable body temperature upon significant fluctuations in the air temperature.

The body receives warmth as a result of metabolism (oxidation of nutrients) and release of heat during exercising as well as from the surrounding objects (hot air, hot food, solar radiation). The intensity of metabolism is crucial in the accumulation of heat in the body.

Humidity also affects the heat transfer of the body. A degree of saturation of the air with water vapor, ie relative humidity also bears a hygienic value. High relative humidity (over 90%) slows the evaporation of sweat and , upon high temperatures, may contribute to overheating. The optimal humidity ranges between 40-60%.

With the increase of *air velocity* the efficiency of heat through convection and sweating increases, subsequently, a man goes through low temperature state easier upon calm weather. Strong wind invades the respiratory rate and the long one may even depress a person.

Electric air condition is characterized by the ionization of air, the presence of electric and magnetic fields of the Earth and natural radioactivity.

Gazes of the air have different meanings for living substances on the Earth. Reduction of the amount of oxygen in the air to 14% is critical, to 8% - incompatible with life. Increasing the oxygen amount in the air (over 28%) leads to the

development of pathological processes in the body, including the reduction of lung capacity and pneumonia.

Nitrogen and inert gases are indifferent to living organisms, and to solar radiation. However, increase of nitrogen to 93% is lethal due to the reduced oxygen content. Air nitrogen is absorbed by only certain bacteria of soil and blue-green algae.

Water. Its physiological significance for humans is preconditioned by the fact that it is a part of all body tissues: from the tooth enamel containing 0.2% and the vitreous (99%). On average, the water content in the body reaches 60-70%, loss of its third part may be lethal. Water is a major part of the blood, secretions and excreta of the body. One of its significant functions is the transportation function: the delivery of nutrients to the cells and detoxification and toxic substances from the body through sweat, urine and saliva. Water plays an important role in thermoregulation of the body by evaporation of sweat.

Natural threats and the nature of their symptoms and effects on humans, animals, plants, objects economy. Emergency situations of the natural origin in Ukraine are divided into geological, meteorological, hydrological, natural fires. Their occurrence is fostered by the geographical features, atmospheric processes, the presence of mountains, proximity to the warm seas, etc. Natural disasters are caused by a variety of climatic conditions, from excessive moisture in the western Polissya to dry one in the southern steppe zone. Exceptional climatic conditions also exist in the southern coast of Crimea, in the mountains of the Ukrainian Carpathians and Crimea.

Typically, the natural phenomenon are caused by endogenous and exogenous hydrometeorological factors.

Natural disasters are classified as simple, with one element (e.g., strong wind, landslide, earthquake) and the complex ones formed by several processes (negative atmospheric and geodynamic processes exogenous, endogenous and exogenous meteorological processes combined with man-made ones).

Geologically hazardous phenomena. These include earthquakes, volcanoes, mud flows, landslides, avalanches, debris, erosion, etc.

Hydrological dangerous phenomenon. These are dangerous rises and falls of the sea level, flooding (in the river basins), mud flows (in the Carpathian and Crimean mountains), oligohydramnios.

Theme. Natural hazards.

Practical class №2. Determining the level of human meteosensitivity

Objective. Learn how to define the level of influence of the weather on human activity and get acquainted with the activities and means of prevention of meteotropic reactions.

Tasks:

1. Learn basic information about the dependence of state of health and working capacity on the weather and meteorological factors.
2. Define the level of weather pathogenicity and its irritant effect, assess the impact of complex weather and meteorological factors on the human organism (task 1).
3. Provide assessment of the own meteosensitivity (task 2).
4. Define individual meteosensitivity (task 3).
5. Analyze findings and give recommendations for prevention meteotropic reactions.

Terms

1. Dependence of state of health and working capacity on the weather and meteorological factors.

The weather is a physical state of the atmosphere that occurs under the influence of solar radiation and circulation processes in the atmosphere and the underlying surface. The weather is a holistic formation of the nature, complex interaction of the weather and meteorological factors.

The weather and meteorological factors include temperature, atmospheric pressure, humidity, cloud amount, precipitations, wind, as well as electric state of the atmosphere. A special place is given to the changes of the electromagnetic field of the Earth - magnetic storms.

In addition, an important role in shaping the weather is played by the circulation processes in the atmosphere arising with a temperature difference of the Earth's surface at different latitudes, and among continents and oceans. The temperature difference in high and low troposphere layers and Earth's rotation that deflects airstream are reflected on the weather and are of great importance.

Airstreams interact while moving,. Limits of distribution of air masses, especially where there are changes in the weather factors, called fronts. There are arctic, polar and tropical fronts. There are also cold fronts, warm and occluded front. Front occlusion is a complex front, which is formed by closing of the cold and warm fronts.

The frontal activity is related to non-periodic variability of the daily temperatures, cloudy and rainy days prevail. The electrical properties of the

atmosphere also change. The front zone with low pressure is called cyclone. Zone with the increased pressure is anticyclone. All these weather phenomena can cause dramatic changes in the human organism.

The nature of the impact on a human is classified by the reactions to the weather and meteorological factors that occur in the body. Depending on favorable or unfavorable effects on the human organism the weather from zero (completely comfortable weather) to a five-point (extremely uncomfortable) are distinguished.

Comfortable type of the weather is between 4 to 36%, and unfavorable from 32 to 48% of the number of days in a year.

Now the connection between fluctuations of the weather conditions and the emergence of adverse reactions of the organism up to serious illnesses and death, the influence of the weather on mental and physical capacity is proven.

Adverse weather effect on the human organism is assessed on the grounds of the following indicators: the level of pathogenic effect of the weather, the effect that causes disruption of the normal human condition is set on the basis of the general pathogenicity index forecast. It is defined as the sum of the components of the pathogenicity indices for individual indicators:

$$J = i_t + i_h + i_v + i_{\Delta p} + i_{\Delta t},$$

J – the general index of pathogenicity; i_t – pathogenicity index of the temperature; i_h – pathogenicity index of humidity; i_v – pathogenicity index of wind speed; $i_{\Delta p}$ – pathogenicity index of the changes in the atmospheric pressure; $i_{\Delta t}$ – pathogenicity index of the changes in the air temperature.

Components of the pathogenicity indices are calculated by the following formulas.

Pathogenicity index of the temperature:

$$i_t = 0{,}2\,(18 - t)^2 \text{ with } t \le 18°,$$

$$i_t = 0{,}2\,(t - 18)^2 \text{ with } t \ge 18°,$$

t – the average daily temperature in °C.

Pathogenicity index of the humidity:

$$i_h = \frac{10 \times (h - 70)}{20} \text{ with } i_h \ge 70,$$

$$i_h = \frac{10 \times (70 - h)}{20} \text{ with } i_h \le 70$$

h – the average daily humidity in %.

Pathogenicity index of the wind speed: $i_v = 0{,}2 \times v^2$,

v – the average daily wind speed in m/s.

Pathogenicity index of the changes in the atmospheric pressure: $i_{\Delta p} = 0{,}06\,(\Delta p)^2$,

$_{\Delta}p$ – inter-day average daily change of the atmospheric pressure in mm of the mercury column/day.

Pathogenicity index of the air temperature: $i_{\Delta t} = 0{,}3\ (_{\Delta}t)^2$,

$_{\Delta}t$ – inter-day change of the average air temperature in °C / day

The pathogenic effect of the weather is classified on a scale (tab. 2.1)

2.1. Scale of the weather pathogenicity

Value J	Assessment of the weather pathogenicity
0 – 9	Optimal
10 – 24	Irritant
25 and more	Acute

The degree of the weather irritant effect is established from the interrelation:

$$R = 0{,}6 \times J,$$

R – degree of the weather irritant effect; J – general index of pathogenicity.

To assess the complex effect of the weather and meteorological factors on the human organism using the coefficient of the weather severity (S).

The coefficient of the weather severity is calculated by the formula:

$$S = (1 - 0{,}006\ t\ )\ (1 + 0{,}272\ v\ )\ \text{Kv Ka}.$$

S – severity of the weather for the day, points*; t* - the average daily temperature,°C;

Kv – relative humidity coefficient, which is 0,9 for humidity less than 60; 0,95 for 61-70%; 1,0 - to 71-81%; 1,05 - to 1,1% and 81-90 - for humidity greater than 90%;

Ka – coefficient, taking into account the role of daily variability of the temperature; it equals, in case of variability to 4°C - 0.85, from 4,1°C to 6°C - 0,90, from 6,1°C to 8°C - 0,95, from 8.1 to 10°C - 1 00, from 10,1°C to 12°C - 1,05, from 12,1°C to 14°C - 1,1, from 14,1°C to 16°C - 1,15, from 16,1°C - 18°C - 1.20;

v – the average daily wind speed, m/s.

The higher the coefficient of the severity of the weather S, the more significant the defection of physiological systems, the stronger the influence of weather and meteorological factors on the human organism.

2. Meteosensitivity of the human and methods of its determination

The weather and meteorological factors affect the organism not by the separate elements, but by the totality of their properties, their effect is not total, but integrated.

The main factors that contribute to the occurrence of different reactions of the organism to the change of the weather conditions, are the human susceptibility to the weather irritants or meteosensitivity.

Meteosensitivity is both common and the most essential for the organism to coordinate physiological property of their vital functions with the rhythms of the biosphere. The response of the human organism to the change of the weather and meteorological factors is a normal physiological response aimed at improving the living material, to support harmony with the world, which is constantly updating.

Pathological reaction of the organism to the changing weather should be distinguished from a physiological meteosensitivity. Pathological response called “metedependance” or “meteopathy”. It may be hereditary (passed from parents to children), and can occur as a result of the great exhaustion, illness, in stress situations, where adaptive reserves of the principal life supporting systems do not have time to prepare the organism to extreme weather situations. Such disharmony with nature at each new outbreak of the weather changes can grow and become one of the main mechanisms for the formation of chronic pathologies.

Meteopathic response are felt subjectively and objectively by the organism, which is displayed by the poor health state, headache, insomnia, increase or decrease of blood pressure, spasms of the coronary and cerebral vessels, in the mental discomfort, worsening of metabolic, immunological and other processes.

Meteopathic reactions of the organism can be joined into the following groups:

1) rheumatoid are displayed by the muscle pain, general fatigue, inflammatory phenomena in peripheral nerves, etc.

2) cardiac are displayed by the pain in the heart, cardiac arrhythmias, etc.

3) catarrhal are displayed by the disorders of the gastrointestinal tract;

4) cerebral are characterized by the increased irritability, general excitement, insomnia, headaches, head congestion, nosebleeds, breathing disorder, negative emotional state, etc.

Meteotropic reactions most often occur in sick people. But about 40% of the healthy people also feel, dependending on changes in weather and meteorological factors. This dependence 20% of them notice in their close relatives, which may indicate a hereditary mechanism of meteosensitivity. In addition, meteosensitivity of the cities residents is in 1.5 - 2 times higher than that of rural residents. This is due to

the fact that city residents are less adapted to fluctuating velocity and air temperature, humidity and other meteorogical factors.

The degree of display of meteopatic reactions are divided into three groups:

1 – weakly expressed reactions, mainly characterized by the subjective symptoms without intoxication;

2 - medium expressed reactions: the objective symptoms of intoxication include fever within 3 - 5 days;

3 – strongly expressed reactions that occur in hypertensive crises, angina attacks, astma-like state, etc.

Reaction of the organism to the effect of the weather and meteorological factors caused by the changes in the state of the autonomic nervous system. To assess its functional status the vegetative Kérdö index is used. It is derived from the pressure and heart rate and is calculated by the formula:

$$K=\{\frac{1-d}{p}\}\times 100\%,$$

d – systolic blood pressure, mm of the mercury column; p – heart rate, beats per minute.

Normally, the ratio d/p ≈ 1 and vegetative index is close to zero. In case of the benefit of parasympathetic tone of the autonomic nervous system, the index has a negative value. If the sympathetic tone of the autonomic nervous system benefits it is positive. The greater the deviation, the more expressed is the benefit of one of the parts of the autonomic nervous system and, hence, the greater meteosensitivity is.

3. Recommendations for the prevention of meteotropic reactions

In the development meteotropic reactions the important role is played by the central nervous system. It was found that the most complete human adaptation to the effect of the weather factors is displayed at a higher functional activity of the right hemisphere of the brain. This hemisphere is responsible for the formation of emotions. It dominates in controlling the aggressive behavior.

It is the understanding of the role of the right hemisphere of the brain in the development of adaptive responses to changing weather conditions, which is based on a number of advice-based prevention meteotropic reactions, primarily in the psycho-emotional sphere.

It is recommended on the eve of the predicted adverse weather condition to be involved into any kind of creativity, like drawing, displaying with bright colorsof the sunny morning, flowers, wood, etc. The drawing has to include as much colorful tones as possible. No matter if the picture will not be an artistic masterpiece.

The same effect on the function of the right hemisphere of the brain, as painting does, have the invented by professor A.P. Churikov with his employees rose-colored

glasses. They are named the FILAT glasses. They combine simultaneous use of bright lights and filters with certain physical characteristics. With the help of these glasses the mood may improve, the pace of thinking may increase, to calm down, to adjust to sleep disorders. Their use by the meteodependent persons caused positive effect in 80% of the patients.

Thus, the most important during the critical weather conditions is the removal of the emotional stress. This can prevent hypertensive crises, angina attacks, reduce the risk of strokes, reduce the number of suicides. Along with the above-mentioned it is possible to use methods of emotional discharge: autogenous training and meditation.

For many people phototherapy may be useful. Its action lies in enhancing of the brain with bright white or dull red lights. This method was suggested by the experts of the National Institute of Mental Health of the USA. The best effect this method brings to the individuals tend to eat a lot of carbohydrate foods in the afternoon. Therefore it is recommended not to begrudge light at work in cloudy days and at night. Light can replace the use of the drug melatonin or vitamin B12. However, the use of these preparations is dangerous because it can disrupt the circadian biorhythm of an individual.

Another preventive measure is a balanced diet. Meteosensitive people are recommended to supplement the diet with foods rich in antioxidants, i.e. substances that inhibit the oxidation of fats. The natural antioxidants include fresh oils, cheese, chokeberry, germinated oats, fresh vegetables, etc. At the same time the diet excludes fried foods, alcohol. In addition, the diet is recommended to be shifted to protein and fat type, and during dangerous days the caloric diet should be significantly reduced.

This group of preventive measures includes complex treatment with the preparations that have antioxidant properties. After a month of treatment meteotropic reactions do not occur within six months in 80% of patients.

Task 1. Determine the level of weather pathogenicity and its irritant effect, assess the impact of complex the weather and meteorological factors on the human organism.

The work must be performed in the following order.

1. Fill in the table 2.2 with the data on the weather and meteorological factors that the teacher reads.

2.2. Weather and meteorological factors

Factor's title	Factor's Measurement								
	For the previous day _____(date)			Average daily	On the day of the experiment _____ (date)			Average daily	Inter-daily difference
	Measurements				Measurements				
	1	2	3		1	2	3		
Temperature ^{0}C									
Wind speed, m / s									-
Humidity, mm									-
Atmospheric pressure, mm of mercury									

2. Calculate the measurement of the average daily temperature, humidity, wind speed, atmospheric pressure.

3. Calculate the measurement between the daily changes in the atmospheric pressure and temperature.

4. Calculate the components of the pathogenicity indices of temperature, humidity, wind speed, atmospheric pressure changes and temperature changes according to the formulas.

5. Calculate, on the basis of the constituents of the pathogenicity index, the overall pathogenicity index of the forecast.

6. Perform, on the basis of measurements of the total pathogenicity index, the assessment of the weather pathogenic effect on humans according to the scale (Table 2.1)

7. Determine the degree of the weather irritant effect.

8. Calculate stiffness forecast and execute a comprehensive assessment of the action weather and meteorological factors on the human body.

9. Fill in the table 2.3. with the results.

Conclusion: _____,

The weather reveals_____

effect (pathogenicity level)

2.3. Defining the level of pathogenicity, irritant effect and rigidity of the weather

Components of the pathogenicity indexes					Total pathogenicity index of the weather , J	Degree of the weather irritant effect, R	The level of the weather pathogenicity (optimally irritant or acute)	Coefficient of the rigidity of the weather , S
Air temperature, i_t	Air humidity , i_h	Wind speed , i_v	Changes in air the temperature, $i_{\Delta t}$	Changes in the atmospheric pressure, $i_{\Delta p}$				
1	2	3	4	5	6	7	8	9

Task 2. **Evaluate own meteosensitivity.**

Conduct the work in the following order. Fill in the questionnaire. Answer each question "yes" or "no". Calculate the amount of points with "yes" answers. Make the meteodependance conclusion on the basis of the comparative Table 4.

Calculation of the total score allows you to get the subjective evaluation of one's own meteodependance, and conclude on the necessity for the measures to reduce metedependance.

Questionnaire

Scores

1.Chy you feel the differences in different periods of the year (yes / no) at:

a) general state 20

b) mood 5

c) working capacity 10

d) state of health 20

2. Do you notice a relationship with the weather changes (yes / no):

a) general state 20

b) working capacity 10

c) mood 5

3. What subjectively reveals as the impact (yes / no) of the "bad" weather:

a) weakness 10

b) sleepiness 5

c) bad mood 5

d) headache _____15
e) dizziness _____25
e) other ailments (which) _____20
4. What weather has the greatest impact on you (yes / no):
a) rainy _____10
b) windy _____10
d) hot _____10
e) cold _____10
e) dry _____10
h) with high humidity _____10
c) other (which) _____10
5. Do you fell future changes in the weather (cross the odd one out):
a) yes _____20
б) no _____0

Total points	Level of meteodependance
0-25	Resistant
26-50	Low
51-100	Threshold point
101-150	High
More than 151	Very high

QUESTIONS:

1. What is the essence of “life safety”? In science achievement which it is based?
2. Specify the basic principles of excreta.
3. What is the United Nations concept of sustainable development mankind?
4. What are the main tasks of the science of human security?
5. In what way calculated the index of human development?
6. Provide a definition of the concepts of "life" and "activities".
7. What are the main problems of life support.
8. Identify and classify the dangerous factors.
9. Name subgroups physical factors of danger.
10. What factors forms chemical hazards.
11. Provide a description of biological factors danger.
12. Provide a classification physiological factors danger.
13. What is the risk to life safety?
14. What is the quantitative risk assessment?
15. What is the axiom dangers?
16. What are the different types of risk?
17. What kinds of environmental risk.
18. What methods of risk used in medical and environmental research?

8.BIOLOGICAL FACTORS

They include microorganisms (plants and animals) and pathogens of infectious agents (bacteria, viruses, fungi, rickettsia, spirochetes, protozoa).

Microorganism (poisonous plants and animals). Toxic substances of poisonous plants are different compounds belonging mainly to the alkaloids, glycosides, acids, resins, hydrocarbons, etc. (tables 8.1-8.2)

8.1. The poisonous plants effect on the human body

The name of a poisonous plants	*Time of effect start*	*The characteristic of the effect on human body*
Cicuta	In 5 min.	Frequent vomiting, severe salivation, dizziness, pale skin, severe cramps
Fungi	between 15 min. to 72 hours	Unbearable pain under the breast, constant vomiting, thickening of the blood, seizures, deaths
Black henbane	In 30-40 min.	Redness of the face and neck, agitated state, convulsions of arms and legs, hallucinations, salivation, and subsequent dry mouth

8.2. The characteristic of poisonous animals effect on the human body

The name of the animal organism	*Effect on a human body*
Spider (tarantula)	Extremely severe pain, headache, weakness, impaired consciousness, seizures, tachycardia, increased pressure fatalities
Acarus	Bites, redness, itching, state of general poisoning
Insects (wasps, bees, ants, beetles)	Allergic reactions, anaphylaxis, inflammation, pain, fatal
Fish (stingrays, sea dragons, scorpionfish)	Pricking, weakness, seldom fainting, diarrhea, convulsions, respiratory failure, lowered pressure, deaths
Reptiles (cobra, snakes)	Paralysis of skeletal and respiratory muscles, suppression of nervous system flabbiness, apathy, braking reflexes, abnormal sleep, deaths

Infectious diseases are carriers of the certain features to the most important of which belong pathogenicity; virulence; environmental sustainability; variability and specificity.

Pathogenicity is the ability of living creatures (usually microorganisms) and their metabolic products to cause diseases of other organisms. Depending on the size of the structure and properties, pathogens are divided into bacteria, viruses, rickettsia, fungi, etc.

Virulence is the aggressive properties of microorganisms in relation to animals and humans. Virulence of different strains varies. Its measure is the minimum number of living microorganisms that can cause death in experimental animals (minimum lethal dose). Often the average lethal dose that causes 50% of deaths of animals is used.

According to the *stability in the environment*, i.e. the ability to resist its effects, microorganisms are classified as unstable, of middle stability and stable.

Volatility is the ability of living organisms to acquire new features other than the ancestors', in the process of individual development. It provides the appearance of certain features, allowing the formation of new species and occurrence of the historical development of the biosphere.

An important feature of pathogens is specificity, which manifests itself in the fact that each type has different effect on the body, causes specific illnesses and immunological resistance. Hence, infectious diseases have very peculiar symptoms. Depending on the overall features of infectious diseases associated with the localization of the pathogen in human body and the mechanism of transmittion, all infectious diseases are divided into four main groups (table 3.3).

8.3 Groups of infectious diseases

Groups of diseases	Diseases	Infection localization	Ways of infection transmission
Respiratory tract infections	Acute respiratory-viral diseases (influenza, para-influenza, adenovirus infection, etc.), sore throat, diphtheria, measles, whooping cough, tuberculosis	Upper respiratory system	Air-drop
Intestinal infections	Dysentery, typhoid, paratyphoid, cholera, hepatitis, polio	Intestine	Through food, water, land, household items, flies
Blood infection	Malaria, typhus and relapsing fever, tick-borne encephalitis	Circulatory system	After biting of carriers - mosquitoes, ticks, fleas, lice, mosquitoes, etc.
Infections of external integuments	Scabies, tetanus	Skin, mucous membranes	Contact way

Infectious disease can be devastating, and sometimes fatal, to the host. In this part of the chapter we will briefly examine the stages of infection, and the various types of infectious agents.

The course of an infection can be divided into several distinct phases. The process of infection can be broken down into stages, each of which can be blocked by different defense mechanisms. In the first stage, a new host is exposed to infectious particles shed by an infected individual. The number, route, mode of transmission, and stability of an infectious agent outside the host determines its infectivity. Some pathogens, such as anthrax, are spread by spores that are highly resistant to heat and drying, while others, such as the human immunodeficiency virus (HIV), are spread only by the exchange of bodily fluids or tissues because they are unable to survive as infectious agents outside the body.

The first contact with a new host occurs through an epithelial surface. This may be the skin or the internal mucosal surfaces of the respiratory, gastro-intestinal, and urogenital tracts. After making contact, an infectious agent must establish a focus of infection. This involves adhering to the epithelial surface, and then colonizing it, or penetrating it to replicate in the tissues.

Many microorganisms are repelled at this stage by innate immunity. We have discussed the innate immune defense mediated by epithelia and by phagocytes and complement in the underlying tissues also discusses how NK cells are activated in response to intracellular infections, and how a local inflammatory response and induced cytokines and chemokines can bring more effector cells and molecules to the site of an infection while preventing pathogen spread into the blood.

These innate immune responses use a variety of germline-encoded receptors to discriminate between microbial and host cell surfaces, or infected and normal cells. They are not as effective as adaptive immune responses, which can afford to be more powerful on account of their antigen specificity. However, they can prevent an infection being established, or failing that, contain it while an adaptive immune response develops.

Only when a microorganism has successfully established a site of infection in the host does disease occur, and little damage will be caused unless the agent is able to spread from the original site of infection or can secrete toxins that can spread to other parts of the body. Extracellular pathogens spread by direct extension of the focus of infection through the lymphatics or the bloodstream.

Usually, spread by the bloodstream occurs only after the lymphatic system has been overwhelmed by the burden of infectious agent. Obligate intracellular pathogens must spread from cell to cell; they do so either by direct transmission from one cell to the next or by release into the extracellular fluid and reinfection of both adjacent and distant cells.

Many common food poisoning organisms cause pathology without spreading into the tissues. They establish a site of infection on the epithelial surface in the lumen of the gut and cause no direct pathology themselves, but they secrete toxins that cause damage either in situ or after crossing the epithelial barrier and entering the circulation.

Most infectious agents show a significant degree of host specificity, causing disease only in one or a few related species. What determines host specificity for every agent is not known, but the requirement for attachment to a particular cell-surface

molecule is one critical factor. As other interactions with host cells are also commonly needed to support replication, most pathogens have a limited host range. While most microorganisms are repelled by innate host defenses, an initial infection, once established, generally leads to perceptible disease followed by an effective host adaptive immune response.

This is initiated in the local lymphoid tissue, in response to antigens presented by dendritic cells activated during the course of the innate immune response. Antigen-specific effector T cells and antibody-secreting B cells are generated by clonal expansion and differentiation over the course of several days, during which time the induced responses of innate immunity continue to function.

Eventually, antigen-specific T cells and then antibodies are released into the blood and recruited to the site of infectione. A cure involves the clearance of extracellular infectious particles by antibodies and the clearance of intracellular residues of infection through the actions of effector T cells.

After many types of infection there is little or no residual pathology following an effective primary response. In some cases, however, the infection or the response to it causes significant tissue damage. In other cases, such as infection with cytomegalovirus or Mycobacterium tuberculosis, the infection is contained but not eliminated and can persist in a latent form. If the adaptive immune response is later weakened, as it is in acquired immune deficiency syndrome (AIDS), these diseases reappear as virulent systemic infections. In addition to clearing the infectious agent, an effective adaptive immune response prevents reinfection. For some infectious agents, this protection is essentially absolute, while for others infection is reduced or attenuated upon reexposure.

The agents that cause disease fall into five groups: viruses, bacteria, fungi, protozoa, and helminths (worms). Protozoa and worms are usually grouped together as parasites, and are the subject of the discipline of parasitology, whereas viruses, bacteria, and fungi are the subject of microbiology. The remarkable variety of these pathogens has caused the natural selection of two crucial features of adaptive immunity. First, the advantage of being able to recognize a wide range of different pathogens has driven the development of receptors on B and T cells of equal or greater diversity. Second, the distinct habitats and life cycles of pathogens have to be countered by a range of distinct effector mechanisms. The characteristic features of each pathogen are its mode of transmission, its mechanism of replication, its pathogenesis or the means by which it causes disease, and the response it elicits. We will focus here on the immune responses to these pathogens.

A variety of microorganisms can cause disease. Pathogenic organisms are of five main types: viruses, bacteria, fungi, protozoa, and worms. Some common pathogens in each group are listed in the column on the right.

We have already seen that two major compartments can be defined—intracellular and extracellular. Intracellular pathogens must invade host cells in order to replicate, and so must either be prevented from entering cells or be detected and eliminated once they have done so. Such pathogens can be subdivided further into those

that replicate freely in the cell, such as viruses and certain bacteria (species of Chlamydia and Rickettsia as well as Listeria), and those, such as the mycobacteria, that replicate in cellular vesicles. Viruses can be prevented from entering cells by neutralizing antibodies whose production relies on TH2 cells, while once within cells they are dealt with by virus-specific cytotoxic T cells, which recognize and kill the infected cell. Intravesicular pathogens, on the other hand, mainly infect macrophages and can be eliminated with the aid of pathogen-specific TH1 cells, which activate infected macrophages to destroy the pathogen.

Pathogens can be found in various compartments of the body, where they must be combated by different host defense mechanisms. Virtually all pathogens have an extracellular phase where they are vulnerable to antibody-mediated effector mechanisms. Many microorganisms replicate in extracellular spaces, either within the body or on the surface of epithelia. Extracellular bacteria are usually susceptible to killing by phagocytes and thus pathogenic species have developed means of resisting engulfment. The encapsulated gram-positive cocci, for instance, grow in extracellular spaces and resist phagocytosis by means of their polysaccharide capsule. This means they are not immediately eliminated by tissue phagocytes on infecting a previously unexposed host. However, if this mechanism of resistance is overcome by opsonization by complement and specific antibody, they are readily killed after ingestion by phagocytes. Thus, these extracellular bacteria are cleared by means of the humoral immune response.

Different infectious agents cause markedly different diseases, reflecting the diverse processes by which they damage tissues. Many extracellular pathogens cause disease by releasing specific toxic products or protein toxins, which can induce the production of neutralizing antibodies. Intracellular infectious agents frequently cause disease by damaging the cells that house them. The specific killing of virus-infected cells by cytotoxic T cells thus not only prevents virus spread but removes damaged cells. The immune response to the infectious agent can itself be a major cause of pathology in several diseases. The pathology caused by a particular infectious agent also depends on the site in which it grows; Streptococcus pneumoniae in the lung causes pneumonia, whereas in the blood it causes a rapidly fatal systemic illness.

Pathogens can damage tissues in a variety of different ways. The mechanisms of damage, representative infectious agents, and the common names of the diseases associated with each are shown. When the infection is due to intestinal pathogens such as Salmonella typhi, the causal agent of typhoid fever, or Vibrio cholerae, which causes cholera, the adaptive immune response occurs in the specialized mucosal immune system associated with the gastrointestinal tract, as described later in this chapter. Some intestinal pathogens even target the M cells of the gut mucosal immune system, which are specialized to transport antigens across the epithelium, as a means of entry.

Many pathogens cannot be entirely eliminated by the immune response. But neither are most pathogens universally lethal. Those pathogens that have persisted for many thousands of years in the human population are highly evolved to exploit their human hosts, and cannot alter their pathogenicity without upsetting the compromise

they have achieved with the human immune system. Rapidly killing every host it infects is no better for the long-term survival of a pathogen than being wiped out by the immune response before it has had time to infect another individual. In short, we have learned to live with our enemies, and they with us. However, we must be on the alert at all times for new pathogens and new threats to health. The human immunodeficiency virus that causes AIDS serves as a warning to mankind that we remain constantly vulnerable to the emergence of new infectious agents

Prevention of infectious diseases. The main method of prevention of infectious diseases is immunization, injection of attenuated pathogens or toxins to acquire immunity. In case of mass infectious diseases fact the *quarantine* is being introduced – a complex operational, administrative and preventive health measures to prevent the spread of infectious diseases and the elimination of the lesion. *Observation* is a set of measures aimed at increased medical surveillance for the source of infection. *Disinfection (decontamination)* is a set of specific measures aimed at destroying pathogens of infectious diseases in the environment. The types of disinfection are:

disinfestation is the process of destroying insects - carriers of infectious diseases;

deratization is an extermination of rodents, a dangerous in terms of epidemic. These activities are conducted to prevent pathogen transmission from ill people to healthy.

Physical methods of disinfection is carried out by means of mechanical, thermal and radiation means.

- *Mechanical means* ensure removal, but not complete destruction of the microorganisms. These are cleaning, wiping, washing, laundry, sweeping, ventilation.

Antisepsis. To prevent the negative effect of biological damaging factors the methods of antiseptic is applied (Gr. Anti - against, and septikos - purulent). It is a set of measures aimed at the destruction of germs in the wound, in the pathological focus or the body in general.

There are physical, mechanical, chemical and biological methods of antiseptics. *Physical methods* allow creating unfavorable conditions for bacterial growth and the absorption of toxins and decomposition products in the wound. This is provided by the outside draining of the infected wound with swabs, drainage and drying wounds with light and heat treatments procedures (radiation solux, quartz).

Mechanical methods cover methods aim at immediate (within the first hour) removal of necrotic tissue, blood clots, foreign bodies and other microorganisms from the wound.

Chemical methods provide destruction of microbs in the wound through the help of various antiseptics. Antiseptics to be bactericidal or bacteriostatic and do not harm tissues.

Biological methods (antiseptic) aim at improving the body's defenses and creating unfavorable conditions for microbial growth. The biological agents include antibiotics, enzymes, and immune wheys.

Restriction of contacts and infectious agent promotes personal hygiene during taking after the diseased.

Theme. Biological hazards.
Practical class №3 Infectious diseases. Epidemics. Pandemics. Immunity. Behavioral rules for population during conduction of isolation and restriction events. Prevention of infectious disease

Objective: Study: the classification of infectious diseases and pathogens; behavioral rules for population during conduction of insulating-restrictive measures

Tasks:

1. To learn about infectious diseases and characteristics of some pathogens.
2. To learn the behavioral rules of the population during the insulating-restrictive measures.
3. To learn about the procedure of disinfection, with disinfectants and solutions.
4. Fill in table 3.1.
5. Describe the chosen infectious disease (the causative agent, the main symptoms, etc.)

General provisions

Over the past decade a wave of various infectious diseases covered the continents, states, millions of people and inflicted irreparable damage and greate mortality rate to the world. In 2000 flu in Ukraine pledged in big cities to stop classes in schools for a long time (in Kiev for two weeks), led to a partial breakdown of production and other activities.

Infectious diseases of people are divided into: individual cases of exotic and highly dangerous infectious diseases; infectious disease in humans with undetected disease etiology; epidemic outbreak of infectious diseases; group cases of infectious diseases; epidemics and pandemics.

To characterize the mass infectious diseases among the population the following terms and definitions are to be applied.

Biologically-social emergency is a situation, when in a result of the source of biological and social emergency in the defined territory, normal living conditions and health, the existence of farm animals and plants are violated, there is a threat to human life and health, threat of widespread infectious disease, loss of farm animals and plants.

Biological safety is a state to protect people, farm animals and plants, the environment from the dangers that are caused or will be caused by a source of bio-social emergency.

Specially dangerous infection is the infection status of human or animal body, which is revealed through the form of infectious diseases, progressing in time and

space, causing severe consequences for human health and the farm animals or even their death.

Infectious disease irritant is pathogens that have evolutionary adaptation to parasitism in humans or animals and the potential to cause illnesses by the infectious disease.

Source of the infectious disease irritant is the body of an infected person or animal, which goes the natural process of keeping, breeding and release into the environment of infectious diseases.

Epidemic is a massive, progressive in time and space within the specified region people's infectious diseases spreading, which is much higher than the level of registered diseases in the given territory.

Epidemic center is the place of infection and people's staying, who got sick with the infectious disease and the area, within which over a certain period of time there is a possible contamination of people and livestock with the infectious disease.

Pathogenic viruses are the cause of many serious and dangerous diseases of humans, animals and plants. These include smallpox, foot and mouth disease, dengue and others.

Infectious diseases of people is a morbidity with pathogenic microorganisms and disease and is transmitted from an infected person or animal to a healthy one. Infectious diseases are revealed in the form of epidemic foci.

Epidemic process is called the process of the emergence and spread of the infectious diseases among people and which is a continuous chain sequence of homogeneous infectious diseases of people.

Epidemic disease or endemy is a constant registration in a particular territory of the morbidity, which is peculiar to the given area. Exotic disease morbidity is observed when the irritants are imported into the territory, which is free from this infectious disease.

Sporadic morbidity is a normal level of morbidity, which is inherent in the relevant disease area.

Epidemic explosion is called a sharp time-limited and defined-territory rise of the morbidity associated with the simultaneous infectioning of humans.

Morbidity is defined by the ratio of the quantity of morbidity in a given period of time to the number of residents of the given area, the city within the same period.

Mortality is the number of deaths from the given disease, which is defined by a coefficient to 100,000, 10,000 and 1,000 people, covered by the epidemic surveillance.

Ways of infectious agent's transmission are defined environmental elements or their combinations that provide pathogen transfer from the source to the surrpunding people in specific epidemic conditions.

There are the following ways of infection transmission from a human:

1. The contact-household path, when the disease is transmitted through objects that surround the patient.

2. Airborne droplets, when the infection is transmitted through saliva droplets that enter the air during the conversation, sneezing, coughing. Tuberculosis, influenza, whooping cough, diphtheria, measles, etc. may be transmitted the same way.

3. Transmission of the infection through the water into which the microbs get inside the organism (cholera, typhoid, dysentery, etc.).

4. Through the bites of blood-sucking arthropods (e.g. malaria).

5. Through contaminated food.

6. Through the soil: for example, intestinal diseases, tetanus.

3.2. Groups of infectious diseases. Depending on the general characteristic features of common infectious diseases associated with the localization of the pathogen in humans and the mechanism of infection transmission, all infectious diseases are divided into 4 main groups:

- infections of the respiratory ways;
- intestinal infections;
- blood infection;
- infection of the outer covers.

Among infectious diseases a group of especially dangerous infections is distinguished:

1. Cholera
2. Cybirka
3. Plague
4. Tularemia

Classification of factors of infectious diseases and infestations that may occur in the agricultural sector is the following:

bacterial: tuberculosis, brucellosis, salmonellosis, leptospirosis, anthrax, lysteriosis diamond-skin disease, plague, tularemia;

viruses: rabies, psittacosis, cholera;

rickettsiosis: fever;

fungus: actinomycosis, blastomycosis, candidiasis, coccidioidomycosis, cryptococcosis, microspores, ringworm, histoplasmosis, epidermatomycosis;

animalculine: echinococcosis, teniasis, trichinosis.

To prevent diseases these diseases, the following preventive measures are to be conducted:

• preventive vaccinations;

• quarantine measures (under quarantine a set of measures to curb the spread of infection, including isolation of the previous patients, disinfection of the patients' residence, detect infection contact with patients, etc. Is understood);

• removal of sources of infection.

Behavioral rules of the population during the insulating-restrictive measures.

While the threat of natural centre of infectious diseases exists, it is necessary to know the clear ways and methods of population protection.

Infectious diseases centre is called a territory contaminated by pathogenic agents which is a source of the spread of infectious diseases: sometimes it is simply called the centre of the epidemic of infection.

The disease occurs not immediately but after a hidden (latent) period, which can last for days, weeks, and sometimes months, depending on the pathogen of the infectious diseases. Infectious diseases can be determined only through special laboratory studies and by analyzing the samples taken, which, of course, makes it difficult to timely acting. But if a mere fact of appearance of th infectious agent is confirmed, then the quarantine is immediately announced.

Quarantine is a system of temporary organizational, operational, restrictive, administrative, economic, health, epidemic, hygienic, therapeutic, and preventive measures aimed at preventing the spread of infectious disease and provision of localization of the epidemic, epizootic or epifiotic centres and their subsequent elimination.

<u>When quarantine is announced, the following measures are taken:</u>

1. The outer quarantine zone includes the guard, commandant service and patrols are organized.

2. Around the settlements and the objects, the local (internal) commandant service is organized, health infectious wards and hospitals, control and transmission points, etc. are carried out.

3. People, animals and property removal is prohibited from the quarantine area. The check out of the contaminated area is allowed to the civil defense chiefs only with special formation and means of transport.

4. Transit transport passing through the centres of contamination is prohibited (except for only railway).

5. Objects of economic activity, continuing their activities, move to a special work regime, in strict compliance with antiepidemic requirements. Workers of the shift are divided into separate groups (of a very small number), contact between them is reduced to a minimum. Meal and rest of employees is organized in groups in specially designated areas. The work of all educational institutions, entertainment facilities, markets and bazaars is being stopped.

The local infectious disease centres all workers and employees of enterprises and institutions should take the following measures for personal safety: wear protective masks; comply with the basic rules of personal hygiene at work and at home; not to use unproven or contaminated food and water; no smoking in the contaminated area; in case of appearance of sickness or weaknessthey should immediately contact a doctor.

The population strictly follows the guidelines for the implementation of HIS (Health Inspection Service) recommendations of all sanitary and epidemic measures.

Quarantine in the centre of infectious diseases after disinfectionof the external centre is replaced by the observation..

Observations are regime and restrictive measures that provide, along with the increased medical and veterinary supervision and conduct of preventive, curative, prophylactic, veterinary and sanitary measures, a restriction of movement of people or livestock in all the surrounding zones to the quarantine administrative-territorial formations that create the observation zone of the spread of infectious diseases.

The objective is to prevent the spread of infectious diseases. For this purpose in fact, the same preventive measures as in the quarantine are taken, but the conditions of observation of the insulating-restrictive measures are less stringent.

The establishment of regime and behavioral rules in the centre of the infectious diseases, as well as the medical services requirements should be abid by all the citizens unconditionally. Nobody has the right to evade preventive vaccination and acceptance of drugs.

It is only allowed to take water from the water supply or with uninfected inspected the medical service of water sources in the centre of the infectious diseases. All products should be stored in tightly closed containers and handled before use: to boil water and milk, raw fruits and vegetables should be thoroughly washed and boiled, individual dishes should be used for eating.

It is necessary to carry out disinfection, decontamination of the items indoors. Decontamination is made in simpler ways: by washing with soap and water, boiling the individual items, etc.

For disinfection of premises the lit (settled) 0.1-0.5 percent chlorinated lime solution is often used. To produce 5-percent solution 10 liters of water are required to be diluted with 0.5 kg of chlorinated lime solution and let it settle.

The procedure of disinfection, disinfectants and solutions.

Sanitization is called a removal of radioactive substances, disposal or removal of toxic substances, pathogens and toxins from the skin of people and personal protective equipment, clothing and shoes that were on. It may be complete or partial.

Partial sanitization during the infection with radioactive substances is held if possible during the first hour after getting infected, after the spread of the radioactive substances directly into the zone of radioactive contamination and is repeated after leaving it.

When infecting with drip-liquid toxic substances and their sprays sanitizing is made immediately.

With the simultaneous infection with radioactive, toxic substances and bacterial agents toxic substances are primarily neutralized, and then the actions provided for handling radioactive substances during infection and bacterial agents are carried out.

Members of civil defense forces and the population use individual anti-gas packages (IPP-8 and its analogues) for carrying out partial sanitization, as well as various means available. Terms of use of IPP-8 package are provided in the form of instructions to it.

Complete sanitization consists of washing the body with warm water and soap. During radioactive contamination full sanitization is carried out in case if after partial sanitization infection of skin and clothes the remains are higher than the acceptable norm. Complete sanitizing should be done if possible within 3-5 hours after infection: carrying it out it after 10-12 hours is practically ineffective. Clothing is replaced if after handling, the contamination level remains above the acceptable norm. Complete sanitization during infection with drip liquids and their aerosols and can be conducted after the partial handling for the hygienic purposes.

When infecting, all the people that are in the area of bacterial agents action are to face sanitization despite the use of protection means and partial sanitization conduct. Infected clothing is subject to disinfection or replacement.

For the complete sanitization sanitary items based on stationary washing baths, showers and changing rooms pavilions; sanitization kits KSO; infectious showers settings DDA-53A, DDA-66, DDP are used.

Point of special treatment PST are designated for complete sanitization of personnel and the population, complete deactivation, decontamination and disinfection of weapons, equipment, decontamination and disinfection of the uniform, clothes,

footwear and protective equipment. These points are located at uncontaminated areas around or directly in the centre of civil defense forces, which are subject to special treatment.

Disinfection of the area is carried out by chemical and mechanical means. Degassing of the areas should be made through the impact on toxic substances by the stream of hot gas from jet engines of the heat machines.

Disinfection is performed chemically by spreading solutions (suspension) for degassing or spillage of dry matter for decontamination over the territory.

Mechanical method of disinfection lies in the remote disinfection of contaminated soil or snow layers. Cutting the upper layer of soil is carried to a depth of 3-4 cm, layer of loose snow - up to 20 cm, thick snow - up to 6 cm.

Disinfection of clothing, footwear and personal protective items is performed by vapor or paraformaldehyde mixture, boiling, soaking in solutions for disinfection (or wiping them), washing up.

Vapor mixture is used to disinfect all types of clothing and personal protective equipment, except for skin coat, fur, leather and felting products, which are to be disinfected with vapor mixture in accordance with the instructions to the disinfection showers cars (DSC) and disinfection showers trailers (DCT).

Disinfection of clothing and personal protective equipment, infected by thevegetative forms of microbes, is carried out by soaking in the 5% aqueous solution of phenol, lysol or naphtalysolum (with variola virus infection the concentration increases to 8%), 3% monochloramine solution or 2.5 % solution of formaldehyde for 1 hour. When infecting with spore forms of bacteria the soaking in 10% solution of formaldehyde for 2 hours is carried out.

Disinfection of clothing and personal protective equipment by washing is carried out with a special technology.

Disinfectants. For disinfection technology, solutions of formaldehyde, phenol and its derivatives (cresol, lysol and naphtalysolum) are used; suspensiums and slurry of two-thirds of the salt calcium hypochlorite and chlorinated lime; aqueous solutions of powder SF-2U.

Aqueous solutions of detergents in relation to the pathogens have a weak effect and is used only to lower sowing germs surfaces and neutralize toxins.

For disinfection of equipment, infected by the vegetative forms of bacteria, 3.5% solution of formaldehyde, 1% a suspension of two-thirds of the salt calcium hypochlorite, 2% monochloramine solution is used.

For disinfection that is contaminated with spore forms of bacteria, the most effective is 17-20% water solution of formaldehyde (formalin), which contains 10% by weight of monochloramine B.

Formaldehyde is a colorless asphyxiating gas that dissolves in water. There is 35-40% aqueous solution of formaldehyde, called formalin. It is stored and transported in iron barrels or in special bottles which are inserted in a wicker basket.

Phenol is a solid pink-brown substance, which dissolves in water well. Dipped in pink liquid carbolic acid consisting of 90% phenol and 10% water is often used in practice.

Mehtyl phenol (cresol) is dark-brown oily liquid, slightly soluble in water, easily soluble in acids and alkalis; used in the form of 3-5% -s krezolovyh hot soap solution.

Lyzol is cresols in liquid solution (potash) and is a red-brown oily liquid that dissolves well in water; disinfection of the weapons and equipment used in the form of 3-5% water solutions.

Naphtasolum is a mixture of 65% naphthenic soap and 35% of cresol, which has effect in disinfection and washing, in the form of 5-10% water solutions is used for the same purposes.

Task: Groups of infectious diseases

Groups of diseases	Examples of diseases	Localization	Ways of pathogen transmission
Infections of the respiratory ays			
Intestinal infections			
Blood infections			
Infections of the external covers			

Description of an infection:

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_____

_____

Conclusions:

9.PSYCHOLOGICAL RELIABILITY OF A HUMAN AND THE ROLE IN SECURITY PROVISION

The human body is a combination of both physical (somatic) and biophysical systems. Mental and nervous systems play a significant role in the safety of life and activity.

Psychic system. It affects not only the mental images, but the antitypical components – the general value orientation of the identity, the meaning and significance of events, mental activity, etc.

Psyche (Greek. Psychikos - sincerity) is the ability of highly active matter to actively reflect objective reality and on the grounds of the formed mental image specifically regulate one's behavior and activities.

It is inherent in animals as well, but only human has a conscience – the highest form of reflection of reality associated with abstract thinking, self-monitoring, predicting performance results.

All psychic phenomena are divided into three groups: mental processes; mental states; mental properties.

Mental process is the act of mental activity that has a display facility and performs regulatory functions. Mental reflection is forming the image of the conditions in which certain activities are performed Among the distinguished mental processes are cognitive (sensation, perception, thinking, memory and imagination), emotional and volitional.

Mental state is a common functional level of mental activity, depending on the operating conditions of a human and one's personal characteristics. Mental states are stable integration of mental manifestations of a human interaction with reality. Mental states are revealed in the general organization of the psyche. Mental states may be short-lived, situational and stable, personal.

The human psyche is closely connected to life safety since psychological qualities are the ones affecting behavior in various circumstances. Hazards affecting a human cannot be regarded neither as an event caused by external influences or consequences as a reflex reaction of the human body on it. Mentally healthy human with no reason will not seek for getting into a risky situation. This can encourage internal factors (individual psychological or physiological properties, emotional state abuse, lack of knowledge and experience) or environmental factors.

Mental development is the result of the evolution of the nervous system under the influence of the environment. All living creatures are characterized with the first signal system – the reaction to stimulation of the senses (touch, smell, taste, sight, hearing). And, only a human has the second signal system: a reaction to words, phrases, heard, seen or said about oneself. These levels of the nervous system have determined the types of behavior. A human has the following behaviors: instinct, skills, conscious behavior.

Instinctive behavior is actions, things that are inherited upon the type of "homo sapiens". This level concentrates all the information accumulated in the flow of human evolution. Famous acts and actions of instinctive human behavior are those associated with survival, procreation, etc.

Behavior upon skills are actions that have developed and trained within the learning process to automatism by means of trials and errors, or by training. As a result, the person produces skills, forms habits under the control of consciousness (training) and without (trials and errors).

Conscious behavior is the highest level of mental reflection of reality and human interaction with the environment that characterizes its spiritual activity in the specific historical conditions. These are the individual consciousness, allowing to learn self-awareness that comes from the study of human's inner world.

Instincts and skills can influence the conscious behavior, however, it controls the skills and brakes instincts.

***Methods for determining the physiological characteristics of a human*.** To assess the physiological characteristics of a person different methods are applied: *general* (supervision), pedagogical (learning outcomes of employment), *psychodiagnostics* (testing).

Psychodiagnostics is the most commonly applied method. The psychological test is an easy to understand task without any peculiar training specifically made and tested on large groups of people that allows to measure the formation of mental processes (e.g., level of mental development) of the subjects. In foreign countries, especially in the US, tests are widely used in schools and various institutions to identify features of the mental processes, training opportunities and professional life. A variety of options of verbal (words), drawings or hardware standardized tests are applied.

The experience has shown extremely high efficiency with the use of physical fitness tests. Thus, screening the "unsuitable ones" during the process of training reduced from 30-40% to 5-8%, accidents due to the fault of the staff decreased by 40-70%, reliability of the management increased by 10-25%.

The value of the tests is revealed in the process of standardization, i.e. in the process of the study of similar large groups of children or adults of different occupations and analysis of the data to match the content and form of each of the test requirements of its main criteria - reliability, validity and predictability.

Psychodiagnostic tests can be successfully used for identification, and for formation of the mental and emotional-volitional qualities, because the test is prepared analogue of some personality traits - intelligence, attention, memory, quick wit, knowledge. Exercising these traits can help to achieve their significant enhancement.

***Typical models of physiological reactions of people in case of emergencies*.** The main basic mental processes of a human man in terms of life safety include memory, attention, thinking, will, emotions, etc.

There are lots of human traits and they can be classified in three main ways:

attributes are integral characteristics, without which a human cannot be imagined and without which s/he cannot exist (gender, age, temperament, language);

traits are stable behavior features, repeated in different situations. They have significant impact on human activity and security (intelligence, perseverance, courage, tenderness, independence);

qualities are the properties which differ depending on the conditions, situations (skills, perception, memory, thinking).

Memory. This is one of the most important functions of the human brain. If perception is the initial stage of the cognitive process, a reflection of objective reality, acting on the senses now, the memory is a playing of events in the past.

Human memory retains two types of information: genetic (species) and acquired (in vivo). Depending on the facilities of storing and playing, the following types of memory are distinguished: genetic; acquired (motor, visual, auditory, emotional, and symbolic. According to the duration immediate, short, and long memory is distinguished.

The development and quality of memory is affected by the physical and mental state of a human, fitness, profession, age. A person engaged in mental work receives information better, especially, if it is related to the industrial activity. In this case a professional memory is being discussed.

By 20-25 years the memory is improving and up to 30-40 years it remains at the same level. Then the ability to remember and recall progressively is worsening. Professional memory remains in an old age as well.

A human successfully remembers the material, if s/he knows the factors that affect memory performance, and some general rules for its improvement and training. It is better to repeat the course material more often and in parts than less often and in large quantity. Every 40 min one needs to make a break for 10-15 minutes. The covered material is preferably to be revised the next day. It should be repeated after 2-3 hrs, not over and over again. It is better to read the text twice carefully, than 10 times carelessly. In order to better remember the material, one should indicate the most basic things, carefully study the illustrations, make a plan, a scheme, a table. It is important to alternate more difficult material with more accessible, interesting with less interesting. While covering new material it is recommended to use all types of memory, for which one can record, outline, repeat to oneself, and even better out loud. Repetition of the material out loud is always more efficient than mechanical, even repeated reading material. Advanced material is useful to repeat before bedtime, as this helps to perpetuate the results of memorization.

Note. It is an essential human mental process. Attention is connected to the will, depending on which there are distinguished *passive* and *active* attention. Passive attention occurs without conscious volitional efforts by external stimuli (strong sound, bright light, etc.) and lasts for as long as they are. Worker’s passive attention occurs when a noise is changing in his well-known operating mechanisms. Active attention is a conscious attention arising from willful effort and always focused on the perception of objects and phenomena, with pre intended purpose.

Passive and active attentions interact and complement each other. Active attention requires volitional efforts, nervous tension and therefore is tedious for a person.

There are also distinguished **externally** and **internally** directed attention. An operator, considering the scoreboard devices, strains his outwardly directed attention, and objects of his internal thoughts are feelings and memories. When they are related to the problems solving that arise in the process of monitoring the device, it has a positive meaning. However, internal experiences unrelated to the operator, may detract from the cause errors.

Necessary aspects of attention are established during training and during professional training can speed up their formation. Upon the lack of stability of attention, it is necessary to work out the ability to disregard extraneous stimuli and to teach oneself to work efficiently in any environment. To educate attention it is required to systematically develop the skills to focus any time on certain objects or activities. Forming the necessary skills of attention requires constant willpower, discipline, determination, perseverance.

Thinking. To get to know the phenomena of the world is only possible through thinking.

All mental activities consist of the following operations:

Analysis is a tacit division of the object, phenomenon into its component parts, features, characteristics and selection of components; *synthesis* – is a tacit combination into a whole of separate parts, features, properties, objects, events, or concepts; generalization is a selection by comparing the principal, which is peculiar to a particular phenomenon, subject, object; *abstraction* is the allocation of significant features of groups of objects, events or concepts; *specification* is the transition from the general to the particular, the relationship between theory and practice, the transition to concrete reality, to the sensory experience.

Will. Memory, attention, thinking closely related to the will. It is expressed through the motivated actions to achieve the consciously set goal. In a volitional act it is crucial to implement the decision. The main will traits are discipline, self-control, determination and perseverance.

Emotions. Volitional qualities can be developed and nurtured. However, education will be accompanied by the education of the feelings that depend on a person's world view, morality and spirituality as well as emotional state.

The following emotional states of a human are distinguished: mood, effect and stress. There are the following emotions: primary (fear, anxiety, joy), with which a person is born; secondary (resentment, guilt, envy), formed as a result of socialization

and awareness of one's own "I"; positive (inspiration, success, confidence); negative (anger, jitters fear).

Each emotion serves a need, encouraging to the actions necessary for its satisfaction. If the requirements are met, then there are positive emotions, whilst the unmet needs cause negative emotions.

Sensorimotor responses are a retroactive actions of a human to any feelings perceived by the senses. In any sensorimotor reactions there are latent (hidden) and motor periods. The time of the onset of the signal prior to movementiscalled the *latent period* and the execution of the movement - *the motor*.

Theme. Physiological characteristics of a human. Practical class №4. Defining the main psychological peculiarities of a human and their influence on safety

Objective. Show the influence of physiological peculiarities of the human impact on the safety. To familiarize students with psychodiagnostic method for assessing psychological characteristics of a person by testing.

Task: To assess individual elements of human psychophysiological reliability using the following tests:

Part 1.

1. Test for defining analyticity thinking;
2. Test for researching the selectivity (test -a) and concentration (test -b);
3. Test for defining the temperament of the individual, graphically show the type of nervous activity;

Part 2.

4. Test for defining volitional qualities of a person;
5. Test for establishment of the sociability level;
6. Test for defining the level of self-esteem;
7. Test for defining the stress resistance.

After the appropriate tests being carried out students analyze the results obtained in terms of personal safety and prepare a report form.

General provisions

Higher cognitive functions is a complex of mental processes that are nbeing formed throughout life. They are social in their origin related to the programming of human life by setting goals and objectives. As a result of this, mental orientation

becomes random, special types of attention, thinking, memory, perception appear: arbitrary attention, random memory, observation.

The feature of higher mental functions is that initially they act as a form of interaction between people and only later as both internal, i.e. intrapsychological process. Therefore, thinking, language and imagination towards the implementation of higher cognitive functions, largely determine the consciousness of the individual.

Thinking arises and develops along with practical activities based on direct human sensory perception. Owing to thinking, the essential properties and relationships of objects and phenomena of reality in a generalized form and indirectly are depicted. The basis of thinking is formed by the analysis and synthesis operations, however, each act of thinking is a unity of knowledge, action and thinking of the human towards the relation to ones activities. While studying the theme "Thinking" students are invited to get acquainted with the term "mindset" and impact of the " mindset " on a way of solving tasks.

Attention is revealed in the direction and focus of human mental activity. Important characteristics include selectivity, stability, concentration, distribution and switching. Modified technique can detect a sufficient number of characteristics of thinking: its speed, depending on the mindset, flexibility, or conversely, stiffness. There are methods of diagnosis selectivity and concentration.

Test 1. Research analyticity thinking

Materials and equipment: the form with 15 rows of numbers, compiled from a pattern, pen and stopwatch. The form of printed thereon table series of numbers is as follows:

№	The numeric rows
1	2 4 6 8 10 12 14 ....
2	6 9 12 15 18 21 24 ... .
3	3 6 12 24 48 96 192 ....
4	4 5 8 9 12 13 16 ....
5	22 19 17 14 12 9 7 ....
6	39 38 36 33 29 24 18 ...
7	16 8 4 2 1 ½ ¼ ....
8	1 4 9 16 25 36 49 .....
9	21 18 16 15 12 10 9 ....
10	3 6 8 16 18 36 38 ....
11	12 7 10 5 8 3 6 ...
12	2 6 9 27 30 90 93 ...
13	8 16 9 18 11 22 15 ....

14	7 21 18 6 18 15 5 ....
15	10 6 9 18 14 17 34 .....

Instruction to the researched one: "Rows of numbers are printed on the forms that lie in front of you. Try setting at which pattern is composed each of 15 proposed numerical series. According to this pattern continue every row, expanding it in two numbers. 7 minutes are given for the task.

In 7 minutes the command is: Stop! Writing is finished!"

Analysis of the results. The level of analyticity thinking is defined by the number of rows of numbers written correctly.

If the researched completed 14 - 15 rows of numbers, his or her analyticity thinking is very high or excellent; if 11 - 13 – analyticity is high or good; if 8 - 10 - average or satisfactory; if 6 - 7 - low or bad; if 5 or less, the analyticity is very low or bad.

Test (a). Research of attention selectivity

Materials and equipment: Test form, pencil and stopwatch.

Procedure of the research. The research is carried out in pairs consisting of experimenter and the researched. The experimenter reads the instruction to the researched, provides a test form and records the time of performance.

The test form is the following:

The Researched_____

The Experimenter_____

Test form

SDGRHSUNKYFTOYJHFNMPOUNBVCFBUILDINGIUTREWETUOLKGDFFFGHLKJHGFD
WINDOWlKGJDGSXGIRLPOIUYFGHJKAPPLEHDKSCNVBNARMCHAIRCVBNMBOOKP
OIUYTRPENCILFGHJKLWERTYUIOWATERSDFGHJKLTOUCHASDFGHJKLBEDROOMZ
XCVBNMPHONELKJHGFDSAZXCVFORESTMNBVCXTREESDFGHJKBALLWSDXCVGTR
SNAKELKJHFGZXCVBNMCATIJHGVBNMONUMENTOKJHBNVMORNINGPLKMNBVFG
LKJGLIGHTOIUYTRDOORSDFGHJAPARTMENTLKJNBFHDRWALLERTNERTYGFDSHJN
VCXMOVIEKJHHGFDSXVCBNFRYUEOWLKFHGJDSXM

Instructions to the researched: "You will be provided a test form with a printed letters and words on it in a row. Search and underline the words there. Try not to miss

a single word and work quickly, as the time is fixed. If everything is clear and there are no questions then start!"

Processing and analysis of the results. Indicators of attention selectivity in this experiment is the performance of the task and the number of the underline words found. All in all there are 25 words in this test:

The result is assessed using the scale of assessments, which comprises points depending on the time spent searching for words. For every word left out, one point is deducted.

Time, s	Points	Level of attention selectivity
250 and more	0	I low
240 – 249	1	I low
230 – 239	2	I low
220 – 229	3	I low
210 – 119	4	I low
20 – 2090	5	I low
190 – 199	6	I low
180 – 189	7	II medium
170 – 179	8	II medium
160 – 169	9	II medium
150 – 159	10	II medium
140 – 149	11	II medium
130 – 139	12	II medium
120 – 129	13	III high
110 – 119	14	III high
100 – 109	15	III high
89 – 99	16	III high
78 – 88	17	III high
70 – 79	18	III high
60 – 69	19	III high
less than 60	20	very high

Test (б). Research concentration of attention

Materials and equipment: Test form, pencil and stopwatch.

Procedure of the research. The experiment can be conducted with one researched, as well as with a group of 5 - 9 people. The main terms of working with

the group - conveniently place the participants, provide each with the test forms, pencils and observe silence during testing.

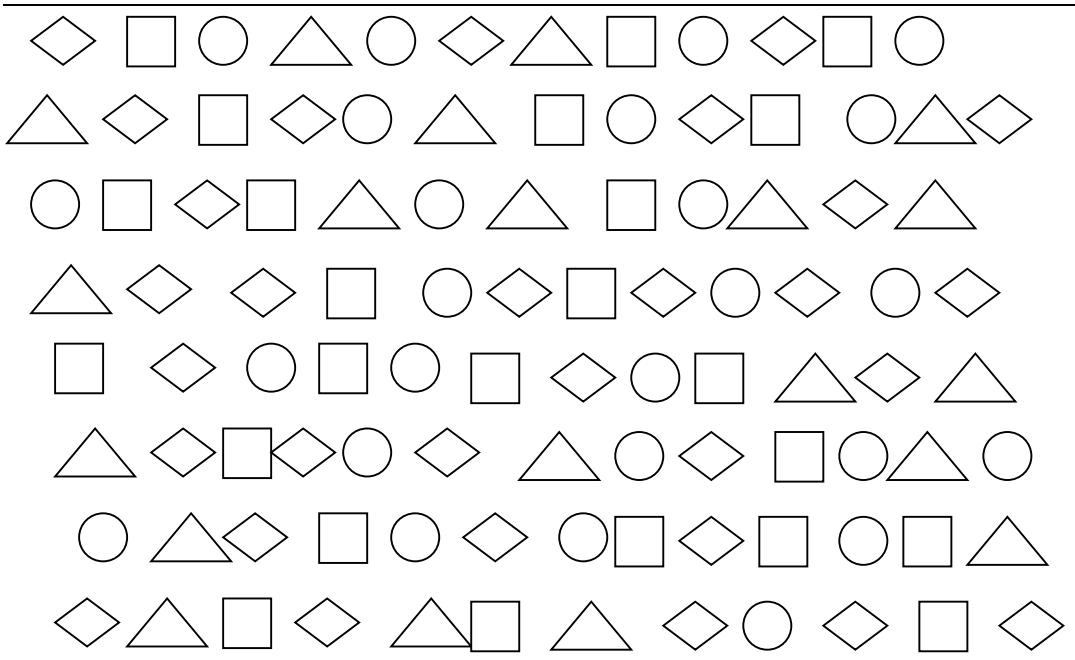
Instructions to the researched: “You are suggested a test with the images on it four geometric figures: square, triangle, circle and rhombus. With a signal "Start!" arrange as soon as possible and without error in these figures the following symbols: the square – plus, the triangle – minus, the circle – nothing in the rhombus – full stop. Arranged these signs consecutively in series in each figure in line from left to right. Time on the job – 1 min.

Processing and analysis of the results. The results of this testing is the number of filled in geometric shapes including circles and number of errors within 1 min. The level of concentration is defined according to the table 4.1.

4.1. The level attention spans

The number of processed figures	Rank	The level of concentration of attention s
100	1	Very high
91 – 99	2	High
80 – 90	3	Average
65 – 79	4	Low
64 and less	5	Very low

The form with geometric figures is as follows:



The rank is reduced according to the mistakes made while filling. If there has been 1 - 2 errors, rank reduces by one, if 3 - 4 by two ranks, and if there are over 4 errors, the concentration of attention is considered worse by three ranks.

Analyzing the results, it is necessary to find out the reasons that have led to such results.

Part 2. General provisions. Higher nervous activity (HNA) is a body activity aimed at interaction with the environment. HNA basis is composed of conditioned reflex (Table 4.2).

Numerous studies of people's activity from different walks of life had revealed the influence of the results of work, especially on behavior, in extreme situations of many physiological peculiarities, namely the qualities of temperament, and weak nervous system; abilities; sensorimotor reactions; competence; communication skills; determination and discipline, self-control; self-assessment.

Characteristic of reflexes

Unconditioned reflex	*Conditioned reflex*
The hereditary form of the activity	Acquired after birth
Has a fixed reflex arc	Formed on the basis of a temporary connection between unconditional and conditional centers
Participation of NS structures is not required	Mandatory participation CNS (cortex)
The presence of specific receptive field and specific stimulus	No specific receptive field and specific stimulus
Differentiated by strength and constancy	Characterized by fragility may vary fade

Methodologies suggested in the recommendations, allow to define the type of nervous activity, volitional qualities of a person, the level of communication skills, self-esteem and stress resistance.

There are 4 types of higher nervous activity.

Types of Higher Nervous Activity

According to Hippocrates	*According to Pavlov*
Sanguine	Strong, balanced, agile
Phlegmatic person	Strong, balanced, inert
Choleric	Strong, imbalanced, with a predominance of excitation
Melancholic person	Weak processes of excitation and inhibition

Type of higher nervous activity

There are 12 statements. Please read them and decide whether they belong to you personally. If you are, then put a mark "yes", do not think long. The best answer is the one that first came to mind.

1. Generally carry out my activities without prior planning.
2. It happens that I feel either happy or miserable with no apparent reason.
3. I feel happy when doing business, which requires immediate action.
4. Prone to mood swings from bad to good with no apparent reason.
5. While making new acuqintances, take the initiative first.
6.I am often in a bad mood.
7. I am tend to act quickly and decisively.
8. It happens that I try to focus on something, and I can not.
9. You are fiery temper person.
10. It often happens that during a conversation with another person you are present only physically, but thoughts are somewhere else.
11. I feel uncomfortable when I do not have to a chance to communicate.
12. From time to time I am full of energy, and from time to time I am a very passive.

Data processing. Make an axis on the Cartesian coordinate system, write the amount of "yes" of all odd statements horizontally (from the left to the right), and to the topthe amount of "yes" of all paired statements - vertically (from the bottom to the top). Define the coordinate of your results, and behind them - the type of higher nervous activity: sector 1 - choleric; sector 2 - sanguine; sector 3 - phlegmatic; sector 4 - melancholic.

If the coordinates are located near the crossroads, it means that you have a mixed type of higher nervous activity.

Remember that the brightly defined types occur less frequently.

Test for defining volitional qualities of a person

Will is a person's ability to control one's actions and deeds. It is expressed through high self-control in dangerous situations, ability to overcome obstacles that have arisen on the path to the goal achieving, the ability to subordinate one's desires to the duty requirements, the ability to overcome feelings of insecurity, doubt and fear.

Activity of a modern worker, which is characterized by the frequent occurrence of dangerous accidents, also has high requirements towards one's volitional qualities.

Are you a strong-willed person?

Give a frank answer. If you can confidently answer "yes", put on paper 2 points if "no", put zero, but if you find it difficult to answer precisely, there are doubts, place 1 point.

1. I complete uninteresting work to the end, even if I lack time.
2. If it is necessary to do something unpleasant I force myself, overcome internal resistance.
3. In a conflict situation I am able to focus and objectively assess one's own and other people's words and actions.
4. If I want to eat something sweet, I can afford to refuse.
5. I find the strength to get up in the morning, even if it is not planned, even if it is unnecessary.
6. I stay at the place of the street accident to witness.
7. I immediately reply to the letters.
8. I can overcome the fear of visiting the dentist office.
9. I calmly drink nasty medicine.
10. I carry out the promise given at theheat of the moment, even if it is related to a rather troublesome business.
11. I will without hesitation go to an unfamiliar city, go on a tourist trip, tour.
12. I precisely perform daily routine .
13. I condemn debtors (in all types of activities).
14. Even the most interesting film will not force me to postpone the work I have to do.
15. I can stop the dispute, despite the insulting words of the opponent.

Total points will determine how strong-willed person you are. If you earned 12 points - you lack willpower, attitude toward duties is careless, as if you do only what is interesting and easy to perform. Those, who earned 13-21 score, have a very strong will, but not always acting purposefully and when the workaround occurs, the person will not pass it. However, the given words this person will comply and unpleasant

work, usually, sets to perform. However, they will not cause any difficulties on their own.

Finally, 22-30points. Without a doubt we can say: you are a strong-willed person. You can be relied on, and will not let down. Cases, challenges, unexpectable situations do not scare you off. But if there are over 30 points certain deficiencies may be noted. Sometimes you are irreconcilable, your self-averse in unimportant matters hinders communication with others - you are too categorical in the judgments.

Test for establishment of the sociability level

In each of these 16 questions, answer "yes", "sometimes" or "no".

1. You are looking forward to the usual business meeting. Is it brings you out of balance?

2. Do you postpone a meeting with a doctor to the time when it becomes necessary?

3. Does the order to deliver a speech, report, information at the meeting cause you confusion and discontent?

4. You are offered to go on a business trip to the city, where you have never been. Would you put a lot of effort to prevent this business trip?

5. Do you share worries with someone?

6. Are you annoyed when a stranger on the street appeals to you with a request (showing the way, saying the time)?

7. Do you believe that there is a problem of "fathers and sons" and that people of different generations are difficult in understanding each other?

8. Would you feel ashamed to remind a friend that he forgot to pay you back the debt, which he lent several months ago?

9. In the restaurant or dining room you were given meal of a poor quality. Will you keep silent, by just pulling away the plate?

10. Being alone with a stranger, will you keep silent? And will you be angry if a stranger speaks first?

11. Do you fall into despair when you see a long line? Will you refuse from your intentions to become the "tail" of the queue?

12. Do you fear to participate in any committee to review conflict situations?

13. Do you own, highly individual evaluation criteria of the works of literature, art, or any "other" thoughts are on not taken into account?

14. Having hear "on the sidelines" false claims on the question well known to you, will you keep silent, without getting engaged in the debate?

15. Does the request to help someone to understand the question or the official training topic causes any dissatisfaction?

16. Do you prefer writing over oral answers?

Estimates answers: "Yes" - 2 points, "Sometimes" - 1 point, "No" - 0

Results:

30 - 32 points - you are obviously not communicative, and this is your problem, this is you, first of all, who suffers from this. But for close people around you, this is not easy as well! Try to become more companionable, control yourself.

25 - 29 points - you are closed, taciturn, prefer solitude, so you probably have few friends. New work and the need for new contacts, if not leading you to panic, will ruin your balance for a long period of time. You know this feature of your character and may be dissatisfied with themselves. But your are not only restrained by dissatisfaction - you are able in certain circumstances to change you character.

19 - 24 points – you are, to some extent, companionable: in an unfamiliar environment you feel pretty confident. New problems do not scare you. Yet you come together the new people hesitantly, and you get involved in arguments and debates with pleasure. Your statements sometimes are unreasonably sarcastic.

14 - 18 points - you have normal communicability. You are curious. You willingly listening to interesting interlocutor, patient, defend your point of view calmly. Without worries you go to meet new people. At the same time, you do not enjoy noisy companies; extravagant behavior, verbiage causes irritation.

Determination of test stress

Answering the questions of the test, specify how often you are in the listed states the following scale: often - 3 points, sometimes - 2 points, rarely - 1 point. Remember, the schyrishi will your answers, the result will be more objective.

The fewer points you score, the higher your stress. If you have the first or second level of stress, you need to dramatically change your lifestyle.

№	Questions	Answer		
		rarely	sometimes	often
1	2	3	4	5
1	I think the team underestimated me	1	2	3
2	I try to work despite health	1	2	3
3	I'm a fan of the quality of their work	1	2	3
4	I am aggressive (Noah)	1	2	3
5	I can not stand criticism	1	2	3
6	I am angry (Noah)	1	2	3
7	I try to be a leader, where possible	1	2	3
8	I believe persistent and assertive man	1	2	3
9	I was worried about insomnia	1	2	3

1	2	3	4	5
10	His enemies I fight back	1	2	3
11	I am emotionally hurt and worry trouble	1	2	3
12	I have no time to rest	1	2	3
13	I am having conflicts	1	2	3
14	I have enough power to realize itself	1	2	3
15	I have no time to engage in favorite business	1	2	3
16	I do everything fast	1	2	3
17	I feel fear not offered the session and will be excluded (Noah) from the Institute	1	2	3
18	I act rashly and then worry about their affairs and actions	1	2	3

Calculate the amount of points and determine the stress level on a scale:

The level of stress		Total points
Quantitative Assessment	Qualitative assessment	
1	very low	54
2	Low	50-53
3	Below average	46-49
4	Slightly below average	42-45
5	Average	38-41
6	Slightly above average	34-37
7	Above average	30-33
8	High	26-29
9	very high	22-25

Conclusions:

_____

_____

_____

10. Electrical safety

As a branch of scientific research and engineering, electrical safety was initiated in the second half of the 19th century, when electric energy was quickly implemented in various spheres of society's life.

Electrical security - a system of organizational and technical measures and facilities that protect people from the harmful and dangerous effects of electric current, electric arc, electromagnetic field and static electricity.

10.1. Effect of electric current on the human body. Types of electrical injuries

Flowing through the human body, the electric current causes a thermal, electrolytic, mechanical (dynamic), biological effect.

These physical and chemical processes are inherent in living and inanimate matter. Simultaneously, the electric current also carries out a biological action, which is a specific process inherent in only living tissue.

The thermal action of the current is manifested through the burns of individual parts of the body, heating blood vessels, nerves, heart, brain and other organs that cause irreversible phenomena (functional changes).

Electrolytic action of current is characterized by the decomposition of organic liquid into the components, in particular, which is accompanied by a significant violation of their physical and chemical composition.

Mechanical (dynamic) action is the stratification, breakage and other mechanical damage to the tissues of the body, in particular, muscle tissue, blood vessel walls, vessels of the pulmonary tissue due to the electrodynamics effect, as well as the instantaneous explosive formation of vapor from overheated tissue fluid and blood.

Biological action of the current is manifested through the irritation and excitation of living tissues of the body, as well as due to violations of internal biological processes occurring in the body and closely related to its vital functions.

The irritating action of the current can be direct and reflexive.

Types of electrical injuries

The diversity of the influence of electric current on the human body leads to electrical injuries, which are conventionally divided into two types:

- local electrical injuries, which indicate local defeat of the body;
- general electrical injuries (electric shock), when the entire body is damaged (or there is a risk of damage) as a result of violation of the norms of activities of vital organs and systems.

According to statistical data, the approximate distribution of HB due to electric current has the following form:

- local electrical injuries - 20%;
- general electrical injuries (electric shock) - 25%;
- mixed injuries (simultaneously local electrical injuries and electric shock) - 55%.

Local electrical injuries

Local electrical injuries – clearly detected violations of body tissue density, in particular bones caused by the action of electric current or electric arc. Local electrical injuries are cured and the work of the victim is restored completely or partially. However, in severe burns, a person dies.

Typical local electrical injuries include electrical burns, electrical labels or signs, metallization of the skin, electrophtalmia and mechanical damage.

Electrical burns it is damage to the body surface under the action of an electric arc or large currents. Burns can be of three types:

- a current when the current flows through the human body;
- arcs that arise under the action of an electric arc (temperature 3500-15000 ^{o}C);
- mixed (90% with fatal outcome).

Small burns - I, II degree; significant III, IV degree.

Electrical labels or signs are a seal on the human skin of an oval or round shape with a diameter of 1-5 mm in gray or pale yellow color. There are two points: input and output current. Electrical signs are painless and eventually cured/

Metallization of the skin – penetration into the skin of metal particles due to its spraying and evaporation under the action of an electric arc. The affected area of the body has a hard surface. The metallization of the skin is observed in 10% of the victims of the electric current.

Electrophthalmia – the inflammation of the outer ocular membranes due to the action of ultraviolet radiation of an electric arc, which develops after 4-8 hours after ultraviolet irradiation. At the same time there is a lacrimation, a sharp pain in the eyes. Cured in a few days.

Mechanical damage – convulsive contraction of human muscles under the action of electric current. As a result, there may be discontinuities of the tendons, skin, blood vessels, nerve tissue and even fractures of the bones, dislocation of the joints.

Mechanical damage occurs when operating in plants with a voltage up to U<1000 with prolonged exposure to voltage.

Common electrical injuries

Electric shock (common electrical injury) – the excitation of the living woven body by electric current, accompanied by convulsive muscle contraction. Such a blow can lead to a disturbance and even a complete cessation of the work of the lungs and heart.

Depending on the consequence of the damage, electric shock can be divided into five stages:

- convulsive, barely noticeable muscle contraction;
- convulsive contractions of the muscles, accompanied by severe pain, barely tolerated without loss of consciousness (see a doctor);
- convulsive muscle contraction with loss of consciousness, but with preservation of breathing and work of the heart;
- convulsive muscle contraction with loss of consciousness and disturbance of cardiac activity or respiration (or one and the second time);
- Clinical death, that is, the absence of respiration and circulation, lasts for a healthy young man for 5-7 minutes; the brain can function during this time without oxygen. In the future, the cells of the cerebral cortex begin to decompose.

Clinical "imaginary" death is the transient process from life to death, which comes from the moment the cardiac and pulmonary activity cease.

Biological (real) death is an irreversible phenomenon. The stage of biological death can only be determined by a doctor and it occurs after a clinical death.

Causes of fatalities from electric current

Causes of death from the action of electric current can be: the termination of the heart; stopping (paralysis) breathing; electric shock possible action for two or three reasons at the same time.

The cessation of cardiac activity from the action of electric current is the most dangerous. The effect of current on the heart muscle may be direct when the current flows directly in the heart area, and reflex, through the central nervous system, when the current path lies outside of this area. In both cases, heart failure or fibrillation may occur.

Fibrillation of the heart is a chaotic movement of the heart muscles (fibrils) in which the heart is not able to move blood through vessels.

The cessation of breathing is due to the direct influence of current on the muscles of the chest involved in breathing. A person feels difficulty breathing already under the influence of a current 20-25 mA frequency f = 50 Hz. Asphyxia (lack of oxygen and excess CO2) occurs during long-term exposure to the current.

Electric shock - a kind of severe nervous reflex reaction of the body to the electric shock (disorders of blood circulation, respiration and metabolism). Electric shock is conventionally divided into three stages: the stage of excitation; inhibition or attenuation of all vital functions; exit from a state of shock or death.

The shock state lasts from several tens of minutes to days. After that, human death may occur as a result of the complete extinction of vital functions of life, or recovery due to timely active medical intervention.

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Causes of electric trauma. First-aid measures for electric shock

Electric trauma can be the result of technical, organizational, technical, organizational and organizational and social reasons.

For technical reasons include:

- imperfection of the design of the electrical installation and means of protection;
- accepted defects in the manufacture, installation and repair of the installation;
- violation of the rules of arrangement, technical operation and TV of electric installations.

In addition to these technical causes electric traps may be malfunctions of electrical installations that arise in the process of their operation, malfunction of protective equipment, the use of electrical protective devices with an overdue date of another test.

For organizational and technical reasons include:

- non-compliance with the requirements of the current standards for controlling the parameters of the technical state of electrical installations;
- errors in the removal of voltage from electrical installations when performing their work without checking the absence of voltage on the electrical installation, which people work;
- absence of temporary fencing of places of electrical works or the discrepancy between the design and placing of the requirements of the current standards and the

absence of marking, posters, blocking, and warning and prohibitive inscriptions; Errors in installing and removing portable earthling, or lack thereof.

The main organizational causes of electrocution include:

- the absence (not appointment of an order) at the enterprise of the person responsible for the electrical equipment or the inconsistency of the qualification of this person with the requirements in force;
- insufficient staffing of the electro technical service by workers of appropriate qualifications;
- absence of job description instructions for electro technical personnel at the enterprise and instructions for safe maintenance and operation of electrical installations;
- insufficient training of personnel on the issues of electrical safety, untimely verification of knowledge, mismatch of the electrical safety team personnel, the nature of the work being performed;
- non-compliance with the requirements for the safe performance of work in electrical installations according to outfits-permits, orders and in the order of current operation;
- ineffective supervision, departmental and public control over compliance with safety requirements when performing work in electrical installations and their operation.

The main organizational and social causes of electrocution include:

- forced execution not on the specialty of electrical work; negative attitude to the work performed, due to social factors;
- involvement of employees in overtime work;
- violation of production discipline;
- employment of persons under the age of 18 years.

These reasons can be grouped by the following factors:

- touch to uninsulated, current-conducting parts of electrical installations which are under voltage, or isolated to the actual damaged insulation - 55%;
- touch to non-conductive parts of electrical installations or to metal structures which are electrically connected with them, which were exposed to voltage as a result of insulation damage - 23%;
- the appearance of voltage on the disconnected current-carrying parts, in which people work, due to mistakenly activated electrical installations;
- absence of reliable protective devices.
- action step voltage - 2,5%;
- defeat for the origin of an electric arc - 1,2%;
- other reasons - less than 20%.

First-aid measures for electric shock

First aid measures are divided into two stages:

1st stage Releasing the victims from the action of electric current in any way: turn off the electrical installation, interrupt the wires, pull off the dry clothes, substitute

the board,> 1000 V - use bots, gloves, insulated rods, pincers, shorten the lines of electrical gears. Determine the state of the person.

Stage 2. Victims provide pre-nursing care, do artificial respiration.

There are three methods of providing artificial respiration:

- *Schaffer method* - help is provided by one person. The victim is put on a stomach - press on a back in a place of finding of lungs - with this 900-1100 ml of air enters the lungs of the victim (the head is turned sideways).

- *Sylvester method* - help is provided by two people. The victim is put on the back, under the neck, put a roller and watch, so as not to fail the tongue. The first makes the waves with his hands, and the second presses on the chest. This method is ineffective. The sufferer receives 500-600 ml of air.

- *The method of "mouth to mouth" or "mouth to nose"* is best done through gauze, bandage. During an artificial respiration, the victim is on the back. Simultaneously with artificial respiration, if it is necessary to conduct a closed heart massage - after each injection, make five shocks on the chest.

11. Fire Security

For the occurrence of combustion requires the presence of three factors:

- a combustible substance (hydrocarbon-containing substances: gasoline, kerosene, alcohol, etc.);

- oxidant (oxygen, chlorine, bromine, iodine, nitrogen oxides);

- sources of ignition (pulse), (hot surfaces, open fire, spark).

Depending on the properties of combustion combinations, it can be homogeneous and heterogeneous.

When homogeneous combustion substances have the same aggregate state, for example, gas-gas or liquid-liquid.

Heterogeneous combustion - substances are in different aggregate states (solid - liquid, liquid - gas).

There are two types of combustion complete and incomplete.

Complete combustion occurs with sufficient or excess amount of oxidant.

In this case, non-toxic substances are formed - carbon dioxide, hydrochloric acid, water, nitrogen, sulfuric anhydride, etc., which are incapable or burning.

Incomplete combustion occurs when the oxidant is insufficient. In this case, toxic substances that are subsequently suitable for combustion (soot, carbon monoxide, aldehydes, alcohols, resins, hydrogen sulfide and ammonia) are formed.

At the rate of propagation of the combustion flame is divided into:

- deflagration (normal) - the rate of propagation of the flame 0.01-1 m/s;

- explosion - an extremely rapid chemical transformation, accompanied by the release of energy and the formation of compressed gases, capable of performing mechanical work, the rate of propagation of which is 1 - 1000 m/s;

- detonation is a chemical reaction in which a shock wave is formed (the condition for detonation), the velocity of the wave propagation is -1000-7000 m/s.

The combustion is divided into the following types: flash, fire, spontaneous combustion, flare, self-flare, decay.

The flash is a quick combustion of a combustible mixture (<5 s), without the formation of compressed gases, which does not pass into a stable combustion under the influence of a source of combustion.

Flash point is the lowest temperature of a combustible substance in which vapor or gases are formed above its surface, which can ignite from a source of ignition, but the rate of their formation is still insufficient for stable combustion.

Occupation (sunburn) – is he occurrence of combustion under the influence of a source of ignition.

The ignition temperature is the lowest temperature of a combustible substance in which it produces combustible vapors and gases at such a rate that after their ignition there is a stable combustion (> 5 s).

Explosion – ignition, accompanied by the appearance of flame.

Self-ignition – the beginning of combustion without the influence of ignition source. Also the self-ignition is a spontaneous combustion, which is accompanied by the appearance of a flame.

The temperature of self-ignition is the lowest temperature of the substance at which there is a sharp increase in the rate of exothermic reaction, which leads to flame burning.

Fracture is the burning without light emission, which is usually recognized with the appearance of smoke.

Depending on the internal impulse, the process of self-ignition (self-ignition) is divided into: thermal, microbiological and chemical.

Thermal spontaneous combustion - arises as a result of the external heating of the substance at a certain distance (sun rays, open flame, etc.).

Microbiological spontaneous combustion occurs due to self-heating, caused by the vital activity of microorganisms in the mass of matter. To such self-ignition, substances of plant origin are susceptible - hay, grain, sawdust, peat (mainly not dried).

Chemical self-ignition - arises as a result of action on the substance of air, water, as well as the interaction of substances. For example, substances that can spontaneously engage in contact with water include potassium, sodium, cesium, calcium and alkali carbides, and the like. These substances emit flammable gases, which are heated due to the heat of reaction and capable of self-engagement. The compressed oxygen causes spontaneous combustion of mineral oils that do not spontaneously burn in the air.

Indicators of fire, explosive substances and materials.

According to the requirements of DBN V.1.1.-7-2002, the assessment of the fire-hazardousness of all substances and materials is carried out depending on the aggregate state: gas; liquid; solid (dust is isolated in a separate group).

First of all, determine the flammability of this substance. By this indicator, all substances and materials are classified as combustible, heavy and combustible.

Non-combustible – substances and materials that are not capable of combustion in the air of the normal composition and in the area of the source of combustion. These are inorganic materials, metals, plaster constructions.

Heavy-duty substances and substances are capable of igniting the air from a source of ignition. However, after its seizure, they are not capable of self-combustion. They contain combustible and non-combustible components (asphalt concrete, fibrolite).

Combustible - substances and materials that are capable of self-ignition, as well as ignition and self-ignition after its removal (all organic materials).

Combustible materials and substances are divided into: flammable, which deal with a source of ignition of insignificant energy (match, spark, etc.), and hard-flames that deal with more powerful sources of ignition.

Flammable liquids

All combustible liquids are more dangerous than solid materials and substances. They are more easily flammable, burn more intensively and form steam and gas air explosive mixtures.

According to GOST 12.1.004-85, the following flash temperatures are distinguished:

- flammable liquids (FL) - liquids with a flash point of not more than 61 0 C in a closed crucible or 66 0 C in an open crucible (gasoline, acetone, ethyl alcohol);

- combustible liquids (CL) - flash point> 61 ^{0}C in closed crucible or 66 ^{0}C- in open crucible (mineral oils, fuel oil, formalin).

The rules of the structure of electrical installations - give such a classification LZR and GR.

- FL - refer to explosive liquids;

- CL - refer to firefighting liquids.

Important indicators characterizing the explosive and fire properties of gases, liquids and dust are the concentration limits of the propagation of the flame (inflammation).

Lower (LCL) and upper (UCL) concentration limits of flame propagation are the minimum and maximum volumetric (mass) fractions of a combustible substance in a mixture with the given oxidizer, at which the ignition (ignition) of a mixture of ignition source is possible and further spreading Nymph of flame in a mixture at any distance from the source of ignition. Below NKM and above LCL mixture can not burn.

There are also lower (LCL) and upper (UCL) temperature limits of the propagation of flames of gases and air evaporation. LCL and UCL are the temperature of a substance in which its saturated vapor forms in these oxidizing medium concentrations equal to LCL and UCL respectively.

Solids and materials

The tendency of solids and materials to ignite is determined by the following methods:

1. Visual – this method forms the basis for the classification of solid materials and substances for ignition. According to this method all solid materials and substances are divided into: combustible; heavy; incendiary

Combustible materials - these are materials, the type of which burns in the source zone and continues to burn without the presence of a source of ignition.

Heavy-duty materials are materials that burn only in the area of the source of ignition.

Non-combustible are materials that do not burn in the area of the source of ignition.

2. Calorimetric – this method consists in placing the sample in a calorimeter, heating it, and forming a thermal balance and calculating the coefficient of ignition of the sample K.

If K <0,1 - the material is combustible, K = 0.1-0.2 - the material is severe, if K> 0.2 - a non-combustible material.

Fire and explosive dust

Industrial dust is of two types: aerosols, aero gels.

Aerosols are suspended dust particles that are in the air and form an explosive mixture.

Air gel is a dust that rests on the equipment and is fire hazard.

Explosive dust is characterized by the lower and upper co-centric limits of the propagation of the flame (NKM and VKM).

Fire hazard is characterized by NKM and temperature of self-ignition.

All dust is divided into four classes: I and II classes - it is explosive, and III and IV classes - it is a fire hazard.

I class - the most explosive dust LCL which up to 15 g/m^3 (dust of sulfur, sugar, rosin, magnesium, aluminum, powdered milk, titanium).

Class II – the explosive dust LCL which is in the limits of 15 - 65 g/m^3 (dust coffee, tea, flour, coal).

Class III is the most fire hazard LCL > 65 g/m^3, and the temperature of self-ignition up to 250 ^{0}C (dust of tobacco, zinc, coal).

Class IV - is a fire hazard LCL> 65 g/m^3 and the temperature of self-ignition > 250 ^{0}C (wood dust, coal high-altitude dust).

Hazardous fires. Causes of fires.

The fire is uncontrolled combustion outside a special fire spreading in time and space, posing a threat to people's life and health, the environment and leads to material damage.

Fire hazard – the possibility of the occurrence or development of a fire in any substance, in process or condition.

When a person is in the fire zone, he may be exposed to the following hazardous and harmful factors: toxic combustion products; fire smoke; high temperature of the medium; lack of oxygen; destruction of building constructions; explosions, leakage of dangerous substances occurring as a result of a fire; panic

Toxic combustion products constitute the greatest danger, a threat to people's lives, especially when fires in buildings. Synthetic materials are the main source of toxic combustion products. Thus, when combustion of polyurethane is formed cyanide hydrogen (hydrocyanic acid). When combustion of vinyl plat - hydrogen chloride and carbon monoxide, with combustion of linoleum - hydrogen sulfide and sulfur dioxide, etc.

Fire is an extremely dangerous fire factor (flame temperature - 1200-1400°C), causing burns and pain. The minimum distance in meters on which the person may still be from the flame is 1.6 • H, where H is the average height of the flame in meters.

The raised temperature of the environment - the danger is that inhaling the heated air together with the products of combustion can lead to damage to the respiratory and death organs. (60 ° C is already life-threatening).

Smoke is a large number of tiny solid or liquid particles of substances that are not burnt. It causes irritation of the respiratory and mucous membranes, and also reduces the visibility in the room.

The insufficiency of oxygen is due to the fact that in the process of combustion there are chemical reactions of oxidation of combustible substances and materials. Hazardous for human life is considered to be a situation where the oxygen content decreases to 14% (the norm is 21%). At the same time, the coordination of movements is lost, weakness appears, dizziness, suppressed consciousness.

Explosions, leakage of dangerous substances are caused by heating and leakage of tanks and pipelines with dangerous liquids and gases. Explosions increase the area of burning.

The destruction of building structures is due to the loss of their bearing capacity under the influence of temperatures and explosions. In case of destruction, a person may get mechanical injuries, fall under the rubble of sunken structures, which makes it difficult to evacuate.

Panic is caused by rapid changes in the mental state of a person with a depressive character in an extreme situation (fires). The action of the fire factors exceeds the limit of human psycho physiological capabilities, and the person is panicked. At the same time, it loses the ability to calmly reflect, its actions become uncontrollable. Panic can lead **to mass deaths of people.**

The main causes of fires and explosions. The phenomenon, or circumstances directly causing the occurrence of a fire, is called the cause of a fire. Analyzing the emergence of fires in industries, institutions, organizations can be conditionally distinguishing causes non-electric and electrical nature.

Categories of premises for explosive and fire hazard

Requirements for constructive and planning decisions of industrial facilities, as well as other issues of ensuring their fire and explosion security, are largely determined by the category of premises and buildings for fire and fire hazard.

The definiti The basis of the calculation method for determining the categories of fire and fire hazard of industrial premises is the energy approach, which consists in

the estimation of the calculated excess pressure of the explosion in comparison with the permissible.

The category of the room and the class of the zone according to the PBE must be indicated on the entrance door of the room.

Classification of explosion and fire hazardous premises (zones) according to AEE

The main measure of preventing fires and explosions from electrical equipment is the proper choice and operation of equipment in explosive and fire hazard operations in explosive and fire hazardous premises.

According to the PBE, premises are divided into explosive and fire hazard zones:

Explosive zones (B3) - this is the space in which there are, or there may be explosive mixtures:

By gases or vapors - 0, 1, 2;

By dust - 20, 21, 22.

Class 0 explosive area is a space in which an explosive atmosphere is present permanently or for a long time.

Explosive class 1 zone is a space in which an explosive atmosphere can be formed during normal operation.

Explosive zone of class 2 is a space in which there is no explosive environment under normal operating conditions, and if it arises, it rarely lasts for a short time. In these cases, accidents and catastrophes are possible.

Class 20 explosive zone is a space in which, during normal operation, explosive dust in the form of a cloud is present constantly or often in an amount sufficient to form a dangerous concentration of the mixture with air, and (or) space where typical layers of predicted or excessive thickness may be formed. Preferably this takes place in the middle of equipment, where dust can form explosive mixtures often and for a long time.

Class 21 explosive area is a space in which, during normal operation, dust may appear in the form of a cloud in an amount sufficient to form an explosive mixture with air. This zone can combine space near the place of powder filling or settling and space, where, during normal operation, the typical appearance of typical layers, which may form dangerous concentrations of an explosive dust-air mixture, can be combined.

The category of the room and the class of the zone according to the PBE must be indicated on the entrance door of the room.

Classification of explosion and fire hazardous premises (zones) according to the Rules of safety.

The main measure of preventing fires and explosions from electrical equipment is the proper choice and operation of equipment in explosive and fire hazard operations in explosive and fire hazardous premises.

According to the Rules of safety, premises are divided into explosive and fire hazard zones:

Explosive zones (B3) - this is the space in which there are, or there may be explosive mixtures:

By gases or vapors – 0, 1, 2; by the dust – 20, 21, 22.

Class 0 explosive area is a space in which an explosive atmosphere is present permanently or for a long time.

Explosive class 1 zone is a space in which an explosive atmosphere can be formed during normal operation.

Explosive zone of class 2 is a space in which there is no explosive environment under normal operating conditions, and if it arises, it rarely lasts for a short time. In these cases, accidents and catastrophes are possible.

Class 20 explosive zone is a space in which, during normal operation, explosive dust in the form of a cloud is present constantly or often in an amount sufficient to form a dangerous concentration of the mixture with air, and (or) space where typical layers of predicted or excessive thickness may be formed. Preferably this takes place in the middle of equipment, where dust can form explosive mixtures often and for a long time.

Class 21 explosive area is a space in which, during normal operation, dust may appear in the form of a cloud in an amount sufficient to form an explosive mixture with air. This zone can combine space near the place of powder filling or settling and space, where, during normal operation, the typical appearance of typical layers, which may form dangerous concentrations of an explosive dust-air mixture, can be combined.

Explosive zone class 22 is a space in which explosive dust in a damaged state may appear infrequently and not long, or in which layers of explosive dust can exist and form explosive mixtures in the event of an accident.

Fire hazard zones (P3) - a space where there may be combustible materials, both in the normal technological process and in case of possible violations (P - 1, P - II, P - IIa, P - III).

Class P-I is a zone of premises where flammable liquids are used or stored at a flash point of ≥ 61 0C.

Class P-II is a zone of premises where a combustible dust or LCL fibers spreads ≥ 65 g/m3 of air volume or explosive dust, the content of which in the air of the premises does not reach explosive concentrations.

Class P-IIa - areas of premises in which there is a solid or fibrous combustible matter. Combustible dust and fibers are not released into the air (closed warehouses).

Class P-III - external installations, where used or stored with a flash point ≥ 61 0C, as well as solid combustible substances.

According to the Rules of safety, in the fire hazard zones, closed type electrical equipment is used, the interior space of which is separated from the outer envelope. Equipment for control and protection, fixtures recommended for use in dustproof performance. All electrical wiring must have a reliable insulation. In explosive zones and external installations it is necessary to use explosion-proof equipment manufactured in accordance with Government Standard (GOST 12.2.020 - 76. Starting equipment, magnetic) starters for classes 0 and 20 must be carried out outside of explosive rooms with remote control. Wires in explosive rooms must be laid in metal

pipes. Armored cable may be used. Lamps for classes 0, 1, 20, 21 must have an explosion-proof performance.

Fire protection system

The system of fire and explosion protection is, so to speak, the second level of fire safety, which begins to operate with the emergence of the first signs of a fire.

The system is aimed at creating conditions for limiting the spread and development of fires and explosions outside the cell at their occurrence, to detect and eliminate the fire, to protect people and property against the effects of harmful and dangerous factors of fires and explosions.

Fire protection must be achieved using one of the following methods or a combination of them:

- Restrictions on the proliferation and development of the fire
- the use of appropriate fire extinguishing and fire fighting equipment
- application of automatic fire alarm installations and fire suppression
- application of basic building constructions and materials, including and facing, with normalized indicators of fire safety
- application of impregnation of structures of the object with fire retardants and application of fire-retardant paints, the use of combustible materials for interior decoration of premises
- the use of devices limiting the spread of the fire
- organization with the help of technical means, including automatic, timely notification of people and their evacuation
- application of means of collective and individual protection of people from dangerous fire factors
- application of anti-smoke protection measures

The most important task of the whole system of fire protection is the protection of people in the event of a fire. Solving this problem is a great deal of complexity, because it has its own specifics and is carried out in other ways than the protection of building structures or material assets.

Salvation is a forced displacement of people outside when exposed to dangerous fire factors or if there is a direct threat of this impact. The forced movement of people to save is called evacuation.

Each object must have such volumetric planning and technical implementation that the evacuation of people from it was completed before the maximum permissible values of the dangerous factors of the fire occurred, and if impractical evacuation was not ensured, the protection of people in the object was ensured.

Evacuation of people from buildings and structures is carried out through evacuation exits. By evacuation is a path that is safe for people to move, which leads to an evacuation exit.

Evacuation exit is the exit from the house (buildings) directly outside or exit from the room leading to the corridor or staircase directly or through an adjacent room. Exits are considered evacuation if they lead from the premises:

- on the first floor directly outside or through the lobby, corridor, staircase;

- any floor except the first in a corridor leading to an inner staircase or staircase having an exit directly outside or through the lobby, separated from the adjacent corridors by the partitions of the door;

- in the adjoining room on the same floor, which is provided with exits.

From the premises located on the second and higher floors (up to a height of not more than 30 m) it is supposed to provide an evacuation (spare) access to the external steel stairs. The number of evacuation exits from the premises and from each floor of buildings should be taken for SNiP 2.09.02-85, but not less than two. Evacuation exits must be dispersed. The minimum distance L between the most remote evacuation outlets from the premises can be determined by the formula: $L= 1,5P$, where P - perimeter of the room.

The width of the evacuation paths in the light should be at least 1 m, the height of the passage - not less than 2 m. Arrangement of screw stairs on evacuation routes is not allowed. Between the stairs marches it is necessary to provide a horizontal clearance of not less than 50 mm.

Doors on the way of evacuation should open in the direction of exit from the premises. The arrangement of sliding doors on evacuation routes is not allowed. The minimum width of the doors on the evacuation paths should be 0.8 m. The width of the outer doors of the staircase should be not less than the width of the staircase march.

The distance from the most distant workplace to the nearest evacuation exit from the premises directly to the outside or to the staircase shall not exceed the values given in SNiP 2.09.02-85. The required evacuation time of people (mines) from public and industrial buildings is established in SNiP II-2-80.

To ensure evacuation you need:

- to establish the number, size and constructive execution of evacuation and exit routes;

- to ensure the possibility of unhindered movement people along the evacuation routes;

- to organize, if necessary, the control of movement of people along the routes of evacuation (light indicators, sound and voice alert, etc.)

The fulfillment of regulatory requirements for evacuation routes does not guarantee the full success of evacuation of people in the event of a fire. In order to ensure organized movement during evacuation and panic prevention, technical solutions should be supplemented by organizational measures, which include, first of all, instruction and training of the personnel. For this purpose, plans are being developed to evacuate buildings and places of mass residence.

Collective and personal protective equipment should ensure the safety of people throughout the lifetime of hazardous fire factors

Collective protection should be provided with fire safety zones and other constructive solutions. Personal protective equipment is primarily used by firefighters involved in the extinguishing of fires, but also applied to other persons in compulsory cases

It is very important for the safety of people to create anti-dust protection of the premises and in particular evacuation routes in order to ensure that the temperature is not diminished, the temperature is reduced and the combustion products and the thermal decomposition evacuated for sufficient time to evacuate people and / or collective protection of people. Anti-theft protection is ensured by limitation of distribution of combustion products in buildings and premises, isolation of possible places of fire, forced smoke removal. These tasks are solved by means of bulk-planning and constructive solutions in the design of objects, some technological techniques in the process of construction, due to the use of special devices and ventilation systems.

For timely implementation of measures for the evacuation of people, the inclusion of stationary fire extinguishing systems, fire protection calls, etc., fire and explosion objects are equipped with fire alarm systems, which can be started automatically or manually.

The fire alarm system should quickly identify the places of the fire, reliably transmit the signal to the reception and control point and to the point of receiving fire signals, turn the signal of fire into a receptive form for the personnel of the protected object, activate the existing stationary fire extinguishing systems, and provide self-monitoring of operation.

Reliable and rapid means of reporting a fire is an electric fire alarm system, automatic or manual operation.

Means and methods of fire extinguishing

In the complex of measures used in the system of fire protection, it is important to choose the most rational methods and means of extinguishing various combustibles and materials in accordance with DBN V. 2.5-13-98 "Fire automatics of buildings and structures."

Burning stops:

- during the cooling of the combustible substance to a temperature lower than the temperature of its ignition (cooling, removal of heat from the combustion zone);
- when reducing the concentration of oxygen in the air in the combustion zone;
- when the flow of vapors, combustible gases into the combustion zone is stopped;
- when diluting the combustible substance with a non-flammable substance;
- when isolating the combustion zone from the interaction of matter.

Ways of extinguishing a fire.

There are some basic ways to stop the combustion process: physical and chemical.

Physical methods:

1. Cooling of combustible substances or (removal of heat from the combustion zone) is carried out:

- irrigation of combustible substances;
- mixing layers of combustible substances;

- evacuation of combustible substances and materials.

The method of cooling is based on the fact that combustion of a substance is possible only when the temperature of its upper layer is higher than the temperature of its ignition. If you remove heat from the surface of the combustible substance, that is, cool it below the ignition temperature, combustion stops.

2. Dilution:

- volume dilution of the oxidant by inert gases and vapor;

- volume dilution of combustible substances with inert gases and vapor (increase of heat capacity of the combustion system).

The method of breeding is based on the ability of the substance to burn at an oxygen content of more than 14-16% by volume. With the decrease of oxygen in the air below the specified value, the combustion is stopped, and then the decay is stopped as a result of the reduction of the oxidation rate. Reducing the concentration of oxygen is achieved by introducing into the air inert gases and vapor from the outside or by diluting the oxygen by combustion products (in isolated premises).

3. Isolation (disabling of the mechanism of ignition) is carried out:

- by isolating surfaces of combustible substances with water, foam, asbestos fabric (blanket);

- removal of combustible substances from the combustion zone.

The method of isolation is based on stopping the flow of oxygen to the burning substance. For this purpose, various insulating extinguishants (chemical foam, powder, etc.) are used.

4. Mechanical methods (turning off the ignition mechanism) are carried out:

- mechanical separation of flames by an air shock wave or a strong jet of water, powder or gas .;

- the method of fire interference is based on the creation of conditions in which the flame does not extend through narrow channels, the cross section of which is less critical.

Chemical methods.

- volumetric dilution of the combustible dust, gas, and air system by flammable substances (extinguishing powders, halogenated hydrocarbons);

- Irrigation of surfaces of combustible materials by phlegmatic agents - inhibitors that slow down the reaction.

The method of chemical inhibition of combustion reactions is to introduce into the combustion zone of halogen derivatives (methyl bromide, ethyl and Freon, etc.) which, when flowing into the flame, decompose and interconnect with the active centers, terminating the exothermic reaction, that is, the release of heat. As a result, the combustion process is stopped.

Means of extinguishing fires

The success of the rapid localization of the fire at its beginning depends on the presence of fire extinguishers, the ability to use them, as well as from the means of fire communication and signaling to call for fire and the commissioning of automatic and primary fire extinguishing means.

Stopping combustion is achieved with the help of fire extinguishers:

- water (in the form of a jet or in a spray form);
- non-combustible (inert) gases, carbon dioxide, nitrogen, etc.;
- Chemicals (in the form of foam or liquid);
- powder-like dry mixtures (a mixture of sand and flux);
- fire covers made of tarpaulins and asbestos.

The choice of certain methods and means of extinguishing fires and extinguishants depends on the extent of the fire, the parameters of the fire (area, intensity, combustion temperature, etc.), the type of fire (in the open or open air), the combustion of substances and materials, fire extinguishing ability to quench specific substances and materials, the effectiveness of the method of extinguishing a fire.

Water - the cheapest and affordable extinguishing agent. It has the highest heat capacity compared to other extinguishants and thermal resistance (1700 °C). For evaporation of 1 liter of water, 2684 kJ of heat is required, with 1725 liters of steam being formed. Water is used in the form of compact and spray jets, and as a pair. A stream of water quenches solid flammable substances; rain and water dust - solid, fibrous, loose materials, as well as alcohols, transformer and solvent oils.

It is impossible to extinguish water. Flammable combustible materials (gasoline, kerosene, as water accumulates below these substances and increases the area of combustible surface), as well as alkali metals (Na, K, Mg), electrical equipment, which is under voltage, securities and equipment.

Water vapor is used to extinguish fires in an area of up to 500 m3 and small fires in open installations. The flammable concentration of vapor in the air is 35%.

Aqueous solutions of salts are used to extinguish substances that are poorly watered (cotton, wood, peat). Surfactants are added to the water: foaming agents, sultanas, and the like.

Inert and non-flammable gases.

Carbon dioxide (CO2) at atmospheric pressure is converted into carbon dioxide. Cools and isolates the combustion zone. With evaporation in air of 1 kg of liquid carbon dioxide, 506 liters of carbon dioxide (snow) are formed. Carbon dioxide is used to extinguish LZR and GR in containers, as well as to extinguish the burning electrical equipment.

Nitrogen. It dilutes and cools the reactants (temperature of liquid nitrogen $t = -250\ ^0C$) and isolates the combustion zone.

Foam is a colloidal dispersion system consisting of cells - gas bubbles. The walls of bubbles are formed from solutions of surface-active substances and stabilizers. Pines are divided into chemical and air-mechanical.

Chemical foam is obtained by the interaction of alkaline and acid solutions in the presence of a foaming agent. This foam consists of 80% CO_2, 19.7% water and 0.3 foaming agent. It is formed in foam generators type PG-50 and PG-100 at interaction of foam gun powder with water. The foam cools the upper layer, and in particular the combustion zone, reducing the ability of the combustible substances to evaporate. Multiplicity of chemical foam 5-8, resistance - up to 50 minutes.

Air-mechanical foam is one of the most effective means of extinguishing, and is formed by mechanical mixing of air (90%), water (9,4-9,8%) and foaming agent (0,2-0,6%). Multiplicity of air-mechanical foam 10-200, resistance to - 20 minutes.

Foaming agent type PO-1 consists of kerosene contact, carpentry glue and ethyl alcohol. Air - mechanical foam is formed as a result of intensive mixing of a water solution of a foaming agent with air, which is carried out in a foam generator.

Foam generators of type's ГВП-200, ГВП-600 and ГВП-2000 have productivity of 200 - 2000 l / s foam, multiplicity of 100.

Foams are used to extinguish flammable liquids

Obligations of the employer regarding the provision of fire safety.

The provision of fire safety is an integral part of the production and other activities of officials, employees of enterprises, institutions, organizations. According to the current legislation, the provision of fire safety to enterprises, institutions and organizations is based on their owners (managers) and their authorized persons, unless otherwise provided by the relevant agreement.

The provision of fire safety in residential premises of the state, public housing fund and housing cooperative is based on tenants and owners, and in residential houses of a private housing stock and other structures, on cottages and garden plots, on their owners or tenants, if this is stipulated by the contract hiring

Owners of enterprises, institutions and organizations or their authorized bodies (hereinafter - owners), as well as tenants are obliged:

- in accordance with the regulations on fire safety, to develop and approve regulations, instructions, other regulations within the enterprise, to exercise constant control over their compliance;
- in the absence of normative acts of the requirements necessary for the provision of fire safety, to take appropriate measures, coordinating them with the state supervision bodies;
- to ensure compliance with fire standards of standards, norms and rules, as well as to comply with the requirements of regulations and regulations of state fire authorities;
- to develop comprehensive measures to ensure fire safety, to introduce advanced science achievements;
- organize training of employees on the rules of fire safety and advocate measures to ensure their safety;
- keep fire protection and communication equipment, fire fighting equipment, equipment and inventory in a good condition, and prevent their unauthorized use;
- to create, in case of necessity, in accordance with the established procedure, the units of fire protection and the material and technical basis necessary for their functioning;
- to file information and documents on the state of fire safety of objects and products manufactured by them upon request of the state fire guard;

- to implement measures for the implementation of automatic means of detection and extinguishing of fires and the use of industrial automatics for this purpose;

- To inform the fire department in a timely manner about the malfunction of fire fighting equipment, fire protection systems, water supply, as well as the closure of roads and fences in its territory;

- to conduct official investigation of fires.

According to Article 6 of the Law of Ukraine "On Fire Safety" citizens of Ukraine, foreign citizens and stateless persons staying in Ukraine are obliged to:

- to comply with the rules of fire safety, to provide the buildings which belong to them on the right of personal property, the primary means of extinguishing fires and fire-fighting equipment, to educate children the ability to behave with caution with fire;

- to inform the fire brigade about the occurrence of a fire and take measures for its elimination, the salvation of people and property.

12. Microclimate of industrial premises

Microclimate is one of the most important physical factors affecting the body of an employee while staying in a production room. The employer must create in each structural unit in the workplace the working conditions in accordance with the regulatory legal acts, ensure the rights of workers in the field of occupational safety, and eliminate hazardous and harmful production factors. This is provided for in Article 13 of the Law of Ukraine "On Occupational Safety" dated October 14, 1992, No. 2694-XII. Requirements for the microclimate of industrial premises are prescribed in the State Sanitary norms of the microclimate of industrial premises (DSN 3.3.6.042-99), approved by the decision of the Chief State Sanitary Doctor of Ukraine of December 01, 1999 No. 42.

Production space - a closed space in specially designated houses and buildings, in which constantly (in change) or periodically (within a part of the working day) is carried out labor activities of people.

Microclimate of industrial premises - conditions of the internal environment of these premises, affecting the heat exchange of work with the environment by the different processes, such as: convection, conduction, thermal radiation and moisture evaporation. These conditions are determined by a combination of temperature, relative humidity and air speed, the temperature of people surrounding the surfaces and the intensity of thermal (infrared) radiation.

Optimal microclimatic conditions - a combination of parameters microclimate, which, with a prolonged and systematic impact on humans provide storage of the normal thermal state of the body of the activation of the mechanisms of thermoregulation. They provide a feeling of warm comfort and create prerequisites for a high level of performance.

The warm period of the year is a period of the year, which is characterized by the average daily temperature of the environment above + 100C.

Cold period of the year - a period of the year and characterized by the average daily temperature of the outside air, which is equal to + 100C and lower.

Average daily temperature of the outside air - the average magnitude of the temperature of the outside air, measured at certain times of the day through the same time intervals. It is accepted by meteorological service.

Category of work - the delineation of work on the basis of the overall energy consumption of the body. Light physical work (category I) covers the types of activities in which the energy consumption is equal to 105-140 Tues (90-120cc / h) - category Ia and 141-175W (121-150 kcal / h) -category Ib.

Category Ia includes work that performs loosening and does not require physical stress. Category Ib include work performed while sitting, standing or walking related and accompanied by some physical tension. Physical work of medium heaviness (category II) covers activities in which the energy consumption is equal to 176-232 W (151-200 kcal / h) - category IIa and 233 - 290 W (201-250 kcal / h) - category IIb. Category IIa includes work related to walking, moving small (up to 1 kg) items or items in a standing position or sitting and requiring some physical exertion. Category IIb includes work carried out standing, associated with the movement, the movement of small (up to 10 kg) cargo and accompanied by moderate physical stress. Heavy physical work (category III) covers activities in which the energy gain is 291-349 W (251-300 kcal / h). Category III includes work related to permanent displacement, the transfer of significant (more than 10 kg) of goods that require a lot of physical effort.

Classification of vibration and its adverse effect on a person

Vibration is the mechanical vibrations of elastic bodies or oscillatory movements of mechanical systems.

For a person, vibration is a kind of mechanical impact, which has negative consequences for the body.

The cause of vibration is the unbalanced forces and shock processes in the operating mechanisms. Creation of high-performance powerful cars and high-speed vehicles while reducing their material intensity inevitably leads to an increase in the intensity and expansion of the spectrum of vibration and vibroacoustic fields. This is also facilitated by the widespread use in the industry and the construction of highly effective mechanisms of vibration and vibration impacts. The action of vibration can lead to the transformation of the internal structure and surface layers of materials, changes in the conditions of friction and wear on the contact surfaces of machine parts, heating structures. Vibration increases the dynamic loads in the elements of structures, joints and joints, reduces the load bearing capacity of parts, initiates cracks, there is a destruction of equipment. All this leads to a decrease in the life of the equipment, the growth of the probability of emergencies and the growth of economic costs. It is believed that 80% of the accident in cars and mechanisms is due to vibration. In addition, fluctuations of structures are often a source of unwanted noise. Protection against vibration is a complex and multifaceted problem in the scientific and technical and socio-economic issues of our society.

The action of vibration is determined by the intensity of oscillations, their spectral composition, duration of influence and the direction of action. Indicators of intensity are the rms or amplitude values of vibration acceleration (a), vibration velocity (v), vibrational displacement (x). The parameters x, v, a are interrelated, and for sinusoidal vibrations, the value of each of them can be calculated by the values of another of the relation:

$a = v \cdot (2 \cdot p \cdot f) = x(2pf)^2$

where 2pf – circular vibration frequencyc^{-1}.

The logarithmic scale of decibel is used to estimate the vibration levels.

By the method of transmission on the human body distinguish between general and local (local) vibration. General vibrations and, causing oscillations of the whole organism, and local (local) - draws into oscillatory movements only certain parts of the body (hands, feet).

Local vibration, acting on the hands of a person, is formed by many manual machines and mechanized tools, while driving vehicles and vehicles, in construction and assembly work.

The total vibration by source is divided into the following categories:

Category 1 - transport vibration, which acts on a person at work places of self-propelled and trailer cars, vehicles during traffic on the ground, agrofons and roads (including during their construction). The sources of transport vibration include, for example, agricultural and industrial tractors, self-propelled agricultural machines; trucks (including trucks, scrapers, graders, rollers, etc.); snow-removers, self-propelled mining equipment, rail transport.

Category 2 - transport-technological vibration, which acts on a person in the work places of machines with limited mobility and moving only on specially prepared surfaces of industrial premises, industrial sites and mining. The sources of transport-technological vibration include, for example, excavators (including rotary), industrial and construction taps, open-hearth furnaces (forging), mining combines, self-propelled drill carriages, road machines, concrete pavers, transport of industrial premises.

Category 3 - technological vibration, which acts on a person in the workplace of stationary machines or transferred to jobs that do not have sources of vibration. The sources of technological vibration include, for example, machine tools and metal-woodworking, press-forging equipment, foundry machines, electric machines, separate fixed electrical installations, pump units and fans, well drilling equipment, drilling rigs, livestock machinery, cleaning and sorting grains (including dryers), equipment for building materials industry (except concrete), installations for chemical and petrochemical industry, etc.

General technological vibration at the place of action is divided into the following types:

a) on permanent working places of industrial premises of enterprises;

b) in the workplace of warehouses, dining rooms, household, duty and other industrialpremises, where there are no sources of vibration;

c) in the workplaces of plant managements, design bureaus, laboratories, educational centers, computer centers, medical centers, office premises, work rooms and other premises for employees of mental work.

By source, the local vibration is divided into one that is transmitted from:

- hand-held machines or manually-mechanized tools, machinery and equipment control systems;
- hand-held tools without motors (for example, rivet hammers) and parts to be machined.

By time characteristics general and local vibrations are divided into:

- constant for which the value of vibration acceleration or vibration velocity changes less than 2 times (less than 6 dB) per working shift;
- non-volatile, for which the value of vibration acceleration or vibration velocity varies by at least 2 times (6 dB or more) per working shift.

Vibration causes a violation of the physiological and functional states of a person, therefore, it is normalized in production.

Maximum permissible vibration levels (Excerpts from DST12.1.12.-78)

A) Norms of local vibration:

Vibration speed	Octave bands with geometric mean frequencies, Hz							
	8	16	31,5	63	125	250	500	1000
$m/s \times 10^2$	5,0	5,0	3,5	2,5	1,8	1,3	0,9	0,65
dB	120	120	117	114	111	108	105	102

B) Norms of total vibration

Vibration speed	Vibration velocity in octave bands with geometric frequencies, Hz					
	2	4	8	16	31,5	63
Technological vibration on permanent workplaces in industrial premises of enterprises (category 3)						
$m/s \times 10^2$	1,3	0,45	0,22	0,2	0,2	0,2
dB	108	99	93	92	92	92
Transport and technological vibration (2 category)						
$m/s \times 10^2$	3,5	1,3	0,63	0,56	0,56	0,56
dB	117	108	102	101	101	101
Transport vibration (1 category)						
$m/s \times 10^2$	3,5	3,2	3,2	3,2	3,2	3,2
dB	117	116	116	116	116	116

Note: The standards are set for the duration of the working shift of 8 hours.

Persistent harmful physiological changes are called vibration disease. Symptoms of vibration illness are manifested in the form of headache, numbness of the fingers; pain in the hands and forearms, seizures, increased sensitivity to cooling, insomnia appears. With a vibration illness, pathological changes in the spinal cord, the cardiovascular system, bone tissues and joints occur, and the capillary circulation changes.

Characterization of noise, infra-red and ultrasound in industrial conditions

Noise is any undesirable sound that harms a person's health, reduces his ability to work, and can also contribute to injury as a result of a decrease in the perception of warning signals. From a physical point of view, it is the wave oscillations of elastic medium that propagate at a certain speed in a gaseous, liquid or solid phase.

Sound waves arise when violations of the stationary state of the medium as a result of the effect on them of the excitation powers and, propagating in it, form a sound field.

The sources of these disorders are mechanical vibrations of structures or their parts, non-stationary phenomena in gaseous or liquid environments. Sound waves propagate in the air environment and differ in this from vibration waves transmitted to the human body only when touching the vibration equipment. The propagation of the sound field is accompanied by energy transfer.

Differentiate the objective and subjective characteristics of the sound. The objective characteristics of sound, like a mechanical wave, are the intensity and intensity of sound, frequency and frequency spectrum. Objective sound characteristics can be measured by appropriate instruments, regardless of the person. Considering that the sound is also the object of auditory perception, it is evaluated by a person subjectively. Subjective characteristics of the sound are: volume of sound, height, timbre.

Inaudible range of sounds (infrasound)	Audible range of sounds	Unexplained range of sounds (ultrasound)
16	20000	f, Hz
Sounds do not cause hearing impairment in humans	Sounds cause a person's feelings	Sounds do not cause certain auditory hearing sensations in humans

By time characteristics, noise is divided into constant and non-constant. Constant considerations are noises in which the sound level during the working day does not change by more than 5 dBA. Uncontinuous noise is divided into intermittent, time-varying, and pulsed ones. With intermittent noise, the sound level can drop sharply to the background level and the length of the intervals when the level remains constant and exceeds the background level, reaches 1 s or more. In noise with fluctuations in time, the sound level continuously changes over time. To impulsive include noises in the form of individual sound signals of less than 1 s each, perceived by the human ear as individual blows.

Noise is sounds of different frequency and intensity that are not perceived as information, so the body is protected by a decrease in sensitivity and an increase in the threshold for excitability of auditory receptors.

Noise - a general biological stimulus - at high intensity or prolonged action can affect all organs and systems of a person. Noise has an effect on different parts of the brain, breaking the normal processes of nervous activity. Characteristic: tiredness, apathy, irritability, memory impairment, weakness.

High intensity noise leads to changes in the cardiovascular system, accompanied by tone and heart rate abnormalities, and changes in arterial blood pressure.

Under the influence of noise disturbed normal functioning of the stomach (decreases the amount of gastric juice, changes in acidity, gastritis and gastric ulcer occurs).

In recent years, the effect of noise on the organ of vision has been determined (the stability of clear vision and visual acuity decreases, color perception deteriorates). Noise leads to a violation of the processes of exchange.

Intermittent and impulse noise violates the accuracy of operations; worsen the process of perception and assimilation of information. The most sensitive to noise are the following operations: compilation and collection of information, thinking. Under the influence of noise there is a decrease in productivity at the enterprise, an increase in the number of defects, and the creation of a hazard. At noisy manufactures (with exceeding the normative values), professional noise with hearing loss is formed.

Maximum permissible noise levels at workplaces (excerpt from Gosstandart 12.1.003-83)

Working places	Sound pressure levels (dB) in octave bands with geometric mean frequencies								Equivalent sound levels (dBA)
	63	125	250	500	1000	2000	4000	8000	
Premises of design bureaus, computer programmers, laboratories for theoretical works	71	61	54	49	45	42	40	38	50
Control rooms, work rooms	79	70	68	58	55	52	50	49	60
Premises and sites of exact assembly, typewriter bureau	83	74	68	63	60	57	55	54	65
Permanent workplaces and work areas in industrial premises on the territory of enterprises, permanent workstations of stationary machines (agricultural, mining, etc.)	99	92	86	83	80	78	76	74	85

Ultrasound is widely used in techniques for dispersing liquids, cleaning parts, welding plastics, metal defectoscopy, cleaning gases from harmful impurities, etc.

Fluctuations and sound of infrasonic frequencies are widespread in modern production and transport. They are formed during the operation of compressors, internal combustion engines, large fans, the movement of locomotives and cars.

Infrasound is one of the unfavorable factors in the production environment, and at high levels of sound pressure (more than 110-120 dB) there is a harmful effect on the human body.

The technology uses sound waves at a frequency higher than 11.2 kHz, that is, it captures part of the range of tangible sounds for humans. On organism ultrasound influences, mainly, on direct contact and through the air. When observing safety measures, work with ultrasound does not affect the health status.

Ultrasound can be considered as mechanical vibrations of the natural environment, which have the same physical nature sound, but differ in higher frequency. A specific feature of the ultrasound is the possibility of propagation of ultrasonic vibrations, which are directed by a beam, which allows you to create large ultrasonic pressure on a small area. This property has caused extensive use of ultrasound for cleaning, drying, technical control.

The source of ultrasound is the equipment in which ultrasonic oscillations are generated for performing technological operations (ultrasonic welding, defectoscopy, purification, etc.), as well as equipment and process, in the operation of which the UH occurs as an associated factor (plasma cutting and welding, sputtering , diffusion welding, oxygen cutting). The ultrasonic range is divided into low-frequency oscillations (1.12 104 - 1 105 Hz) that propagate in the air and by contact and high-frequency oscillations (1 105-1 109 Hz), which are distributed only by contact. Industrial equipment operates mainly from ultrasound frequency of 18 - 70 kHz.

The main parameters are: ultrasonic pressure; intensity; frequency When distributed in different environments, ultrasound waves are dressed the more that the higher their frequency. Therefore, low-frequency and ultrasound are well distributed in the air, and ultrasound is practically non-existent. In elastic environments (water, metal, etc.). U.S. little absorbs and extends over long distances. When you collect UZ there is an environment heating.

U.S. acts on a person in the following cases:

- when propagated by air (often with noise);
- in direct contact with the liquid and solid bodies in which the (contact action) extends. The phenomenon of contact action is most safely used in medicine.

The influence of ultrasound can cause damage to the peripheral nervous and vascular system of a person in places of contact (autonomic polyneuritis, muscle weakness of the fingers, shoulders and forearms).

With prolonged operation of the ultrasound, functional disorders of the central and peripheral nervous system, the cardiovascular system, the auditory and vestibular apparatus may occur. Unlike noise, ultrasound has a lesser effect on the auditory function, but leads to significant deviations from the norm of vestibular function, pain sensitivity, and thermo repression.

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levels of sound pressure (more than 110-120 dB) there is a harmful effect on the human body.

Infrasound is a mechanical oscillation of the natural environment up to 20 Hz. Characteristics are the same as for noise. There are natural sources: earthquake, volcano, sea storms. In production conditions, I3 occurs when working low-speed machines and mechanisms with large dimensions, as well as compressors, fans, which carry out reciprocating or rotational movements up to 20 Hz. Infrasound is well spread in the air and transmitted over long distances.

Infrasound has a negative effect on the whole body, including on the hearing (ear pain, hearing loss sensation at all frequencies). Infrasound is perceived by the body as a physical activity: tiredness, headache, dizziness, vestibular disorders, reduced visual acuity, peripheral blood circulation, a feeling of fear appear. The severity of the effect depends on the frequency range, the level of sound pressure and the duration of action.

Infrasound with a level of oscillation of 150 dB and more completely not tolerated by the body (affects the digestive organs, brain function, heart rate, fainting, loss of vision and hearing, respiratory failure (6.9 Hz).

Particularly adverse effects at a frequency of 2 - 15 Hz, which is due to the emergence of resonance phenomena in the human body. The most dangerous frequency is the frequency of 7 Hz, since it is possible to coincide with the rhythm of the functioning of the brain.

Means of combating noise and vibration in working conditions

Collective protection means can be acoustic, architectural and planning, organizational and technical.

You can reduce the noise in the source by:

- Replacing the reciprocating movement of parts by rotating;
- Improving the quality of parts balancing;
-improvement of kinematic schemes;
- Replacing bearings for rolling bearings for sliding bearings;
-application of parts from nylon, textolite;
- elimination of backlashes, skewed parts;
-equipment of noise silencers.

Noise characteristics are necessarily set in standards or technical specifications on cars and indicated in their passports. The values of the noise characteristics are established, based on the requirements of provision in workplaces, residential areas and buildings of permissible noise levels.

The calculation of the expected noise characteristic is a necessary component of the design of a machine or vehicle.

According to GOST 12.1.003 - 83, noise protection must be achieved by noise-saving equipment, the use of means and methods of collective protection (GOST 12.1.029-30); means of personal protection (GOST 12.4.051 - 78), and building acoustic methods. To create a soundproofing technology at the stage of its design, methods should be used that reduce the noise in the source itself. They are divided into methods:

- reduce noise excitement;
- that reduce the sound-emitting power of the source.

Reducing aerodynamic noise is achieved by improving the aerodynamic characteristics of structural elements, for example - plasma torch.

The reduction of electromagnetic noise is achieved by choosing the optimal size, technology and quality of magnet wire preparation, by selecting the values of magnetic induction.

To reduce the sound emission of the source, its surface is covered with damping materials, which have a large internal friction. The most common hard coatings of elastic viscous materials (linoleum, mastics).

Among the architectural and planning means for reducing noise in the workshops include: rational planning of the territories of the enterprise (in which objects requiring protection from noise - laboratories, KB, VC - as far removed from noise equipment and premises), rational floor planning of houses and placement of equipment generating noise, placement of workplaces and the organization of traffic flows, creation of noise protection zones.

Acoustic means is a means of protection against noise coming to its distribution. First and foremost, these include sound insulation and sound absorption.

The method of sound insulation is based on the reflection of the sound wave, which falls on the fence (walls, housings, screens).

The noise in the propagation path is reduced by applying housings, screens, fencing, surveillance cabinets, lining, etc. Facing is the treatment of interior surfaces of walls, ceilings, floors with sound absorbing materials. They are made of porous materials. External isolation of noise sources and premises, soundproofing covers, acoustic screens and noise silencers is applied. Their isolated ability is determined by physical parameters of materials and sizes.

An interesting and fundamentally new method of noise reduction is the active noise-suppression method. It is based on the creation of antisocial. that is equal in level and the opposite in phase of sound. Due to the interference of the main sound and antisocial, in some places of the room it is possible to create zones of silence. This method is effective for suppressing tonal noises. In a place where noise must be reduced, set the microphone, the signal from which is converted into electric, goes to the phase control and then to the amplifier and speakers that set in a definite way.

To protect workers from noise also used means individual protection, which allows you to reduce the perception of sound by 10 - 45 dB, with the most significant muzzle observed in the field of high frequencies.

Personal protective equipment is divided into:

- silencing liner (cover the auricle outside);
- noise-canceling headphones (cover the auditory passage);
- silent helmets and helmets (cover the entire head and are used in conjunction with headphones and silent suits).

Methods of control by ultrasound: Standardization of ultrasound is carried out in accordance with GOST 12.1.003 - 83, according to which the permissible levels of

sound pressure in third octave full frequencies with average nominal values are established.

The characteristic of the ultrasound, which propagates by contact, is the peak value of the vibration velocity (m / s) in the frequency range 1105 - 1109 kHz or its logarithm. Levels of ultrasound in areas of contact of hands and other parts of the body of operators with operating devices and equipment, which are permissible, should not exceed 110 dB.

For collective protection from UZ the following measures are used:

- reduction of harmful radiation in the source;
- localization of ultrasound action with the help of constructive and planning decisions;
- organizational and preventive measures.

To reduce the amount of harmful radiation in the source, it is recommended to increase the operating frequencies of sources (not less than 18 kHz) of ultrasound, which provides in the intensity of ultrasound in the workplace and eliminates the radiation of sound energy.

For the localization of ultrasound, it is mandatory to use sound-insulated covers or screens, which are usually made of steel or duralumin sheets, the thickness of which is 0.7-1 mm., The inner surface of the casing must be glued rubber or thin (5-10mm.) Laminate material that absorbs the sound (you can achieve the effect of 50 - 70dB). It is possible to use elastic shells with 2 to 3 layers of rubber with a total thickness of 4 - 5 mm. Transparent screens are installed between workplaces and equipment.

Control-planning solutions require the use of remote control and planning systems, the placement of ultrasound equipment in special rooms, cabins, enclosures.

The U.S. contact action can be ruled out by automating production processes and using remote control. Use a special tool with vibration grid and protective gloves if this is necessary. Organizational and preventive measures consist of conducting briefings and establishing rational arrangements for work and rest.

For the individual means of protection used silent.

The ultrasound equipment must meet the requirements of GOST 12.2.003 - 74. Control - at an altitude of 1.5 m, at a distance of 0.5 m from the equipment in 44 points along the contour.

Struggle with the infrasound: According to the CH 22 - 74 - 80 normalized levels 13 - the pressure in accordance with full frequencies (2, 4, 8 and 16 Hz), as well as 32 Hz (102 dB). The methods of struggle are the same as with low-frequency noise. The control is carried out by noise-measuring devices SHVK-1 with filter Ф 3-2.

The general methods of struggle by a rebreeding are based on the analysis of equations describing the fluctuations of machines in the production environment and are classified as follows:

- reduction of vibrations in the source by reducing or eliminating excitatory forces;
- debugging from resonant modes by rational choice of reduced mass or rigidity of the system that fluctuates;

- vibration damping - reduction of vibrations due to the friction force of the damper device, that is, the transfer of oscillating energy into heat;

- Dynamic extinguishing - introduction into the oscillatory system of additional masses or increase the rigidity of the system;

- vibration isolation - introduction into the oscillatory system of an additional elastic connection, in order to reduce the transmission of vibrations to the adjacent element of the structure or the workplace; - use of personal protective equipment.

Thus, the collective methods of protection include: the change of the design elements of the source of excitation; balancing of separate elements of machines; departure from resonance; application of vibration isolators, vibration dampers; decrement; balance of equipment elements; antiphase synchronization.

Means of individual vibration protection - these are gloves, lining, pads, special shoes, pods, bibs, bibs, belts and special costumes.

Electric vibration measuring devices are widely used to measure vibrations, the principle of which is based on the transformation of the kinetic parameters of the oscillatory motion into electrical quantities, which are measured and recorded with the help of electric devices.

Vibration measuring devices with sensors can measure vibrations at many points; their advantage is the remoteness of measurement of vibration parameters, simple structure and lack of inertia.

The number of measurements of the vibration parameters must be at least three for each octave frequency band.

The measuring parameters of the vibration are the peak or square root meanings of vibrations, vibration velocity or vibration acceleration in octave or 1/3 octave frequency bands.

The fight against the adverse effects of vibration, noise, infra-red and ultrasound is in almost the same direction. The most expedient way is to reduce the intensity of fluctuations at the design stage of machines and assemblies.

Hygienic assessment of working conditions in the event of noise, infrasound, ultrasound, vibration.

The degree of harmfulness of working conditions when exposed to noise workers, infra-ultrasound, depending on the values of exceeding the standards, shall be established in accordance with Appendix 18 to this Hygienic Classification of Labor.

The degree of harmfulness and hazard of working conditions under the influence of these factors is established taking into account their time characteristics (constant, inconstant noise, infrasound, air and / or contact ultrasound).

The definition of the class of working conditions and control of the level of production noise is carried out in accordance with the Sanitary norms of industrial noise, ultrasound and infrasound, approved by the decision of the Chief Sanitary Doctor of Ukraine dated December 01, 1999 No. 37 (hereinafter - DSN 3.3.6.037-99).

Hygienic estimation of working conditions when exposed to workers of constant noise is carried out by the results of measurements of sound level in dBA on the scale of the FTA.

Hygienic estimation of working conditions when exposed to a noncontiguous noise worker is carried out on the basis of the results of measurements of the equivalent sound level by the device for measuring noise. In the absence of an equivalent level, the sound level is calculated in accordance with Annexes 2 and 3 of the DSN 3.3.6.037-99.

In the course of a change in the worker's noise with different time (constant or inconsistent noise, the level of which fluctuates, intermittent, pulse) and spectral (tonal) characteristics and various combinations of such noise, measure or calculate equivalent levels of sound.

Determination of the class of working conditions under the influence of infrasound, monitoring of levels of infrasound and its evaluation are carried out in accordance with the DSN 3.3.6.037-99.

Hygienic estimation of working conditions under the influence of constant infrasound is carried out on the basis of measurements of the overall level of sound pressure on the "linear" scale in dBLin (provided that the difference between the levels measured on the scale "linear" and "A" in the time characteristic "slowly" is not less than 10 dB).

Determination of the class of working conditions when exposed to ultrasound workers, monitoring of ultrasound levels and their assessment are carried out in accordance with DSN 3.3.6.037-99.

Hygienic estimation of working conditions under the influence of air ultrasound (with oscillation frequencies in the range from 12.5 to 100 kHz) is carried out on the basis of measurements of the level of sound pressure (in dB) in normalized bands with average geometric frequencies covering the working frequency of the source of ultrasonic oscillations.

Hygienic estimation of working conditions under the action of contact ultrasound is carried out on the basis of measurements of the peak value of the logarithmic level of vibration velocity (dB) at the operating frequency of the source of ultrasonic oscillations.

In the case of simultaneous contact and air ultrasound, the maximum permissible level (GDR) of the contact ultrasound should be taken at 5 dB below that specified in DSN 3.3.6.037-99.

Hygienic assessment of working conditions under the influence of production vibration

The hygienic estimation of the permanent vibration (general, local) operating on the employee is carried out in accordance with the State sanitary norms of general and local production vibration, approved by the decision of the Chief State Sanitary Doctor of Ukraine of December 01, 1999 No. 39 (hereinafter - DSN 3.3.6.039-99) , by the method of integral estimation of the frequency of the parameter being normalized. In order to assess the working conditions, the adjusted vibration velocity or vibration

acceleration shall be measured or calculated in accordance with Annex 9 to DSN 3.3.6.039-99. Determination of the class and degree of harm is carried out in accordance with the annex to this Hygienic classification of labor.

Hygienic estimation of non-permanent vibration (general, local) affecting workers is carried out in accordance with DSN 3.3.6.039-99 by the method of integral estimation of the equivalent (on energy) vibration velocity (vibration acceleration). At the same time, to assess the working conditions, an equivalent adjusted dB in accordance with Annex 10 of the DDS 3.3.6.039-99 is measured or calculated.

When exposed to a local vibration worker in conjunction with the cooling of hands (work in conditions of a cooling microclimate of class 3), the hazard class increases to one degree.

The hygienic estimation of working conditions under the influence on impulse vibration workers is carried out depending on the magnitude of the vibration influence on the basis of counting the number of vibration impulses per shift at the peak vibration acceleration from 120 to 160 dB, depending on the duration of the pulse in accordance with Appendix 12 to DSN 3.3.6.039-99.

When the combined action of vibration of different types (local, general, impulse), the overall assessment is carried out according to the highest class and degree of harmfulness of the factor.

Theme. Technological hazards and their consequences. Practical class №5. Noise of air pollution in cities and the coefficient of social hazards

Goal. Rate noise level of air pollution in cities and its social hazard ratio

Innovation and technology

In order to meaningfully improve disaster risk management around the world, enhancing access and use of advanced technology and innovations is essential. Acknowledging that especially developing countries are often deprived from access to the advanced technologies and innovations.

Therefore, enhanced knowledge transfer, exchange and technical assistance between developed and developing countries need to be facilitated and strengthened. In addition to improved access, investment need to be made for multi-hazard, solution-driven research, innovations and technologies, ensuring long-term disaster risk management approaches.

Man-made hazards often have major negative impacts on the environment. Mainstreaming environmental aspects in all phases of disaster risk management; prevention, preparedness, response and recovery, is of utmost importance to achieve sustainable and effective disaster risk management.

The UN Environment/OCHA Joint Unit represents an example for how the coordinated collaboration between environmentalists and humanitarians in the field of man-made hazard preparedness and response can ensure the consideration of environmental aspects throughout the disaster management cycle, culminating in improved man-made hazard preparedness as well as in the duly consideration of environmental aspects in hazard risk management.

Extensive disaster risk

Extensive disaster risk is defined as “The risk of low-severity, high-frequency hazardous events and disasters, mainly but not exclusively associated with highly localized hazards.” [66]Extensive disaster risk is usually high where communities are exposed to, and vulnerable to, recurring localized floods, landslides, storms or drought. Extensive disaster risk is often exacerbated by poverty, urbanization and environmental degradation.

Similar to large-scale natural hazards, large man-made disasters often receive most attention with regard to the overall risk management but in particular regarding disaster response and recovery efforts. However, also low-severity, frequently occurring hazard events can culminate in severe impacts due to their cumulative character.

For example, since the development of the oil industry in Nigeria, the country suffers frequent oil spills due to technical problems and sabotage.

Summary

The UN Office for Disaster Risk Reduction (UNISDR) with the UN Environment and OCHA have partnered with several key agencies and institutions to develop this targeted WiA Guide, with the aim to strengthen national and local disaster risk management plans, by the inclusion of an all-hazards approach that covers man-made and technological hazards, and to raise awareness for better prevention, preparedness and response to the risks and impacts of these hazards. This Guide provides insights on man-made/technological hazards vis-a-vis the Sendai Framework's four priorities; namely, 1) understanding disaster risk; 2) strengthening disaster risk governance; 3) investing in disaster risk reduction for resilience; and 4) enhancing disaster preparedness for effective response and to "build back better" in recovery, rehabilitation and reconstruction.

The Guide highlights the enormous costs and multiple impacts of Man-made / Tech hazards in various domains, including those stemming from chemical and industrial accidents, nuclear and radiological emergencies as well as accidents in the transport sector and those associated with the particular case of "Natech" hazards.

Man-made / Tech disasters, whether caused by natural or man-made hazards, can cause severe damage to individuals, communities, economies, supply chains and the environment. Moreover, they may trigger secondary disasters, aggravating initial impacts. Industrial facilities, nuclear and other technological installations and transport systems are all vulnerable to natural hazards, and their design is not always adequate to withstand current or future impacts.

In purely economic terms, the cost of natural and man-made disasters worldwide has been estimated at US$ 175 billion for 2016 alone, with US$ 9 billion of that stemming from man-made disasters. This number has risen from previous years and continues to grow due to increasing disaster risk as a result of factors such as climate change, rapid urbanization and industrialization. In the case of one high-profile example, the Fukushima radiological emergency displaced 165,000 people and has an estimated economic recovery cost of US$ 235 billion. In another example, hundreds of hazardous materials were released after hurricanes Katrina and Rita, while pipeline accidents, train derailments and other transport accidents hauling dangerous goods have caused catastrophic pollution incidents around the world. Such examples illustrate the "business case" for improved preparedness and response to Man-made / Tech hazards, as well as the importance of implementing multi-sectoral and multi-hazard approaches to reducing risk from them.

This WiA Guide on Man-made / Tech Hazards offers a targeted set of practical activities for implementation at national and local levels. It also clarifies the roles and responsibilities of specialized stakeholders within each of the four Priorities for Action with regard to man-made hazards, and the subset of

technological hazards.

A review of over-arching key considerations and prominent examples of "no-regrets" actions, which apply across all four of the Man-made / Tech mentioned above includes:

Understanding disaster risk:

- Conduct risk assessment and ensure access to pre-disaster risk assessment information, with a baseline for hazards, exposure, risks and vulnerability, including local sources of risks;
- Collect information on local institutions, capacities and plans to address disasters;
- Develop and regularly update local and national maps on disaster risk, hazards, human exposure and vulnerability, including key infrastructure elements;
- Engage with communities at risk to understand community structures and support inclusiveness, while ensuring access of communities to relevant risk information;
- Enhance understanding of disaster risks among all stakeholders, including government officials at all levels, civil society and NGOs, local communities, the private sector, disaster and emergency responders as well as volunteers;
- Improve the flow of disaster risk information from scientific and technical experts to policy-makers, communities and other stakeholders, and assure appropriate use of the same;
- Strengthen understanding of disaster risk at the local level through education and awareness-raising campaigns;
- Apply risk information to develop and implement DRR policies and strategies.

Strengthening disaster risk governance:

- Mainstream DRR within and across all sectors dealing with man-made hazards, through relevant legal frameworks, policies, regulations, reporting requirements and compliance incentives;
- Ensure that sectors involved in man-made risk management are involved in appropriate DRR coordination and organizational structures, including forums and platforms at local and national levels;
- Ensure that sectors involved in man-made risk management adopt and apply national and local DRR strategies and plans, including targets, indicators and timeframes, and follow-up mechanisms to monitor progress;
- Assign clear roles and tasks to relevant national and local authorities, community leaders and other stakeholders to operationalize strategies and plans, while reinforcing the role of the appropriate national authority(-ies) as having primary responsibility for DRR
- Strengthen cooperation and capacities for transboundary disaster risk governance.

Investing in disaster risk reduction for resilience:

- Ensure the allocation of financial and logistical resources to implement DRR plans, policies and strategies at national and local levels;
- Promote disaster risk financial sharing, transfer and insurance mechanisms;
- Strengthen public and private sector investments to prevent and reduce the impacts of man-made disasters, including their impact on critical infrastructure;
- Improve building codes and standards and enforce specific standards in the construction of all technological facilities;
- Invest in appropriate land use, local planning and zoning policies in relation to the location of technological facilities;
- Enhance the resilience of national health care systems to deal with specific hazard types, and enhance local access to basic health care services and safety-nets for post-disaster assistance for populations at risk from man- made disasters;
- Protect the most disadvantaged persons, along with livelihoods and productive assets, including major earning sectors such as tourism, from man-made hazards.

Enhancing disaster preparedness for effective response and to "build back better" in recovery, rehabilitation and reconstruction:

- Develop and update disaster preparedness and contingency plans, programs and policies at regional, national and local levels, involving relevant authorities and stakeholders in a "whole of government, whole of society" approach;
- Develop and maintain multi-sectoral rapid early warning and alert systems including robust means of communication to inform the public prior to and during an incident to prevent and/or mitigate the impacts and facilitate the response;

- Develop and enforce improved building codes and standards for the (re-) construction of all technological facilities for preventing future Man-made / Tech disasters;
- Promote the resilience of key infrastructure such as power, water, emergency centers, roads and water treatment plants, that are critical in preparing for and responding to man- made disasters;
- Conduct targeted training for emergency workers e.g. first responders, medical staff, public service and voluntary workers who deal with specific man-made disasters;
- Organize and conduct periodic disaster preparedness, response and recovery exercises and evacuation drills, with the involvement of the public;
- Promote cooperation among multiple authorities, relevant institutions and stakeholder groups to assure a smooth and effective Man-made / Tech disaster response.
- In summary, putting in place as many as possible of the measures listed above will help any government to be both better prepared for a possible Man-made / Tech emergency event, and to mitigate the potential impacts of such an event on people, society, the economy and the environment, while addressing the four priorities of the Sendai Framework.

5.1. Characteristics zones and noise pollution levels in cities

№	Characteristics of the zone of noise pollution	Noise level, dB
1	Noise pollution missing	35 and less
2	Very poor noise pollution	40
3	Weak noise pollution	45
4	Slight noise pollution	50
5	Small noise pollution	55
6	Moderate noise pollution	60
7	Big noise pollution	65
8	Considerable noise pollution	70
9	Strong noise pollution	75
10	Dangerous noise pollution	80
11	Very dangerous noise pollution	85
12	Especially dangerous noise pollution	90 and more

Terms Sound - a combination of sounds of different frequencies and intensities that arise from the vibrational motion of particles in elastic media (solid, liquid, gaseous). Minimum sound intensity, which treats ear, called the threshold of audibility. It depends on the frequency of sound waves. For comparison made by standard frequency of 1000 Hz. Sound waves have a frequency threshold of audibility of sound intensity at 2.10 W / m2 and sound pressure 2 * 10-5 Pa. Pain in the ear occur when

sound intensity 100 W / m2 and the sound pressure of 200 Pa. Because these values vary widely, for hygienic assessment of noise used are not absolute values, and decimal logarithms ratio of these values to the zero level of standard that meets the threshold of audibility. Logarithm of these relations is called intensity level and sound pressure, measured in belah (B). But in practice, using ten times smaller unit from Bella, namely decibels (dB), because the human ear is able to distinguish the sound intensity level about 0.1 dB.

The total sound intensity level L, which creates multiple noise sources with the same level L1, calculated by the formula

$$Lc = L_1 + 10Ig\ N,$$

де N – sources of.

One of the main sources of noise in cities is road transport. The noise of traffic depends on the transport, traffic, condition covering the streets. The levels of noise pollution in urban areas of the main sources of noise may be filed in the twelve system (Table 6.2).

The magnitude of the noise that is generated transport stream, depending on speed, traffic and vehicle types. The level of noise that make cars, they are divided into three groups:

- cars;
- Cargo carburetor;
- transport diesel.

The expected noise level determined by the formula

$$L = 44{,}4 + 0{,}268V + 10Ig\left(\frac{N_1 + 4N_2 + +8\,N_3}{V}\right) + \sum_{i=1}^{n} P_i\ ,$$

де V - speed of the car, km / h;

N_1 – the traffic cars, h^{-1};

N_2 - the traffic truck gasoline cars, h^{-1};

N_3 - the traffic commercial diesel, h^{-1}.

$\sum_{i=1}^{n} Pi$ – the amount of amendments that takes into account the location. territories predicting noise (in the first approximation these. negligible as amended)..

For noise ratio find social dangers of noise pollution site

$$T_i = 0{,}04\ (L_i - 55)\ H_i$$

де L_i – Noise in the territory, which exceeds the maximum permissible level of 55 dB;

H_i - the number of people exposed to noise.

Integral Social Security figure noise pollution determined by the formula

$$T = \sum_{i=1}^{m} Ti.$$

Noise adversely affects the human body as a whole and especially the central nervous system, causing a decrease in attention, slowing and speeding up the body's response fatigue.

To reduce the harmful effects of noise on workers depending on the type of set it permissible levels in the workplace. Equivalent noise level considering acceptable levels for all frequencies shall not exceed:

- 50 dB - in rooms design offices, laboratories
- 60 dB - in areas to manage and working rooms;
- 80 dB - in production facilities for permanent jobs, experimental laboratories.

Reducing noise levels indoors achieved through:

- noise reduction at the source of its formation; isolation of noise sources;
- architectural and design solutions;
- use of personal protective equipment.

Objectives:

1. Determine noise traffic consisting of cars, trucks gasoline and diesel vehicles;

2. Assess factor of social hazards of noise pollution. Take notation: velocity - V; traffic - N, the share of cars - K_1; truck gasoline - diesel trucks and K_2 - K_3, the number of people living in the area - H_i.

Variants individual tasks

№	Speed of the car V, km/h	intensity of traffic N, per hour	The share of cars			The number of people living in the area of noise, H_i
			passenger, K_1	freight carburetor, K_2	freight diesel, K_3	
1	2	3	4	5	6	7
1	30	800	0,65	0,25	0,10	1000
2	35	800	0,60	0,20	0,20	1100
3	40	800	0,70	0,20	0,10	1200
4	45	800	0,80	0,15	0,10	0300
5	50	800	0,90	0,10	0,10	1400
6	55	800	0,70	0,05	0,05	1500
7	60	800	0,90	0,10	0,20	1600
8	55	1000	0,85	0,05	0,05	1700
9	50	1000	0,80	0,10	0,05	1800
10	45	1000	0,75	0,15	0,05	1900
11	40	1000	0,70	0,15	0,15	2000
12	35	1000	0,65	0,15	0,20	2100

1	2	3	4	5	6	7
13	30	1000	0,60	0,20	0,10	2200
14	35	400	0,70	0,20	0,10	2300
15	40	400	0,60	0,25	0,05	2400
16	45	400	0,85	0,20	0,10	2500
17	50	400	0,75	0,10	0,05	2400
18	55	400	0,65	0,05	0,05	2300
19	60	400	0,85	0,15	0,05	2200
20	55	1500	0,90	0,15	0,10	2100
21	50	1500	0,85	0,20	0,15	2000
22	75	1500	0,80	0,20	0,20	1900
23	40	1500	0,75	0,10	0,10	1800
24	35	1500	0,70	0,05	0,15	1700
25	30	1500	0,65	0,05	0,10	1600
26	35	600	0,70	0,15	0,10	1500
27	40	600	0,75	0,15	0,10	1400
28	45	600	0,80	0,15	0,10	1300
29	50	600	0,85	0,10	0,05	1200
30	55	600	0,90	0,05	0,05	1100

Conclusions:

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QUESTIONS:

1. What is an industrial environment?
2. What are the main elements of the industrial environment.
3. Describe the meteorological factors.
4. What factors characterizing microclimate of home?
5. What is the role of microclimate regulation?
6. What are allergens? How will they influence on the climate?
7. What are the main recommendations to reduce exposure to allergens in the domestic environment.
8. Describe the lighting requirements for the workplace.
9. What is the noise?
10. Give characteristics of areas and levels of noise pollution in cities.
11. What are the main characteristics of the work with the PC?
12. What preventive measures when working with computers.
13. According to the Rules of fire safety in Ukraine which are major organizational measures to ensure fire safety?
14. What are the main activities of the persons responsible for fire safety?
15. What is fire protection system?

Theme. Chemical safety.
Practical class №6. Environmental risk assessment. Identify the environmental risk assessment of pesticide use in different climatic zones of Ukraine

Purpose. Familiar with integral indicator that characterizes the potential contamination of agricultural landscape, learn to identify the risk of pesticides used in growing crops.

Objectives:

1. Determine the risk of pesticides used in growing crops using ahroekotoksykolohichnoho index (AETI). .

General questions

For an objective assessment of pesticides used in different climatic zones of Ukraine for growing crops used integrated classification. According to this classification pesticides are characterized by an integral factor, which takes into account the toxicological and hygiene (category A) and ecotoxicological aspects (category B).

Category A describes the dangers of pesticides at: chronic action; poisoning; skin irritation; irritation of the upper respiratory tract; allergic action and others. Chief among them is the LD50 - dose that causes 50% of deaths of animals when injected into the stomach.

Category B describes the dangers of pesticides ecotoxicological indicators: biokumulyatsiya in the migration of pesticides in surface, water and soil ecosystems; migration in the soil profile; in the soil - plant - water – air; phytotoxic action; improving the nutritional value of products, the effect on soil biocenosis; toxicity to beneficial insects, fish; the formation of toxic degradation products; the maximum level (MRL), etc. The half-life (T_{50}), that period (in dobah), for which the amount of toxic substances in the test object is reduced by 50%, is the main criterion for category B.

Pesticides are considered practically safe if LD_{50} dose greater than 1000 mg/kg, and T_{50} - less than 3 days. In each category, provides for the distribution of drugs in four classes: I - dangerous; II - dangerous; III - moderately hazardous; IV - little dangerous. Integral classification can be represented by a scale of 7 degrees of danger, defined by the formula

$$C_H = (K_A + K_B) - 1,$$

де C_H - the degree of danger the drug; K_A і $K_Б$ – hazard classes of pesticides in categories A and B.

According to the formula, integral degree of risk expressed natural integer from 1 to 7 and pesticides describes thus: dangerous - the gravity of 1 and 2; dangerous - 3; moderately dangerous - 4 and 5; little dangerous - 6 and 7.

To assess the level of risk and prognosis contamination with pesticides was used a model that includes three parameters: the properties of drugs, quantitative load them into and intensity decay in specific soil and climatic conditions. An indication of the range of features pesticides used is the average degree of danger (Q), which is calculated by the formula:

$$Q = \sum_{i=1}^{i=n} C_{Hi} \frac{mi}{M},$$

C_{Hi} – the degree of danger integrated pesticide;
m - the amount of pesticide that will be used or applied, kg;
M - the total number of all pesticides, kg.

Averaged load pesticides on the farm ecotoxicological measured dose (D):

$$Д = \frac{MS_{об}}{S_{ор}} \text{ кг},$$

де: $S_{ор}$ – the total arable area, ha; $S_{об}$ – area, which is processed, ha.

Tolerance territory to pesticide load capacity index is estimated to land clean (Izon). This figure reflects the intensity of pesticide degradation depending on soil - climatic conditions and varies from 0.1 to 1.

Potential pollution (V) assess agricultural landscape integral indicator that considers three options:

$$\mathbf{V = \frac{D}{QI_{зон}}}, \text{ kg/ha}$$

The risk of pesticides used in growing crops, was described by ahroekotoksykolohichnym index – AETI

$$\mathbf{AETI = \frac{10\ V\ (1+V)^3}{(1+V)^4 + 5000}}$$

AETI characterized by values from 0 to 10: a little dangerous - 0-1; medium dangerous - 1-4; increased danger - 4-8; highly dangerous - 8-10.

When planning measures to protect chemical plants grown in the economy should pick up the range of pesticides and their total consumption per unit of arable area so that the value AETI were as little as possible and would not exceed the value of 1. If more than one AETI, control of the actual content pesticides in food crops and agro-ecosystems sites is a must.

Variants individual tasks

№	Pesticides that used	Index purification, $I_{зон}$	Total arable area, ha ($S_{ор}$)	Area, which is processed, ha ($S_{об}$)
1	2	3	4	5
1	1,3,5,12,13	0,3	0,6	0,1
2	1,2, 6,8,12,13	0,5	0,4	0,08
3	1,5,7	0,8	0,5	0,1
4	3,4	0,55	0,1	0,09
5	7,12,13	0,2	0,1	0,06
6	4,4	0,5	0,4	0,045
7	4,12	0,8	0,15	0,04
8	1,4,8,12,13	0,55	0,3	0,07
9	2, 6,8,12,13	0,2	0,4	0,08
10	3,5,12,13	0,8	0,5	0,1
11	2, 12,13	0,55	0,1	0,4
12	1,12,13	0,2	0,1	0,15
13	4,8,11,13	0,5	0,4	0,3
14	2,9,12,13	0,8	0,1	0,4
15	6,8,11,13	0,8	0,4	0,5
16	6,8,12,13	0,3	0,15	0,1
17	9,12,13	0,55	0,3	0,4
18	7,10,12	0,4	0,4	0,15
20	2, 6,8,12,13	0,2	0,4	0,08
21	3,5,12,13	0,8	0,5	0,1
23	2, 12,13	0,55	0,1	0,4
24	1,12,13	0,2	0,1	0,15
25	4,8,11,13	0,5	0,4	0,3
26	2,9,12,13	0,8	0,1	0,4
27	6,8,11,13	0,8	0,4	0,5
28	6,8,12,13	0,3	0,15	0,1
29	9,12,13	0,55	0,3	0,4
30	7,10,12	0,4	0,4	0,15

Conclusions:

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QUESTIONS:

1. What is an industrial environment?
2. What are the main elements of the industrial environment.
3. Describe the meteorological factors.
4. What factors characterizing microclimate of home?
5. What is the role of microclimate regulation?
6. What are allergens? How will they influence on the climate?
7. What are the main recommendations to reduce exposure to allergens in the domestic environment.
8. Describe the lighting requirements for the workplace.
9. What is the noise?
10. Give characteristics of areas and levels of noise pollution in cities.
11. What are the main characteristics of the work with the PC?
12. What preventive measures when working with computers.
13. According to the Rules of fire safety in Ukraine which are major organizational measures to ensure fire safety?
14. What are the main activities of the persons responsible for fire safety?
15. What is fire protection system?
16. What is the fire safety facility?
17. What are the main sources of ignition protection?
18. What is the chemical safety?

Theme. Social human environment.
Practical class №7. Defining types of individual's behavior in conflict situations

Purpose. 1.Zasvoyity main provisions of the "man in the environment. Man in a social environment "theoretical rate discipline" Safety ".

2. Acquire skills using self diagnostic psychological tests for self.

3. Identify possible predisposition to conflict behavior and its types, subject to a conflict.

Task. 1.Oznayomytysya with the general concept of "conflict", "types of conflicts", "ways of solving conflicts", "types of behavior in conflict situations on the model of Thomas."

2. Familiar with the principle of psychodiagnostic testing.

3. conduct testing to determine whether you are a personality conflict and typical form individual behavior in conflict situations.

4. Prepare a report in the form of conclusions.

5. Obtain skills on the way to resolve conflicts.

Terms

The conflict – a clash of opposing interests, views, controversial, complications, fighting the warring parties and the different levels of the participants.

There are two forms of course conflicts:

• open - outright confrontation, collision, struggle;

• latent or closed when no outright opposition, but does not stop the invisible struggle.

The goal of conflict resolution is to achieve a conflict-free ideal state where people live and work in perfect harmony, which is almost impossible.

To determine the types of behavior in conflict situations using two-dimensional model of regulation conflicts K. Thomas determining dimensions which are:

- Cooperation, connected with the person's attention to the interests of other people involved to the conflict;

- Assertiveness, characterized by a focus on protecting their own interests.

There are 5 types of regulation conflicts:

1. Racing (competition) - to achieve satisfaction of their interests to the detriment of another.

2. Adaptations - sacrifice their own interests for the sake of the other.

3. Compromise - agreement of understanding with the enemy reached by mutual concessions.

4. Avoidance, which is characterized as a lack of willingness to cooperate, and tendency to achieve their own goals.

5. Co-situation when participants come to a common solution that fully meets the interests of both parties.

Test 1

Are you a personality conflict?

To find out, use a test by choosing one answer to each question.

1. The public transport pass argument in a raised voice. Your reaction?

a- not involved;

B. vyslovlyuyus briefly to defense side, which I consider right;

B- actively interfere, the "cause the fire itself."

2. Do you speak up at meetings criticized leadership?

nor;

B. only when I have important reasons for this;

B criticized for any pretext not only leadership, but also those who protect.

3. Often you argue with your friends?

a- only if it is inoffensive people;

B. only on fundamental issues;

B disputes - my element.

4. queues, unfortunately, consistently part of our lives. How would you react if someone will come from?

a- oburyuyus in the shower, but keep quiet: a more expensive;

B. make comments;

B pass forward and begin to watch the procedure.

5. Home for lunch filed nedosolene dish. Your reaction?

a- I will not raise a rebellion trifles;

B. silently take the salt;

B did not refrain from harsh comments and may deliberately give up food.

6. If the street, in transportation you stepped on the foot. Your reaction?

a- indignantly'll see the offender;

B. dryly make comments;

B vyslovlyus not on ceremony in expressions.

7. If someone from the family bought a thing that you did not like:

a- silent;

B. limit myself to a brief comment considerate;

B- arrange scandal.

8. No luck with the lottery. What do you think of this vidnesetes?

a- try to go indifferent, but in my heart I will give a word never participate in it;

b- not hide frustration (frustration), but vidnesus to what happened with humor, promising to take revenge;

B- long losing spoil the mood.

Now count points scored based on the fact that each "a" - 4 points, "b" - 2 "in" - 0 points.

If you typed:

From 22 to 32 points - you are tactful and loving, easy to avoid disputes and conflicts, emergencies at work and at home. The expression "Plato is my friend, but truth is more expensive!" Has never been your motto. Maybe because you sometimes

called opportunists. Please be brave if circumstances require essentially say, despite the person.

From 11 to 21 points - you believe human conflict. But in fact you conflict only when there is no other choice and other measures expired. You strongly defend their opinion, though how it will affect your state official or friendly relations. It is not beyond the scope of correctness, not to prynyzhuyetes image. All this is to have respect.

Up to 10 points - disputes and conflicts - the air, without which you can not live. Love criticize others, but if you hear the remarks in his address, can "eat alive." Your criticism for criticism, and not for good cause. It is very difficult to have those next to you at work or at home. Your intemperance and coarseness repel people. Is it because you have no real friends? In short, try to overcome his grumpy character!

Test 2 (TEST Thomas)

Select those statements that are most typical of your behavior characteristics:

1. A. Sometimes I give the opportunity to others to take responsibility for the issue that caused the dispute.

B. I try to point out what we both agree than discussing something which we disagree.

2. A. I try to find a compromise solution.

B. I try to settle the case with the interests of others and my own.

3. A. I try hard to achieve his.

B. I sometimes sacrifice their own interests for the benefit of another person.

4. A. I try to find a compromise solution.

B. I try not to offend the feelings of another person.

5. A. Uladnuyuchy contradictory situation, I always try to find support in another.

B. I try to find the best way out while avoiding unnecessary stress.

6. A. I try to get out of the conflict situation with minimal losses for themselves.

B. I try to get her, whatever it was.

7. A. I try to postpone the issue of conflict resolution in order to eventually solve it completely.

B. I think it possible to give your partner something if it will lead to positive results in resolving the issue as a whole.

8. A. Normally, I try hard to achieve his.

B. First of all I try to define the essence of conflict issues and find out what what are all affected (affected) the interests of the parties that address these issues.

9. A. I think that does not always have to worry about any emerging differences.

B. I devotes every effort to achieve his.

10. A. I try hard to achieve his.

B. Usually, I want to find a compromise solution.

11. A. First of all, I try to define that from which all consist infringed (affected) the interests and questions.

B. I try to consider the interests of the other and mainly preserve our relationship.

12. A. I usually stick to the neutral position to avoid disputes arising.

B. I give another opportunity to have an opinion when it also comes to meet me.

13. A. I stick to the neutral position.

B. I strongly defend their own point of view, taking into account the opinions of partners.

14. A. I tell the other their views and asked about his views.

B. I try nav`yazaty other logic and prefer my views.

15. A. I try to take into account the opinion of the other and save our relationship.

B. I try to do everything necessary to avoid conflict.

16. A. I try not to offend the feelings of another.

B. I usually defend their position, considering it better.

17. A. Normally, I try hard to achieve his.

B. I try to do everything to avoid useless tensions.

18. A. If it makes the other happy, I will give him the opportunity to insist on his.

B. I give another opportunity to stay in his mind if he also comes to meet me.

19. A. First of all I'm trying to define something which consist of all interests and controversial issues.

B. I try to postpone the decision controversial issue to eventually solve it completely.

20. A. I try to immediately overcome all differences that have arisen.

B. I try to find a mutually beneficial solution to the question with minimal losses.

21. A. Through negotiations, I try to be attentive to the interests of another.

B. I always lean to a direct discussion of issues.

22. A. I try to find a position that is in the middle between my position and point of view of another person.

B. I am convinced of the correctness of their position and defend their interests.

23. A. I usually concerned to satisfy the desire of all of us.

B. Sometimes I give the opportunity to others to take responsibility for solving controversial issues.

24. A. If the other's position is considered very important to him, I will try to meet its interests.

B. I try to convince the other to reach a compromise.

25. A. I try to show a different logic and benefits of my views.

B. Through negotiations, I try to be attentive to the interests of the other, and above all take into account their interests.

26. A. Generally, I suggest a compromise. B. I almost always try to consider both their interests and the interests of the parties so.

27. A. As a rule, I avoid to take a position that might cause controversy.

B. If it makes the other happy, I'm happy it will support.

28. A. Normally, I try hard to achieve his.

B. Uladnuyuchy situation, I certainly try to find support in another.

29. A. I offer a compromise solution.

B. I believe that not always have to worry about any differences arising

30. A. I try not to hurt feelings of others.

B. I always take a position on controversial issues that we together with other interested person could succeed.

Mark your answers in the key to the test.

Number of points gained by each individual scale, gives an idea of the prudence of his tendencies to exercise appropriate behavior in conflict situations. The maximum number of points for each type of behavior – 12. By counting the amount you typed points, determine which type of behavior in the conflict situation prevails in your behavior.

Please conclusions tests number one (as far as you personality conflict) and number 2 (which behaviors specific to you subject to the conflict).

Key to the test

№	Competition	Cooperation	Compromise	Avoidance	Adaptations
1				A	B
2		B	A		
3	A				B
4			A		B
5		A		B	
6	B			A	
7			B	A	
8	A	B			
9	B			A	
10	A		B		
11		A			B
12			B	A	
13	B		A		
14	B	A			
15				B	A
16	B				A
17	A			B	
18			B		A
19		A		B	
20		A	B		
21		B			A
22	B		A		
23		A		B	
24			B		A
25	A				B
26		B	A		
27				A	B
28	A	B			
29			A	B	
30		B			A

Recommendations regarding conflict resolution

Constructive debate as deliberately organized clarify the opposing viewpoints, to help resolve conflicts in interpersonal relations. Technique of conduct can be used in business and personal spheres.

Constructive debate has three distinct and consecutive phases.

1. Introduction. Accomplices have to confirm consent to the dispute and report what she called.

2. Average. The very argument. This is the essence of the dispute, not around it. Locations to respond to the need expressed by misunderstanding, criticism. Put your opinion specifically and clearly.

3. Conclusion. A decision on the issue that caused the dispute. You either acknowledge his mistake, or prove the validity of your position. Naidoo another something good and positive.

Conclusions:

_____
_____
_____
_____
_____

QUESTIONS:

1. Identify and classify dangerous factors.
2. What are subgroups of physical factors of danger?
3. What are the factors of chemical hazards?
4. Describe the biological factors of danger.
5. Provide the classification of physiological factors of danger.
6. What is the risk in the life safety?
7. What is concluded quantitative risk assessment?
8. What is the axiom of danger?
9. What are the types of risk?
10. Name the kinds of environmental risk.
11. What methods of risk used in medical and environmental research?
12. Provide a definition of anthropogenic risk.
13. What is social risk?
14. What is social risk calculation?
15. Name the signs of structuring social risk.
16. What is a subjective risk?
17. What are the types of compensation acceptability of risk?

13. GENERAL FRAMEWORK FOR OCCUPATIONAL SAFETY AND HEALTH

Although effective legal and technical tools and measures to prevent occupational accidents and diseases exist, national efforts to tackle OSH problems are often fragmented and as a result have less impact. Such efforts are also hampered by the inevitable time lag between changes in the world of work or detection of new hazards and risks, and the development and implementation of appropriate responses. The traditional strategies and methods for prevention and control need radical updating to respond effectively to the fast and continuous changes in the workplace. In addition, there is a perpetual need to train new generations of workers as they replace retiring ones. Mechanisms and strategies must therefore be developed to keep occupational safety and health continuously at the forefront of national and enterprise priorities. This is a fundamental requirement for achieving and sustaining decent working conditions and a decent working environment. This can be done by raising the general awareness of the importance of occupational safety and health in social and economic contexts, and integrating it as a priority element in national and business plans. It is also important to engage all social partners and stakeholders in initiating and sustaining mechanisms for a continued improvement of national OSH systems.

The ultimate goal is that the application of principles to protect safety and health by prevention and control of hazards becomes an integral part of working culture and indeed of all social and economic processes. In order to be successful, the development of appropriate responsesmustmake use of the collective body of knowledge, experience and good practice in this area and ensure that this knowledge is kept up to date and disseminated efficiently though good information and education systems.

Dynamic management strategies need to be developed and implemented to ensure the coherence, relevance and currency of all the elements that make up a national OSH system. The Promotional Framework for Occupational Safety and Health Convention, 2006 (No. 187), and its accompanying Recommendation (No. 197) integrate the two fundamental pillars of the ILO's global strategy to improve safety and health in the world of work, namely the building and maintenance of a national preventive safety and health culture, and the application of a systems approach to the management of occupational safety and health at both national and enterprise levels. With the objective of promoting continuous improvement of occupational safety and health to prevent occupational injuries, diseases and death, the Convention provides for the development, establishment and implementation of a number of tools for the sound management of occupational safety and health, in consultation with

themost representative organizations of employers and workers, as well as other stakeholders engaged in the area of occupational safety and health. These tools include:

• a national OSH policy, as defined in the Occupational Safety and Health Convention (No. 155), 1981;

• a national OSH system; and

• a national OSH programme based on the elaboration and periodic updating of a national OSH profile.

14. NATIONAL POLICY ON OCCUPATIONAL SAFETY AND HEALTH

The promotion of occupational safety and health, as part of an overall improvement in working conditions, represents an important strategy, not only to ensure the well-being of workers but also to contribute positively to productivity. Healthy workers are more likely to be better motivated, enjoy greater job satisfaction and contribute to better-quality products and services, thereby enhancing the overall quality of life of individuals and society.

The health, safety and well-being of working people are thus prerequisites for improvements in quality and productivity, and are of the utmost importance for equitable and sustainable socio-economic development. In order to ensure that satisfactory and durable results are achieved in the field of occupational safety and health, each country should put in place a coherent national policy. Such a policy should be aimed at promoting and advancing at all levels the right ofworkers to a safe and healthyworking environment; at assessing and combating at source occupational risks or hazards; and at developing a national preventive safety and health culture that includes information, consultation and training.

By striving to minimize the causes of hazards in the working environment, the policy will reduce the costs of work-related injury and disease, contribute to the improvement of working conditions and the working environment, and improve productivity. The articulation of such a policy will reaffirma government's commitment to the cause of a safeworking environment and enable it to comply with its moral and international obligation.

In order to ensure that a national OSH policy is comprehensive, measures should be taken to ensure tripartite participation, which is to say participation by government, employers' and workers' organizations, in its formulation, practical implementation and review. There must be coherence in terms of policy content, as well as during

implementation. Although the substance and approach of these policies can vary according to national conditions and practice, there are nevertheless some basic features that are generally desirable:

It should also be borne in mind that if a policy is to be successfully implemented, local conditions and practices must be taken into account when the policy is being formulated. Improving occupational safety and health is a dynamic process and the objectives are long-term.

The implementation of any well-thought-out programme may thus be expected to extend over several years. Significant developments or phenomena need to be identified, and the necessary action taken by government as well as within enterprises to avoid possible disasters. Because the occupational safety and health situation evolves, the policy itself should be reviewed at appropriate intervals. This review may be an overall assessment of the policy or else focus on particular areas. The objectives of a policy review are to:

- identify major problems;
- devise effective methods of dealing with them;
- formulate and establish priorities for action; and
- evaluate the results.

The nature and extent of OSH problems vary from country to country, resulting in part from differences in the level of economic development, and in technological and social conditions. For example, while a developing country may be grappling with the basic OSH hazards related to agriculture, an industrialized country may be confronted by hazards resulting from an advanced technology such as the production of nanomaterials or from new patterns of work organization leading to stress. Similarly, within countries the incidence of work-related accidents and diseases, including fatal ones, is higher in certain occupations and sectors than in others.

Consequently, national policies should establish priorities for action with regard to the specific problems faced within the country concerned. Such priorities may also vary according to other factors including the severity or extent of the particular problems, the available means of action, the economic situation of the country, sector or enterprise in question, the effects of changing technology and social conditions. It should, however, be stressed that adverse socio-economic conditions must not be used as a pretext for inaction.

Theme. Management of forces and means of civil protection during emergencies.

Practical class №8. Quantitative assessment of emergencies

Aim. To review the Classification of Emergencies of Ukraine. To learn about the common characteristic of rescuing.

Task.

1. To learn about the Classification of Emergencies of Ukraine;

2. To study the procedure for providing public information about the threats of emergencies occurence.

General provisions

1. The provision of public information on the threats of emergencies occurence

Quantitative characterization of emergencies can be obtained by using the concept of acceptable risk, inherent in the classification cards of emergencies collected in the Classification of Emergencies in Ukraine (the principle of comparing risk of entirely different hazards).

To simplify machine information processing the classifier determines the original code of each emergency, consisting of 5 digits which indicate the class, group, and type of emergency, and a single letter that indicates the level of emergency (O - Object, L - local, R - regional, S - state).

To emergency situation of man-made nature (code 10000) belong the following groups (in parentheses the group code is indicated):

traffic accident (catastrophe - 10100)

fires, explosions (10200);

accident with the release of (the threat of release) highly toxic substances at the facilities of Economics (10300);

the presence of environmental pollutants exceeding the maximum allowable concentration (10400);

accident with the release of (the threat of release) radioactive substances (10500);

sudden destruction of facilities (10600);

accident at the power systems (10700)

accidents at systems for mining (10800)

accidents at communications and telecommunications systems (10900);

accidents at wastewater treatment plants (11000);

hydrodynamic accident (11100).

Emergencies of a natural character (code 20000) include groups:

geological (20100);
meteorological (20200);
hydrological marine and hydrological freshwater (20300 and 20400);
fire in natural ecosystems (20500);
infectious diseases of humans (20600);
humans poisoning (20700);
infectious diseases of farm animals (20800);
massive loss of wildlife (20900);
defeat of crops with the diseases and pests (20950).

Emergencies of social and political nature (code 30000) include:

– armed attacks, capture and retention of to the state bodies, diplomatic and consular offices, law enforcement, TV and radio and communication centers, military garrisons, public facilities, nuclear power plants and other objects of atomic energy (30100);

– an attempt on the state leaders and deputies of Ukraine (30200); assault, attempt on air crew or high-speed sea (river) vessels, theft or attempted theft, destruction or attempted destruction of such ships, taking hostages from among the members of the crew or passengers (30300);

– the establishment of an explosive device in a public place, institution, organization, enterprise, residential sector, transport (30400);

– the disappearance or theft from storage objects, use, recycling and during transportation of firearms, ammunition, artweapons, explosives, radioactive substances, drugs, medicines and raw materials (30500);

– identification of old ammunition (30600);

– failure on the arsenals, ammunition depots and other military facilities with the release of debris, jet and conventional shells (30700).

Within the process of determining the level of emergency three groups of factors are considered: the territorial distribution; amount of incurred (expected) economic losses and casualties; classification features of emergencies.

Upon the emergency, operational facility staff notifies its permanent governing body of the local emergency management and appropriate, upon subordination, sectoral management body of the local, regional, or national level.

Responsibility for timely, complete and objective information coordination of management of state emergency management is entrusted by the Cabinet of Ministers of Ukraine to the respective ministries and other central executive bodies, by which appropriate classification card are developed and agreed.

In case of further deterioration of the situation and meet the criteria specified in the last column of cards, the emergency moves to a state-level management bodies which from now on assume the responsibility for the timely, complete and adequate response to emergencies.

The main function of the state executive bodies, management of enterprises, institutions and organizations irrespective of their ownership form in the event of emergencies is to protect the population and its life-support organization.

Measures to protect the population are planned and carried out in all regions, towns, cover the entire population. However, the nature and content of protective equipment is set according to the degree of threat of the local conditions, taking into account the importance of production for public safety and other economic and social factors. Upon this, the city is divided into groups of importance and the objects in accordance with the categories concerning remedies in case of an emergency. This division is conducted by the Cabinet of Ministers of Ukraine

For cities, the following groups are established: special importance; the first group; the second group; the third group.

For businesses and organizations, the following categories are: special importance; the first category; second category.

The main measures to protect the population are planned and carried out in advance and are advanced in their nature. This is related primarily to training, maintaining constant readiness of individual and collective means of protection, their storage and preparation for evacuation from high risk zones.

2. General characteristics of the rescue works

Rescue and other urgent works are carried out in order to: save lives and help the hurt, localization of accidents and elimination of injuries, creating conditions for the following reconstruction works. In conducting rescue and other urgent works it is of great importance to comply with such conditions as the timely creation of groups of forces involved for rescue and other urgent works; timely reconnaissance; rapid movement and deployment to the center of destruction; continuous rescue and other urgent works until their completion; solid and operational management of the forces involved in conducting rescue and other urgent works; comprehensive support of their activities.

Rescue work include:

- intelligence of the units' routes and operations facilities;
- localization and extinguishing of fires at the routes and work areas;

• search for hurt and rescuing them from damage and burning buildings, gassy, flooded, smoky rooms, from debris;

• disclosure of destroyed, damaged, trapped buildings and rescuing people who are there;

• submission of air in buildings littered with damaged filter-ventilation system;

• provision of the first aid and evacuation of the injured to medical facilities;

• output (export) of population from hazardous areas to safe areas;

• sanitization of people, veterinary treatment of farm animals, deactivation and decontamination of equipment, protective means, clothing, food, water and forage. Other urgent works are conducted as well.

QUESTIONS

1. What is an industrial environment?
2. What are the main elements of the industrial environment.
3. Describe the meteorological factors.
4. What factors characterizing microclimate of home?
5. What is the role of microclimate regulation?
6. What are allergens? How will they influence on the climate?
7. What are the main recommendations to reduce exposure to allergens in the domestic environment.
8. Describe the lighting requirements for the workplace.
9. What are the main real and potential threats to national security in the environmental sphere?
10. Describe the main functions of providing subjecti the national security?
11. Describe the structure of the safety management of life at the regional level?
12. What are the order of rescue in case of emergencies?

15. NATIONAL LAWS, LABOUR CODES AND REGULATIONS

Appropriate legislation and regulations, together with adequate means of enforcement, are key policy instruments for the protection of workers. They form a basis for efforts to improve working conditions and the working environment. The inspection mechanism should make use, among other things, of a workers' health surveillance system, which may be run by the government, the community or the enterprise. Labour legislation lays down minimum standards which are compulsory and applicable to everyone.

As employers and plant managers have to fulfill these stipulations by adopting appropriate techniques, and as the efficacy of safety measures ultimately rests on their application by workers, it is imperative that representative organizations of employers and workers be consulted at the various stages in the preparation of laws and regulations. It has been recognized, in countries with good safety records, that it is more effective to stipulate the duties of those with primary responsibility for OSH measures in general terms, rather than to attempt to regulate a multitude of hazards in minute detail.

This approach is important because technology is developing at an increasingly rapid pace, and it often proves difficult for the legislation to keep abreast of progress. More recent legislation has therefore avoided setting out detailed requirements, but rather has defined general objectives in broad terms.

The trend in major industrialized countries is to restrict the number of statutory instruments and to promote the publication by government agencies or specialized professional bodies of directives, codes of practice and voluntary standards, which are more flexible and can be updated more easily. This approach fosters prevention but does not in any way preclude the enactment of specific regulations where strict measures are required to control serious occupational hazards.

Standards, specifications and codes of practice issued by national standards organizations or professional or specialized institutions are generally not binding, but in some cases they have been given the force of law by the competent authority. This practice, which is more common in countries where such organizations and institutions are public bodies rather than private concerns, considerably lightens the legislator's task, but it may increase the burden on the OSHadministrators unless they can rely on approved bodies or institutions for the application and monitoring of these standards and specifications.

16.NATIONAL POLICY ON OCCUPATIONAL SAFETY AND HEALTH ROLE AND OBLIGATIONS OF THE COMPETENT AUTHORITY

The formulation of a national OSH policy should reflect the respective functions and responsibilities of public authorities, employers, workers and others, and should recognize the complementary character of those responsibilities. Having said that, is the responsibility of the national designated competent authority to identify the major problems and draw up a realistic policy, taking into account the resources and means available. In doing so, the competent authority must set priorities on the basis of the urgency and importance of the problems to be overcome in that particular country.

In order to give effect to OSH policy, and taking account of the available technical means of action, the competent authority or authorities in each country will need to:

• review from time to time the OSH legislation and any other related provisions issued or approved, e.g. regulations or codes of practice, in the light of experience and advances in science and technology;

• issue or approve regulations, codes of practice or other suitable provisions on occupational safety and health, taking account of the links existing between safety and health on the one hand, and hours of work and rest breaks, on the other;

• undertake or promote studies and research to identify hazards and find means of overcoming them;

• provide specific measures to prevent catastrophes, ensuring that action is coordinated and coherent at all levels, with particular attention to areas of potentially high risk for workers and the population at large;

• provide information and advice, in an appropriate manner, to employers and workers, and promote or facilitate cooperation between them and their organizations, with a view to eliminating hazards or reducing them as far as practicable;

• ensure that national laws and regulations, and other approved provisions (for example, guidelines developed by national organizations), are clear, consistent and comprehensive, and reflect national conditions; and

• verify that national legislation takes into account the applicable provisions of international labour standards, especially Conventions Nos. 155 and 161 and their accompanying Recommendations.

Fundamental principles of occupational health and safety

• set the conditions governing the design, construction and layout of undertakings with a view to avoiding or minimizing hazards;

• ensure that hazards are avoided or controlled when operations begin, or when major alterations or changes are made;

• verify the safety of technical equipment used at work;

• see to it that the procedures defined by the competent authority are enforced;

• identify work processes, substances and agents which are to be prohibited, limited or made subject to authorization or control, taking into consideration the possibility of simultaneous exposure to several substances or agents;

• establish and apply procedures for the notification of occupational accidents and diseases by employers and, when appropriate, insurance institutions and others directly concerned, and produce annual statistics on occupational accidents and diseases;

• hold inquiries in cases of accidents, diseases or any other injuries which arise in the course of or in connection with work and appear to reflect a serious situation;

• publish information on measures taken in pursuance of the national OSH policy, and on accidents, diseases and injuries which arise in the course of or in connection with work; and • introduce or extend systems to examine chemical, physical and biological agents, and ergonomics and psycho-social factors, with a view to assessing the risk to the health of workers, in so far as is practicable in current national conditions.

In order to ensure coherence in formulating and applying the national OSH policy, there must be coordination between the various authorities and bodies designated to implement the policy. There should also be close cooperation between public authorities, representative employers' and workers' organizations, and any other concerned bodies, with a view to making arrangements that are appropriate to national conditions and practice. Such arrangements might include the establishment of a central body to take overall responsibility for implementation of policy measures.

The main purposes of these joint efforts should be to:

• fulfil the requirements regarding policy formulation, implementation and periodic review;

• coordinate efforts to carry out the functions assigned to the competent authority;

• coordinate related activities that are undertaken nationally, regionally or locally by public authorities, employers and their organizations, workers' organizations and representatives, and other individuals or bodies concerned; and

• promote the exchange of views, information and experience nationwide, within particular industries, or in specific branches of economic activity. If the goals of OSH policy are to be achieved, employers and workers must be continuously involved in its implementation and review. National tripartite seminars can be an effective means of associating employers and workers in the policy-making process. The consensus

developed by such seminars increases the commitment to implement the agreed measures.

Education and training provide individuals with the basic theoretical and practical knowledge required to carry out their trade or occupation successfully and to fit into the working environment. Because of the importance of occupational safety and health, measures should be taken to include these subjects in education and training at all levels in all trades and professions, including higher technical, medical and professional education. OSH training should meet the needs of all workers, and should be promoted in a manner that is appropriate to national conditions and practice. The idea is to incorporateOSHprinciples related to the student's needs into the teaching of all trades and professions. It is therefore important to ensure that OSHmatters are integrated in the curricula and teachingmaterials of trades and occupations at a level in line with the future functions and responsibilities of the people being taught. In general, individuals have great difficulty in modifying acquired habits or abandoning ingrained actions and reflexes. Schooling or apprenticeship should therefore inculcate safe working methods and behavior at an early stage, so that they are followed throughout working life.

Vocational training, whether in the enterprise or at school, often leaves workers poorly prepared to deal with the hazards of their trade. Fundamental principles of occupational health and safety have learnt to work with defective or badly guarded machines and tools, it would be surprising if they were later to be much concerned about safety. If, on leaving school, they are unaware of the importance of good personal hygiene, they are scarcely likely to practise it in the workshop. If people are to be taught how to earn their living, they should also be taught how to protect their lives.

The need to give appropriate training in occupational safety and health to workers and their representatives in the enterprise should thus be stressed as a fundamental element of OSH policy, and should be stated explicitly in the policy document.Workers should be provided with adequate training in terms of the technical level of their activity and the nature of their responsibilities.

Employers should also learn how to gain the confidence of their workers and motivate them; this aspect is as important as the technical content of training. The need to train labour inspectors, OSH specialists and others directly concerned with the improvement of working conditions and the working environment cannot be overemphasized and should be reflected in the policy document.

The training should take into account the increasing complexity of work processes, often brought about by the introduction of new or advanced technology, and the need for more effective methods of analysis to identify and measure hazards, as

well as action to protect workers against them. Employers' and workers' organizations should take positive action to carry out training and information programmes with a view to preventing potential occupational hazards in the working environment, and to controlling and protecting against existing risks such as those due to air pollution, noise and vibration. The public authorities have the responsibility to promote training and to act as a catalyst by providing resources and specialized personnel where necessary. Such support is essential in developing countries. Initial training, even under the best of conditions, cannot cover all foreseeable and unforeseeable situations. Consequently, occupational safety and health training is a long-term task, and one that is never completely finished.

17.NATIONAL SYSTEM FOR OCCUPATIONAL SAFETY AND HEALTH

A national OSH system comprises all the infrastructures, mechanisms and specialized human resources required to translate the principles and goals defined by the national policy into the practical implementation of national OSH programmes. In turn, one of the main aims of national OSH programmes should be to strengthen national OSH systems. An OSH system must respond to the effects of both socio-economic and technological changes on working conditions and environment, and so is not built just once but must be to be strengthened, reorganized and reoriented through a permanent cyclical process of reviews, performance evaluations, and readjustments of objectives and programmes or creation of new ones to meet new needs.

While legislation, tripartite collaboration, inspection and enforcement are the core components of any national OSH system, other elements are needed to make the system function adequately. For example, most employers, particularly those of small and even medium-sized enterprises, need assistance to understand and comply with OSH regulatory requirements, such as providing training to workers handling hazardous substances, conducting technical inspections of dangerous machinery or making OSH-related information available in the enterprise. Further support and services are required to promote good practice covering many other aspects of occupational safety and health that lie outside the legal sphere. According to Convention No. 187, to be functional and effective in addressing the OSH needs of both employers and workers, a national systemmust include at the least the following key elements:

• laws, regulations, collective agreements where appropriate, and any other relevant instruments on occupational safety and health;

• an authority or authorities responsible for occupational safety and health, designated in accordance with national law and practice;

18.NATIONAL SYSTEM FOR OCCUPATIONAL SAFETY AND HEALTH

Fundamental principles of occupational health and safety:

• mechanisms for ensuring compliance with national laws and regulations, including systems of inspection;

• arrangements to promote, at the level of the undertaking, cooperation between management, workers and their representatives as an essential element of workplace-related prevention measures;

• a national tripartite body on occupational safety and health;

• information and advisory services on occupational safety and health;

• the provision of OSH training;

• the provision of occupational health services in accordance with national law and practice;

• research on occupational safety and health;

• mechanisms for the collection and analysis of data on occupational accidents and diseases, taking into account relevant ILO instruments;

• provisions for collaboration with relevant insurance and compensation schemes covering occupational accidents and diseases;

• support mechanisms for a progressive improvement of occupational safety and health conditions in micro-, small and medium-sized enterprises and in the informal economy.

Other additional elements are also required to complete a system adequate to deal with so complex an area as occupational safety and health.

National programmes are strategic programmes with a predetermined time frame that focus on specific national priorities for occupational safety and health, identified through analysis of the national OSH system and an up-to-date national profile (see below). The aims of these programmes are to promote the development and maintenance of a preventive safety and health culture and to bring about continuous improvement in the weak or ineffective elements of the national OSH system, identified through monitoring and evaluation. The national programme is the “Act” element of

19.OCCUPATIONAL SAFETY AND HEALTH POLICY WITHIN THE ENTERPRISE

Since occupational accidents and work-related injuries to health occur at the individual workplace, preventive and control measures within the enterprise should be planned and initiated jointly by the employer, managers and workers concerned. Measures for the prevention and control of occupational hazards in the workplace should be based upon a clear, implementable and well-defined policy at the level of the enterprise. This occupational safety and health policy represents the foundation from which occupational safety and health goals and objectives, performance measures and other system components are developed. It should be concise, easily understood, approved by the highest level of management and known by all employees in the organization.

The policy should be in written form and should cover the organizational arrangements to ensure occupational safety and health. In particular, it should:

- allocate the various responsibilities for OSH within the enterprise;
- bring policy information to the notice of every worker, supervisor and manager;
- determine how occupational health services are to be organized; and
- specify measures to be taken for the surveillance of the working environment and workers' health.

The policy may be expressed in terms of organizational mission and vision statements, as a document that reflects the enterprise's occupational safety and health values. It should define the duties and responsibilities of the departmental head or the occupational safety and health team leader who will be the prime mover in the process of translating policy objectives into reality within the enterprise.

The policy document must be printed in a language or medium readily understood by the workers. Where illiteracy levels are high, clear non-verbal forms of communication must be used. The policy statement should be clearly formulated and designed to fit the particular organization for which it is intended. It should be circulated so that every employee has the opportunity to become familiar with it. The policy should also be prominently displayed throughout the workplace to act as a constant reminder to all. In particular, it should be posted in all management offices to remind managers of their obligations in this important aspect of company operations. In addition, appropriate measures should be taken by the competent authority to provide guidance to employers and workers to help them comply with their legal obligations. To ensure that the workers accept the safety and health policy objectives,

the employer should establish the policy through a process of information exchange and discussion with them. A checklist for employers writing a safety and health policy is given in Annex V. The policy should be kept alive by regular review. A policy may need to be revised in the light of new experience, or because of new hazards or organizational changes. Revision may also be necessary if the nature of the work that is carried out changes, or if new plant or new hazards are introduced into the workplace. Itmay also be necessary if new regulations, codes of practice or official guidelines relevant to the activities of the enterprise are issued. The safety and health policy should reflect the responsibility of employers to provide a safe and healthy working environment. The measures that need to be taken will vary depending on the branch of economic activity and the type of work performed; in general, however, employers should:

• provide and maintain workplaces, machinery and equipment, and use work methods, which are as safe and without risk to health as is reasonably practicable;

• ensure that, so far as reasonably practicable, chemical, physical and biological substances and agents under their control are without risk to health when appropriate measures of protection are taken;

• give the necessary instructions and training to managers and staff, taking account of the functions and capacities of different categories of workers;

• provide adequate supervision of work, of work practices, and of the application and use of occupational safety and health measures;

• institute organizational arrangements regarding OSH adapted to the size of the undertaking and the nature of its activities;

• provide adequate personal protective clothing and equipment without cost to the worker, when hazards cannot be otherwise prevented or controlled;

• ensure that work organization, particularly with respect to hours of work and rest breaks, does not adversely affect the safety and health of workers;

• take all reasonable and practicable measures to eliminate excessive physical and mental fatigue;

• provide, where necessary, for measures to deal with emergencies and accidents, including adequate first-aid arrangements;

• undertake studies and research or otherwise keep abreast of the scientific and technical knowledge necessary to comply with the obligations listed above;

• cooperate with other employers in improving occupational safety and health.

Workers' duties and rights. The cooperation of workers within the enterprise is vital for the prevention of occupational accidents and diseases. The enterprise's safety

and health policy should therefore encourage workers and their representatives to play this essential role: specifically, it should ensure that they are given adequate.

In taking preventive and protective measures, the employer should assess the risk and deal with it in the following order of priority:

• eliminate the risk;

• control the risk at source;

• minimize the risk by means that include the design of safe work systems;

• in so far as the risk remains, provide for the use of personal protective equipment.

The policy should outline the duty of individual workers to cooperate in implementing the OSH policy within the enterprise. In particular, workers have a duty to:

• take reasonable care for their own safety and that of other persons who may be affected by their acts or omissions;

• comply with instructions given for their own safety and health, and those of others, and with safety and health procedures;

• use safety devices and protective equipment correctly (and not render them inoperative);

• report promptly to their immediate supervisor any situation which they have reason to believe could present a hazard and which they cannot themselves correct;

• report any accident or injury to health which arises in the course of or in connection with work.

Workers also have certain basic rights in respect of occupational safety and health, and these should be reflected in the enterprise's policy. In particular, workers have the right to remove themselves from danger, and to refuse to carry out or continue work which they have reasonable justification to believe presents an imminent and serious threat to their life or health. They should be protected from unforeseen consequences of their actions. In addition, workers should be able to:

• request and obtain, where there is cause for concern on safety and health grounds, inspections and investigations to be conducted by the employer and the competent authority;

• know about workplace hazards that may affect their health or safety;

• obtain information relevant to their health or safety, held by the employer or the competent authority; and • collectively select safety and health representatives.

Access to better information is a prime condition for significant, positive contributions by workers and their representatives to occupational hazard control. The enterprise policy should make sure that workers are able to obtain any necessary

assistance in this regard from their trade union organizations, which have a legitimate claim to be involved in anything that concerns the protection of the life and health of their members.

Cooperation in the field of occupational safety and health between management and workers or their representatives at the workplace is an essential element in maintaining a healthy working environment. It may also contribute to the establishment and maintenance of a good social climate and to the achievement of wider objectives. Depending on national practice, this cooperation could be facilitated by the appointment ofworkers' safety delegates, orworkers' safety and health committees, or joint safety and health committees composed equally of workers' and employers' representatives. Workers' organizations play a very important role in reducing the toll of accidents and ill health. One study found that establishments with joint consultative committees, where all employee representatives were appointed by unions, had significantly fewer workplace injuries than those where the management alone determined safety and health arrangements (Reilly, Paci and Holl, 1995).

The appointment of joint safety and health committees and of workers' safety delegates is now common practice, and can help to promote workers' active involvement in safety and health work. Furthermore, safety delegates are known to be effective in monitoring the safety and health aspects of shopfloor operations and in introducing corrective measures where necessary.

Joint safety and health committees provide a valuable framework for discussion and for concerted action to improve safety and health. They should meet regularly and should periodically inspect the workplace. Workers' safety delegates, workers' safety and health committees, and joint safety and health committees (or, as appropriate, other workers' representatives) should be:

- given adequate information on safety and health matters;
- enabled to examine factors affecting safety and health;
- encouraged to propose safety and health measures;
- consulted when major new safety and health measures are envisaged and before they are carried out;
- ready to seek the support of workers for safety and health measures;
- consulted in planning alterations of work processes, work content or organization of work which may have safety or health implications for workers;
- given protection from dismissal and other measures prejudicial to them while exercising their functions in the field of occupational safety and health as workers' representatives or as members of safety and health committees;

• able to contribute to the decision-making process within the enterprise regarding matters of safety and health;

• allowed access to all parts of the workplace;

• able to communicate with workers on safety and health matters during working hours at the workplace;

• free to contact labour inspectors;

• able to contribute to negotiations within the enterprise on OSH matters;

• granted reasonable time during paid working hours to exercise their safety and health functions and to receive training related to these functions;

• able to have recourse to specialists for advice on particular safety and health problems.

Safety committees or joint safety and health committees have already been set up in larger enterprises in a number of countries. Smaller firms sometimes group together to set up regional safety and health committees for each branch of activity. The most promising results seem to have been achieved when management has concentrated on increasing workers' awareness of their important role in safety and health and encouraged them to assume their responsibilities more fully.

20. MANAGEMENT OF OCCUPATIONAL SAFETY AND HEALTH

The protection of workers from occupational accidents and diseases is primarily a management responsibility, on a par with other managerial tasks such as setting production targets, ensuring the quality of products or providing customer services. Management sets the direction for the company.

The strategic vision and mission statement establish a context for growth, profitability and production, as well as placing a value on workers' safety and health throughout the enterprise. The system for managing safety and health should be integrated within the company's business culture and processes.

If management demonstrates in words and action, through policies, procedures and financial incentives, that it is committed to workers' safety and health, then supervisors and workers will respond by ensuring that work is performed safely throughout the enterprise. Occupational safety and health should be treated not as a separate process, but as one that is integral to the way in which activities take place in the company. In order to achieve the objective of safe and healthy working conditions

and environment, employers should institute organizational arrangements adapted to the size of the enterprise and the nature of its activities.

While top management has the ultimate responsibility for the safety and health programme in an enterprise, authority for ensuring safe operation should be delegated to all management levels. Supervisors are obviously the key individuals in such a programme because they are in constant contact with the employees. As safety officers, they act in a staff capacity to help administer safety policy, to provide technical information, to help with training and to supply programme material.

Total commitment on the part of management to making safety and health a priority is essential to a successful OSH programme in the workplace. It is only when management plays a positive role that workers view such programmes as a worthwhile and sustainable exercise. The boardroom has the influence, power and resources to take initiatives and to set the pattern for a safe and healthy working environment.

Management commitment to occupational safety and health may be demonstrated in various ways, such as:

• allocating sufficient resources (financial and human) for the proper functioning of the occupational safety and health programme;

• establishing organizational structures to support managers and employees in their OSH duties;

• designating a senior management representative to be responsible for overseeing the proper functioning of OSH management.

The process of organizing and running an OSH system requires substantial capital investment. To manage safety and health efficiently, adequate financial resources must be allocated within business units as part of overall running costs. The local management team must understand the value that corporate leaders place on providing a safe place of work for employees.

There should be incentives for managers to ensure that resources are deployed for all aspects of safety and health. The challenge is to institutionalize safety and health within the planning process. Once the programme is under way, concerted efforts must be made to guarantee its sustainability Cooperation between management and workers or their representatives within an enterprise is an essential element of prevention of accidents and diseases at the workplace. Participation is a fundamental workers' right, and it is also a duty. Employers have various obligations with regard to providing a safe and healthy workplace, and workers should, in the course of performing their work, cooperate in order to enable their employer to fulfil those obligations. Their representatives in the undertaking must also cooperate with the employer in the field of occupational safety and health. Employee participation has been identified as a key

precondition of successful OSH management and a major contributing factor in the reduction of occupational diseases and injuries.

The full participation of workers in any OSH programmes designed for their benefit will not only ensure the efficacy of such measures, but will also Fundamental principles of occupational health and safety make it possible to sustain an acceptable level of safety and health at a reasonable cost. At the shop-floor level, workers and their representatives should be enabled to participate in the definition of issues, goals and resulting actions related to occupational safety and health

21.OCCUPATIONAL HEALTH SERVICES

Occupational health services are defined as services entrusted with essentially preventive functions. According to the Occupational Health Services Convention, 1985 (No. 161), they are responsible for advising the employer, the workers and their representatives in the workplace on:

(i) the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work;

(ii) the adaptation of work to the capabilities of workers in the light of their state of physical and mental health. (Article 1(a)) It is desirable that some sort of occupational health services be established in every country. This may be done by laws or regulations, or by collective agreements, or as otherwise agreed upon by the employers and workers concerned, or in any other manner approved by the competent authority after consultation with the representative organizations of employers and workers concerned.

The coverage of workers by occupational health services varies widely, ranging from 5–10 per cent at best in the developing world up to 90 per cent in industrialized countries, especially those in Western Europe. There is therefore a universal need to increase worker coverage throughout the world.

Ideally, each country should progressively develop occupational health services for all workers, including those in the public sector and members of production cooperatives, in all branches of economic activity and in all enterprises. The occupational health services provided should be adequate and Fundamental principles of occupational health and safety appropriate to the specific health risks of the enterprises. These services should also include the necessary measures to protect self-employed persons and those working in the informal sector. To that end, plans should be drawn up to effect such measures and to evaluate progress made towards their implementation

In relation to work, “health” does not merely mean the absence of disease or infirmity; it also includes the physical and mental elements affecting health which are directly related to safety and hygiene at work.

Occupational health practice is a broad concept, and includes occupational health services, which are defined in Article 1(a) of the Occupational Health Services Con¬vention, 1985 (No. 161). It involves activities for the protection and promotion of workers’ health and for the improvement of working conditions and environment carried out by occupational safety and health professionals as well as other specialists, both within the enterprise and without, as well as workers’ and employers’ representatives and the competent authorities. Such multisectoral and multidisciplinary participation demands a highly developed and coordinated system in the workplace.

Administrative, operative and organizational systems must be in place to conduct occupational health practice successfully.

Occupational health care is another broad concept; it encompasses all the people and programmes directly or indirectly involved in making the work environment healthy and safe. It includes practical, enterprise-level efforts aimed at achieving adequate occupational health, such as preventive health care, health promotion, curative health care, first aid, rehabilitation and compensation, as well as strategies for prompt recovery and return to work.

Occupational health services can be organized to serve a single enterprise or a number of enterprises, depending on which type ismore appropriate in terms of national conditions and practice. Similarly, these services may be organized by:

- the enterprise or group of enterprises concerned;
- the public authorities or official services;
- social security institutions;
- any other bodies authorized by the competent authority;
- a combination of any of the above.

In the absence of a specific occupational health service, the competent authority may, as an interim measure, designate an appropriate existing service, for instance a local medical service, to act as an occupational health service.

Thus, in an enterprise where establishing an occupational health service or providing access to such a service is impracticable, the competent authority should – after consulting the employers’ and workers’ representatives in the workplace or the safety and health committee – make provisional arrangements with a local medical service to:

- carry out the health examinations prescribed by national laws or regulations;
- ensure that first aid and emergency treatment are properly organized; and

• provide surveillance of the environmental health conditions in the workplace.

• recognition of the interrelation between environment and industry;

• factors of the working environment that may impair health and well-being;

• the formation of recommendations for the alleviation of such problems.

Occupational safety and health management comprises the activities designed to facilitate the coordination and collaboration of workers' and employers' representatives in the promotion of occupational safety and health in the workplace. The concept defines rights, roles and responsibilities regarding the identification of hazards and risks and the implementation of control or preventive measures.

Occupational health services should be made up of multidisciplinary teams whose composition should be determined by the nature of the duties performed. Each team should have sufficient technical personnel with specialized training and experience in such fields as occupational medicine, occupational hygiene, ergonomics and occupational health nursing. The staff of occupational health services should, as far as possible, keep themselves up to date with progress in the scientific and technical fields relevant to performing their duties, and should be given the opportunity to do so without loss of earnings. In addition, occupational health services should have the necessary administrative personnel to ensure their smooth operation. The staff of occupational health services must enjoy full professional independence from employers, workers and their representatives in relation to the functions of occupational health services.

Basically, occupational health services aim to protect and promote the health of workers, improve working conditions and the working environment, and maintain the health of the enterprise as a whole.

In order that they may perform their functions efficiently, occupational health services should:

• have unrestricted access to all workplaces and to the ancillary installations of the enterprise;

• be able to inspect the workplaces at appropriate intervals in cooperation, where necessary, with other services of the enterprise;

• have access to information concerning the processes, performance standards and substances used or the use of which is contemplated;

• be authorized to request the competent authorities to ensure compliance with occupational safety and health standards; and

• be authorized to undertake, or to request that approved technical bodies undertake:

(i) surveys and investigations on potential occupational health hazards, for example by sampling and analysis of the atmosphere of workplaces, of the products and substances used, or of any other material suspected of being harmful; and

(ii) the assessment of harmful physical agents.

Within the framework of their responsibility for their employees' safety and health, employers or management should take all necessary measures to facilitate the activities of occupational health services. Equally, workers and their organizations should provide support to occupational health service functions. Furthermore, in cases where occupational health services are established by national laws or regulations, the manner of financing these services should also be determined.

The main functions of a occupational health service are to:

• identify and assess the risks from health hazards in the workplace;

• watch for factors in the work environment and working practices that may affect workers' health, such as sanitary installations, canteens and housing provided by the employer;

• advise on work planning and organization, including workplace design and the choice, maintenance and condition of machinery, and other equipment and substances used in work;

• participate in the development of programmes for the improvement of work practices;

• collaborate in testing new equipment and evaluating its health aspects;

• advise on occupational health, safety and hygiene, and on ergonomics and protective equipment;

• monitor workers' health in relation to work;

• try to make sure that work is adapted to the worker;

• contribute to vocational rehabilitation;

• collaborate in providing training and education in occupational health and hygiene, and ergonomics;

• organize first aid and emergency treatment; and

• participate in the analysis of occupational accidents and occupational diseases.

Primary health care approach Programmes introduced in a number of countries to increase worker coverage of occupational health services have demonstrated that it is possible to improve the availability of such services substantially in a relatively short time and at a reasonable cost by adopting a primary health care approach. Such an approach is particularly appropriate for developing countries as it has been found to improve both the workers' access to the services and the costeffectiveness of the services provided. Primary health care, carried out in the community, by community-

based doctors, nurses and other medical staff, can reach more people, often at lower cost, than centralized hospital provision.

Bearing in mind that workers are part of the community at large, and taking into account the organization of preventive medicine at the national level, occupational health services might, where possible and appropriate:

• carry out immunizations in respect of biological hazards in the working environment;

• take part in campaigns for the protection of health; and • collaborate with the health authorities within the framework of public health programmes.

In the context of occupational safety and health, first aid means the immediate measures taken at the site of an accident by a person who may not be a physician but who is trained in first aid, has access to the necessary equipment and supplies, and knows what must be done to ensure that professional medical care will follow his or her intervention.

When a serious accident happens, the first few minutes may be decisive in terms of lives being saved or injuries avoided. Therefore, taking national law and practice into account, occupational health services in enterprises should:

• provide first aid and emergency treatment in cases of accident or indisposition of workers at the workplace; and • collaborate in the organization of first aid.

It is the employer's responsibility to ensure that first aid is available at all times. This implies a responsibility to ensure that trained personnel are available at all times. It is up to the occupational health service to ensure the training and regular retraining of first-aid personnel. Indeed, on a broader Fundamental principles of occupational health and safety scale, occupational health services should ensure that all workers who contribute to occupational safety and health are trained progressively and continuously.

The manner in which first-aid facilities and personnel are to be provided should be prescribed by national laws or regulations which should be drawn up after consulting the competent authority and the most representative organizations of employers and workers concerned.

Although occupational health services essentially focus on prevention, they may also engage in other health activities, where the local organization of health care or the distance of the workplace from general medical clinics makes such extended activities appropriate. These may include curative medical care for workers and their families, provided that the activities are authorized by the competent authority in consultation with the most representative organizations of employers and workers.

Measures should be taken to encourage and promote programmes or systems aimed at the rehabilitation and reintegration, where possible, of workers unable to

undertake their normal duties because of occupational injury or illness. The provision of such care, where appropriate, should not involve any cost to the worker and should be free of any discrimination or retaliation whatsoever.

Special occupational health needs Some workers have special occupational health needs. These may arise for a variety of reasons, including age, physiological condition, social conditions and barriers to communication. The special needs of such workers should be met on an individual basis with due concern to protecting their health at work, making sure that there is no possibility of discrimination.

One category of workers with special occupational health needs comprises pregnant women and working mothers. The assessment of risks at work, and the preventive and control strategies prescribed to control risks, should take account of these special needs, and arrangements should be made to avoid harm. Where hazards and risks to reproductive health have been identified, employers should take appropriate measures. This is especially important during health-risk periods such as pregnancy and breast-feeding.

These measures might include training and special technical and organizational measures, in particular the right to appropriate alternative work, without any loss of earnings.

Disabled workers are another group with special needs. In order to give effect to OSH policy, the competent authority should provide appropriate measures for these workers. Similarly, measures should also be taken to promote programmes or systems for the rehabilitation and reintegration of workers who have sustained occupational injury or illness.

Occupational health services should carry out their functions in cooperation with the other services in the enterprise. Measures should be taken to ensure adequate cooperation and coordination between occupational health services and, as appropriate, other bodies concerned with the provision of health services. It is recommended that national laws and practice be adapted to these requirements to ensure progress in the field of occupational safety and health.

Occupational health services should cooperate with the other services concerned in the establishment of emergency plans for action in the case of major accidents.Where necessary, they should also have contacts with external services and bodies dealing with questions of health, hygiene, safety, vocational rehabilitation, retraining and reassignment, working conditions and the welfare of workers, and inspection.

The occupational health service of a national or multinational enterprise with more than one establishment should provide the highest standard of services, without

discrimination, to the workers in all its establishments, regardless of the place or country in which they are situated.

Within the limits of their resources, occupational health services should contribute to research by participating in studies or inquiries in the enterprise or in the relevant branch of economic activity. Such research, which should be preceded by consultation with employers' and workers' representatives, might, for example, aimto collect data for epidemiological purposes or for orienting the activities of the occupational health service. The results ofmeasurements carried out in theworking environment and the assessments ofworkers' healthmay also be used for research purposes, subject to the agreement of the employer and the workers or their representatives in the enterprise or the safety and health committee.Most importantly, the privacy of the workers must be protected.

There is a need for action-oriented research programmes, in particular to:

• provide accurate statistics on the incidence of occupational accidents and diseases and on their causes;

• identify the hazards associated with all forms of new technology, including chemical substances;

• describe and analyse the working conditions of workers in poorly protected occupations and sectors; and

• investigate relationships between working conditions, occupational safety and health, and productivity, including the impact of improved conditions on employment and economic growth.

Where guidelines for research programmes are developed on a tripartite basis, the links between research and action are likely to be strengthened.

22. PREVENTIVE AND PROTECTIVE MEASURES

The incidence of accidents and work-related diseases and injuries in most occupational sectors is still regrettably high; there is therefore an urgent need for preventive and protective measures to be instituted at workplaces in order to guarantee the safety and health of workers. Occupational accidents and diseases not only cause great pain, suffering and death to victims, but also threaten the lives of other workers and their dependants. Occupational accidents and diseases also result in:

• loss of skilled and unskilled but experienced labour;

• material loss, i.e. damage to machinery and equipment well as spoiled products; and

• high operational costs through medical care, payment of compensation, and repairing or replacing damaged machinery and equipment.

Occupational health problems arise largely from hazardous factors in the working environment. Since most hazardous conditions at work are in principle preventable, efforts should be concentrated on primary prevention at the workplace, as this offers the most cost-effective strategy for their elimination and control. The planning and design of workplaces should be aimed at establishing working environments that are conducive to physical, psychological and social well-being. This means taking all reasonable precautions to avoid occupational diseases and injuries.

Workplace safety and health programmes should aim at eliminating the unsafe or unhealthy working conditions and dangerous acts which account fo nearly all occupational accidents and diseases. This can be achieved in a number of ways: engineering control, design of safe work systems to minimize risks, substituting safer materials for hazardous substances, administrative or organizational methods, and use of personal protective equipment.

How particular occupational hazards are prevented depends on the nature of the various causal agents, their mode of action and the severity of the risk.

In prescribing measures for the prevention and control of such hazards, the competent authority should take into consideration themost recent ILOcodes of practice or guidelines and the conclusions of relevant meetings of experts convened by the ILO, as well as information from other competent bodies. The competent authority should ensure that exposure to hazardous substances (such as asbestos, for instance), is prevented or controlled by prescribing engineering controls and work practices which afford maximum protection to workers. One type of engineering control involves built-in protection as part of the work process concerned. These engineering controls should be built in during the design phase; they may be implemented later, but this tends to be more costly. Engineering controls may be more expensive to implement than methods which depend on continual vigilance or intervention by the worker, but they are safer. Examples include erecting guards around machines to prevent accidents or encasing a noise source with a muffler.

Another form of engineering control is the mechanization process. This involves the use of a machine to do dangerous work rather than exposing a worker to the hazard. An example is the use of an automatic parts dipper on a vapour degreaser rather than having dipped parts into the tank by hand.

Where the elimination of hazardous substances is not practicable in existing plants and processes, employers or managers should apply technical measures to control the hazard or risk by changing the process, so that the job is done in a

completely different and safer way, or by enclosing the process completely to keep the hazard from reaching the worker. If the problems still cannot be solved by these methods, then methods such as local exhaust ventilation could be used to control the hazard.

These and other appropriate measures should be taken so that the exposure level is reduced to a level which, in the light of current knowledge, is not expected to damage the health of workers, even if they should go on being exposed at the same level for the duration of their working lives.

Good work practices and working methods can ensure that hazardous materials are contained before they become a problem. Where complete containment has not been achieved, strict housekeeping and personal hygiene are absolutely essential to ensure workplace and personal safety. In the presence of toxic chemicals, for instance, strict personal hygiene must always be observed so as to prevent local irritations or the absorption of such chemicals through the skin. Where hazardous substances such as lead dust in a storage battery plant or asbestos dust in brake shoe manufacture are involved, inadequate housekeeping can result in toxic materials circulating in the air.

There are several ways of maintaining good housekeeping; for example: • vacuuming is the best way of cleaning up dust, as dry sweeping often makes the problem worse by pushing dust particles back into the air; and • regular and thorough maintenance of machines and equipment will reduce dust and fumes. Where necessary for the protection of workers, the competent authority should require the replacement of hazardous substances by substitute materials, in so far as this is possible. For example, in the case of asbestos or products containing asbestos, national laws or regulations must provide for its replacement, if technically practicable, by other materials and products, or for the use of alternative technology, scientifically evaluated by the competent authority as harmless or less harmful. The use of asbestos, or of certain types of asbestos, or of products containing asbestos, may be totally or partially prohibited in certain work processes. It is, however, necessary to ensure that the substitute is really safer.

Where the evaluation of the working environment shows that elimination of risk and total enclosure of machinery are both impracticable, employers should reduce exposure to hazard as much as possible, through administrative or organizational measures, so as to:

• reduce the source of the hazard, so that risks are confined to certain areas where engineering control measures can be applied effectively;

• adopt adequate work practices and working-time arrangements so that workers' exposure to hazards is effectively controlled; and

• minimize the magnitude of exposure, the number of workers exposed and the duration of exposure, e.g. carry out noisy operations at night or during the weekend, when fewer workers are exposed. When none of the above approaches is feasible, or when the degree of safety achieved by them is considered inadequate, the only solution is to provide exposed persons with suitable personal protective equipment and protective clothing. This is the final line of defence and should be used only as a last resort, since it entails reliance on active cooperation and compliance by the workers. Moreover, such equipment may be heavy, cumbersome and uncomfortable, and may restrict movement.

Employers should consult workers or their representatives on suitable personal protective equipment and clothing, having regard to the type of work and the type and level of risks. Furthermore, when hazards cannot be otherwise prevented or controlled, employers should provide and maintain such equipment and clothing as are reasonably necessary, without cost to the workers. The employer should provide the workers with the appropriate means to enable them to use the individual protective equipment. Indeed, the employer has a duty to ensure its proper use. Protective equipment and clothing should comply with the standards set by the competent authority and take ergonomic principles into account. Workers have the obligation to make proper use of and take good care of the personal protective equipment and protective clothing provided for their use.

Technological progress can play an important role in improving working conditions and job content, but it can also introduce new hazards. Great care should therefore be taken in both the choice and the international transfer of technology in order to avoid potential hazards and ensure that the technology is adapted to local conditions. Management should consult with workers' representatives whenever new technology is introduced.

The hazards associated with technologies (equipment, substances and processes) used at the work site must be identified and effective measures taken to eliminate or control them. This means that safety factors should be built in, and that working conditions, organization and methods should be adapted to the characteristics and capacities of workers.

The introduction of new technology should be accompanied by adequate information and training. Furthermore, potentially dangerous machinery, equipment or substances should not be exported without adequate safeguards being put in place, including information on safe use in the language of the importing country. It is the duty of the governments of importing countries to review national legislation to make sure that it includes provisions to stop the import of technology detrimental to

occupational safety and health or working conditions. The importance of protecting workers, the general public and the environment from materials containing hazardous substances cannot be overemphasized.

To this end, the competent authority should ensure that criteria consistent with national or international regulations regarding disposal of hazardous waste are established. Procedures to be followed in the disposal and treatment of hazardous waste products should also be established, with a view to ensuring the safety of workers, and the protection of the general public and the environment.

Employers must therefore dispose of waste containing hazardous materials, such as asbestos, in a manner that does not pose a health risk to the workers concerned, including those handling the waste material, or to the general population. Furthermore, it is up to the competent authority and employers to take measures to prevent pollution of the general environment by dust or other pollutants released from the work site.

23.EXCERPTS FROM MAJOR OSH INTERNATIONAL LABOUR STANDARDS

Convention concerning the promotional framework for occupational safety and health, 2006 (No. 187)

Excerpts, Articles 1 to 5

The General Conference of the International Labour Organization,

Having been convened at Geneva by the Governing Body of the International Labour Office, and having met in its Ninety-fifth Session on 31 May 2006,

Recognizing the global magnitude of occupational injuries, diseases and deaths, and the need for further action to reduce them, and Recalling that the protection of workers against sickness, disease and injury arising out of employment is among the objectives of the International LabourOrganization as set out in its Constitution, and

Recognizing that occupational injuries, diseases and deaths have a negative effect on productivity and on economic and social development.

Noting paragraph III(g) of the Declaration of Philadelphia, which provides that the International Labour Organization has the solemn obligation to further among the nations of the world programmes which will achieve adequate protection for the life and health of workers in all occupations.

Mindful of the ILO Declaration on Fundamental Principles and Rights atWork and its Follow-Up, 1998.

Noting the Occupational Safety and Health Convention, 1981 (No. 155), the Occupational Safety and Health Recommendation, 1981 (No. 164), and other

instruments of the International Labour Organization relevant to the promotional framework for occupational safety and health.

Recalling that the promotion of occupational safety and health is part of the International Labour Organization's agenda of decent work for all.

Recalling the Conclusions concerning ILO standards-related activities in the area of occupational safety and health – a global strategy, adopted by the International Labour Conference at its 91st Session (2003), in particular relating to ensuring that priority be given to occupational safety and health in national agendas.

Stressing the importance of the continuous promotion of a national preventative safety and health culture.

Having decided upon the adoption of certain proposals with regard to occupational safety and health, which is the fourth item on the agenda of the session.

Having determined that these proposals shall take the formof an internationalConvention; adopts this fifteenth day of June of the year two thousand and six the following Convention, which may be cited as the Promotional Framework for Occupational Safety and Health Convention, 2006.

24. DEFINITIONS

Article 1

For the purpose of this Convention:

(a) the term national policy refers to the national policy on occupational safety and health and the working environment developed in accordance with the principles of Article 4 of the Occupational Safety and Health Convention, 1981 (No. 155);

(b) the term national system for occupational safety and health or national system refers to the infrastructure which provides the main framework for implementing the national policy and national programmes on occupational safety and health;

(c) the term national programme on occupational safety and health or national programme refers to any national programme that includes objectives to be achieved in a predetermined time frame, priorities and means of action formulated to improve occupational safety and health, and means to assess progress;

(d) the term a national preventative safety and health culture refers to a culture in which the right to a safe and healthy working environment is respected at all levels, where government, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties, and where the principle of prevention is accorded the highest priority.

II. OBJECTIVE

Article 2

1. Each Member which ratifies thisConvention shall promote continuous improve-ment of occupational safety and health to prevent occupational injuries, diseases and deaths, by the development, in consultation with the most representative organizations of employers and workers, of a national policy, national system and national programme.

2. Each Member shall take active steps towards achieving progressively a safe and healthy working environment through a national system and national programmes on occupational safety and health by taking into account the principles set out in instruments of the International Labour Organization (ILO) relevant to the promotional framework for occupational safety and health.

3. Each Member, in consultation with the most representative organizations of employers and workers, shall periodically consider what measures could be taken to ratify relevant occupational safety and health Conventions of the ILO.

III. NATIONAL POLICY

Article 3

1. Each Member shall promote a safe and healthy working environment by formulating a national policy.

2. Each Member shall promote and advance, at all relevant levels, the right of workers to a safe and healthy working environment.

3. In formulating its national policy, each Member, in light of national conditions and practice and in consultationwith themost representative organizations of employers and workers, shall promote basic principles such as assessing occupational risks or hazards; combating occupational risks or hazards at source; and developing a national preventative safety and health culture that includes information, consultation and training.

IV. NATIONAL SYSTEM

Article 4

1. Each Member shall establish, maintain, progressively develop and periodically review a national system for occupational safety and health, in consultation with the most representative organizations of employers and workers.

2. The national system for occupational safety and health shall include among others:

(a) laws and regulations, collective agreements where appropriate, and any other relevant instruments on occupational safety and health;

(b) an authority or body, or authorities or bodies, responsible for occupational safety and health, designated in accordance with national law and practice;

(c) mechanisms for ensuring compliance with national laws and regulations, including systems of inspection; and

(d) arrangements to promote, at the level of the undertaking, cooperation between management, workers and their representatives as an essential element of workplace-related prevention measures.

3. The national system for occupational safety and health shall include, where appropriate:

(a) a national tripartite advisory body, or bodies, addressing occupational safety and health issues;

(b) information and advisory services on occupational safety and health;

(c) the provision of occupational safety and health training;

(d) occupational health services in accordance with national law and practice;

(e) research on occupational safety and health;

(f) a mechanism for the collection and analysis of data on occupational injuries and diseases, taking into account relevant ILO instruments;

(g) provisions for collaboration with relevant insurance or social security schemes covering occupational injuries and diseases; and

(h) support mechanisms for a progressive improvement of occupational safety and health conditions in micro-enterprises, in small and medium-sized enterprises and in the informal economy.

V. NATIONAL PROGRAMME

Article 5

1. Each Member shall formulate, implement, monitor, evaluate and periodically review a national programme on occupational safety and health in consultation with the most representative organizations of employers and workers.

2. The national programme shall:

(a) promote the development of a national preventative safety and health culture;

(b) contribute to the protection of workers by eliminating or minimizing, so far as is reasonably practicable, work-related hazards and risks, in accordance with national law and practice, in order to prevent occupational injuries, diseases and deaths and promote safety and health in the workplace;

(c) be formulated and reviewed on the basis of analysis of the national situation regarding occupational safety and health, including analysis of the national system for occupational safety and health;

(d) include objectives, targets and indicators of progress; and

(e) be supported, where possible, by other complementary national programmes and plans which will assist in achieving progressively a safe and healthy working environment.

3. The national programme shall be widely publicized and, to the extent possible, endorsed and launched by the highest national authorities.

I. NATIONAL POLICY

1. The national policy formulated under Article 3 of the Convention should take into account Part II of the Occupational Safety and Health Convention, 1981 (No. 155), as well as the relevant rights, duties and responsibilities of workers, employers and governments in that Convention.

II. NATIONAL SYSTEM

2. In establishing, maintaining, progressively developing and periodically reviewing the national system for occupational safety and health defined in Article 1(b) of the Convention, Members:

(a) should take into account the instruments of the International Labour Organization (ILO) relevant to the promotional framework for occupational safety and health listed in the Annex to this Recommendation, in particular the Occupational Safety and Health Convention, 1981 (No. 155), the Labour Inspection Convention, 1947 (No. 81) and the Labour Inspection (Agriculture) Convention, 1969 (No. 129); and

(b) may extend the consultations provided for in Article 4(1) of the Convention to other interested parties.

3. With a view to preventing occupational injuries, diseases and deaths, the national system should provide appropriate measures for the protection of all workers, in particular, workers in high-risk sectors, and vulnerable workers such as those in the informal economy and migrant and young workers.

4. Members should take measures to protect the safety and health of workers of both genders, including the protection of their reproductive health.

5. In promoting a national preventative safety and health culture as defined in Article 1(d) of the Convention, Members should seek:

(a) to raise workplace and public awareness on occupational safety and health through national campaigns linked with, where appropriate, workplace and international initiatives;

(b) to promotemechanisms for delivery of occupational safety and health education and training, in particular for management, supervisors, workers and their representatives and government officials responsible for safety and health;

(c) to introduce occupational safety and health concepts and, where appropriate, competencies, in educational and vocational training programmes;

(d) to facilitate the exchange of occupational safety and health statistics and data among relevant authorities, employers, workers and their representatives;

(e) to provide information and advice to employers and workers and their respective organizations and to promote or facilitate cooperation among them with a view to eliminating or minimizing, so far as is reasonably practicable, work-related hazards and risks;

(f) to promote, at the level of the workplace, the establishment of safety and health policies and joint safety and health committees and the designation of workers' occupational safety and health representatives, in accordance with national law and practice; and

(g) to address the constraints of micro-enterprises and small and medium-sized enterprises and contractors in the implementation of occupational safety and health policies and regulations, in accordance with national law and practice.

6. Members should promote a management systems approach to occupational safety and health, such as the approach set out in the Guidelines on occupational safety and health management systems (ILO-OSH 2001).

III. NATIONAL PROGRAMME

7. The national programme on occupational safety and health as defined in Article 1(c) of the Convention should be based on principles of assessment and management of hazards and risks, in particular at the workplace level.

8. The national programme should identify priorities for action, which should be periodically reviewed and updated.

9. In formulating and reviewing the national programme, Members may extend the consultations provided for in Article 5(1) of the Convention to other interested parties.

10. With a view to giving effect to the provisions of Article 5 of the Convention, the national programme should actively promote workplace prevention measures and activities that include the participation of employers, workers and their representatives.

11. The national programme on occupational safety and health should be coordinated, where appropriate, with other national programmes and plans, such as those relating to public health and economic development.

12. In formulating and reviewing the national programme, Members should take into account the instruments of the ILO relevant to the promotional framework for occupational safety and health, listed in the Annex to this Recommendation, without prejudice to their obligations under Conventions that they have ratified.

IV. NATIONAL PROFILE

13. Members should prepare and regularly update a national profile which summarizes the existing situation on occupational safety and health and the progress made towards achieving a safe and healthy working environment. The profile should be used as a basis for formulating and reviewing the national programme.

14. (1) The national profile on occupational safety and health should include information on the following elements, as applicable:

(a) laws and regulations, collective agreements where appropriate, and any other relevant instruments on occupational safety and health;

(b) the authority or body, or the authorities or bodies, responsible for occupational safety and health, designated in accordance with national law and practice;

(c) the mechanisms for ensuring compliance with national laws and regulations, including the systems of inspection;

(d) the arrangements to promote, at the level of the undertaking, cooperation between management, workers and their representatives as an essential element of workplace-related prevention measures;

(e) the national tripartite advisory body, or bodies, addressing occupational safety and health issues;

(f) the information and advisory services on occupational safety and health;

(g) the provision of occupational safety and health training;

(h) the occupational health services in accordance with national law and practice;

(i) research on occupational safety and health;

(j) the mechanism for the collection and analysis of data on occupational injuries and diseases and their causes, taking into account relevant ILO instruments;

(k) the provisions for collaboration with relevant insurance or social security schemes covering occupational injuries and diseases; and

(l) the supportmechanisms for a progressive improvement of occupational safety and health conditions in micro-enterprises, in small and medium-sized enterprises and in the informal economy.

(2) In addition, the national profile on occupational safety and health should include information on the following elements, where appropriate:

(a) coordination and collaboration mechanisms at national and enterprise levels, including national programme review mechanisms;

(b) technical standards, codes of practice and guidelines on occupational safety and health;

(c) educational and awareness-raising arrangements, including promotional initiatives;

(d) specialized technical, medical and scientific institutions with linkages to various aspects of occupational safety and health, including research institutes and laboratories concerned with occupational safety and health;

(e) personnel engaged in the area of occupational safety and health, such as inspectors, safety and health officers, and occupational physicians and hygienists;

(f) occupational injury and disease statistics;

(g) occupational safety and health policies and programmes of organizations of employers and workers;

(h) regular or ongoing activities related to occupational safety and health, including international collaboration;

(i) financial and budgetary resources with regard to occupational safety and health; and

(j) data addressing demography, literacy, economy and employment, as available, as well as any other relevant information.

V. INTERNATIONAL COOPERATION AND EXCHANGE OF INFORMATION

15. The International Labour Organization should:

(a) facilitate international technical cooperation on occupational safety and health with a view to assisting countries, particularly developing countries, for the following purposes:

(i) to strengthen their capacity for the establishment andmaintenance of a national preventative safety and health culture;

(ii) to promote a management systems approach to occupational safety and health; and (iii) to promote the ratification, in the case of Conventions, and implementation of instruments of the ILO relevant to the promotional framework for occupational safety and health, listed in the Annex to this Recommendation;

(b) facilitate the exchange of information on national policies within the meaning of Article 1(a) of the Convention, on national systems and programmes on occupational safety and health, including on good practices and innovative approaches, and on the identification of new and emerging hazards and risks in the workplace; and

(c) provide information on progress made towards achieving a safe and healthy working environment.

VI. UPDATING OF THE ANNEX

16.TheAnnex to thisRecommendation should be reviewed and updated by theGoverning Body of the International LabourOffice. Any revised annex so

established shall be adopted by the Governing Body and shall replace the preceding annex fter having been communicated to theMembers of the International LabourOrganization.

PART I. SCOPE AND DEFINITIONS

Article 1

1. This Convention applies to all branches of economic activity.

2. A Member ratifying this Convention may, after consultation at the earliest possible stage with the representative organisations of employers and workers concerned, exclude from its application, in part or in whole, particular branches of economic activity, such as maritime shipping or fishing, in respect of which special problems of a substantial nature arise.

3. Each Member which ratifies this Convention shall list, in the first report on the application of the Convention submitted under Article 22 of the Constitution of the International Labour Organisation, any branches which may have been excluded in pursuance of paragraph 2 of this Article, giving the reasons for such exclusion and describing themeasures taken to give adequate protection toworkers in excluded branches, and shall indicate in subsequent reports any progress towards wider application.

Article 2

1. This Convention applies to all workers in the branches of economic activity covered.

2. A Member ratifying this Convention may, after consultation at the earliest possible stage with the representative organisations of employers and workers concerned, exclude fromits application, in part or in whole, limited categories of workers in respect of which there are particular difficulties.

3. Each Member which ratifies this Convention shall list, in the first report on the application of the Convention submitted under Article 22 of the Constitution of the International Labour Organisation, any limited categories of workers which may have been excluded in pursuance of paragraph 2 of this Article, giving the reasons for such exclusion, and shall indicate in subsequent reports any progress towards wider application.

Article 3

For the purpose of this Convention –

(a) the term branches of economic activity covers all branches in which workers employed, including the public service;

(b) the term workers covers all employed persons, including public employees;

(c) the termworkplace covers all placeswhereworkers need to be or to go by reason of their work and which are under direct or indirect control of the employer;

(d) the term regulations covers all provisions given force of law by the authority or authorities;

(e) the termhealth, in relation to work, indicates notmerely the absence of disease or infirmity; it also includes the physical and mental elements affecting health which are directly related to safety and hygiene at work.

PART II. PRINCIPLES OF NATIONAL POLICY

Article 4

1. Each Member shall, in the light of national conditions and practice, and in consultation with the most representative organisations of employers and workers, formulate, implement and periodically review a coherent national policy on occupational safety, occupational health and the working environment.

2. The aim of the policy shall be to prevent accidents and injury to health arising out of, linked with or occurring in the course of work, byminimising, so far as is reasonably practicable, the causes of hazards inherent in the working environment.

Article 5

The policy referred to in Article 4 of this Convention shall take account of the following main spheres of action in so far as they affect occupational safety and health and the working environment:

(a) design, testing, choice, substitution, installation, arrangement, use andmaintenance of the material elements of work (workplaces, working environment, tools, machinery and equipment, chemical, physical and biological substances and agents, work processes);

(b) relationships between the material elements of work and the persons who carry out or supervise the work, and adaptation of machinery, equipment, working time, organisation of work and work processes to the physical and mental capacities of the workers;

(c) training, including necessary further training, qualifications andmotivations of persons involved, in one capacity or another, in the achievement of adequate levels of safety and health;

(d) communication and co-operation at the levels of the working group and the undertaking and at all other appropriate levels up to and including the national level;

(e) the protection of workers and their representatives fromdisciplinarymeasures as a result of actions properly taken by them in conformity with the policy referred to in Article 4 of this Convention.

Article 6

The formulation of the policy referred to in Article 4 of this Convention shall indicate the respective functions and responsibilities in respect of occupational safety and health and the working environment of public authorities, employers, workers and others, taking account both of the complementary character of such responsibilities and of national conditions and practice.

Article 7

The situation regarding occupational safety and health and the working environment shall be reviewed at appropriate intervals, either over-all or in respect of particular areas, with a view to identifying major problems, evolving effective methods for dealing with them and priorities of action, and evaluating results.

PART III. ACTION AT THE NATIONAL LEVEL

Article 8

Each Member shall, by laws or regulations or any othermethod consistent with national conditions and practice and in consultation with the representative organisations of employers and workers concerned, take such steps as may be necessary to give effect to Article 4 of this Convention.

Article 9

1. The enforcement of laws and regulations concerning occupational safety and health and the working environment shall be secured by an adequate and appropriate system of inspection.

2. The enforcement system shall provide for adequate penalties for violations of the laws and regulations.

Article 10

Measures shall be taken to provide guidance to employers and workers so as to help them to comply with legal obligations.

Article 11

To give effect to the policy referred to in Article 4 of this Convention, the competent authority or authorities shall ensure that the following functions are progressively carried out:

(a) the determination, where the nature and degree of hazards so require, of conditions governing the design, construction and layout of undertakings, the commencement of their operations, major alterations affecting them and changes in their purposes, the safety of technical equipment used at work, as well as the application of procedures defined by the competent authorities;

(b) the determination of work processes and of substances and agents the exposure to which is to be prohibited, limited ormade subject to authorisation or control by the competent authority or authorities; health hazards due to the simultaneous exposure to several substances or agents shall be taken into consideration;

(c) the establishment and application of procedures for the notification of occupational accidents and diseases, by employers and, when appropriate, insurance institutions and others directly concerned, and the production of annual statistics on occupational accidents and diseases;

(d) the holding of inquiries, where cases of occupational accidents, occupational diseases or any other injuries to health which arise in the course of or in connection with work appear to reflect situations which are serious;

(e) the publication, annually, of information on measures taken in pursuance of the policy referred to in Article 4 of this Convention and on occupational accidents, occupational diseases and other injuries to health which arise in the course of or in connection with work;

(f) the introduction or extension of systems, taking into account national conditions and possibilities, to examine chemical, physical and biological agents in respect of the risk to the health of workers.

Article 12

Measures shall be taken, in accordance with national law and practice, with a view to ensuring that those who design, manufacture, import, provide or transfer machinery, equipment or substances for occupational use –

(a) satisfy themselves that, so far as is reasonably practicable, the machinery, equipment or substance does not entail dangers for the safety and health of those using it correctly;

(b) make available information concerning the correct installation and use of machinery and equipment and the correct use of substances, and information on hazards of machinery and equipment and dangerous properties of chemical substances and physical and biological agents or products, as well as instructions on how hazards are to be avoided;

(c) undertake studies and research or otherwise keep abreast of the scientific and technical knowledge necessary to complywith subparagraphs (a) and (b) of thisArticle.

Article 13

A worker who has removed himself from a work situation which he has reasonable justification to believe presents an imminent and serious danger to his life or health shall be protected fromundue consequences in accordance with national conditions and practice.

Article 14

Measures shall be taken with a view to promoting in a manner appropriate to nationalconditions and practice, the inclusion of questions of occupational safety and health and theworking environment at all levels of education and training, including higher technical, medical and professional education, in amannermeeting the training needs of allworkers.

Article 15

1. With a view to ensuring the coherence of the policy referred to in Article 4 of this Convention and of measures for its application, each Member shall, after consultation at the earliest possible stage with the most representative organisations of employers and workers, and with other bodies as appropriate, make arrangements appropriate to national conditions and practice to ensure the necessary co-ordination between various authorities and bodies called upon to give effect to Parts II and III of this Convention.

2. Whenever circumstances so require and national conditions and practice permit, these arrangements shall include the establishment of a central body.

PART IV. ACTION AT THE LEVEL OF THE UNDERTAKING

Article 16

1. Employers shall be required to ensure that, so far as is reasonably practicable, the workplaces, machinery, equipment and processes under their control are safe and without risk to health.

2. Employers shall be required to ensure that, so far as is reasonably practicable, the chemical, physical and biological substances and agents under their control are without risk to health when the appropriate measures of protection are taken.

3. Employers shall be required to provide, where necessary, adequate protective clothing and protective equipment to prevent, so far is reasonably practicable, risk of accidents or of adverse effects on health.

Article 17

Whenever two or more undertakings engage in activities simultaneously at one workplace, they shall collaborate in applying the requirements of this Convention.

Article 18

Employers shall be required to provide, where necessary, for measures to deal with emergencies and accidents, including adequate first-aid arrangements.

Article 19

There shall be arrangements at the level of the undertaking under which –

(a) workers, in the course of performing their work, co-operate in the fulfillment by their employer of the obligations placed upon him;

(b) representatives of workers in the undertaking co-operate with the employer in the field of occupational safety and health;

(c) representatives of workers in an undertaking are given adequate information on measures taken by the employer to secure occupational safety and health and may consult their representative organisations about such information

provided they do not disclose commercial secrets;

(d) workers and their representatives in the undertaking are given appropriate training in occupational safety and health;

(e) workers or their representatives and, as the case may be, their representative organisations in an undertaking, in accordance with national law and practice, are enabled to enquire into, and are consulted by the employer on, all aspects of occupational safety and health associated with their work; for this purpose technical advisers may, by mutual agreement, be brought in from outside the undertaking;

(f) a worker reports forthwith to his immediate supervisor any situation which he has reasonable justification to believe presents an imminent and serious danger to his life or health; until the employer has taken remedial action, if necessary, the employer cannot require workers to return to a work situation where there is continuing imminent and serious danger to life or health.

Article 20

Co-operation betweenmanagement and workers and/or their representatives within the undertaking shall be an essential element of organisational and other measures taken in pursuance of Articles 16 to 19 of this Convention.

Article 21

Occupational safety and health measures shall not involve any expenditure for the workers.

I. SCOPE AND DEFINITIONS

1. (1) To the greatest extent possible, the provisions of the Occupational Safety and Health Convention, 1981, hereinafter referred to as the Convention, and of this Recommendation should be applied to all branches of economic activity and to all categories of workers.

(2) Provision should be made for such measures as may be necessary and practicable to give self-employed persons protection analogous to that provided for in the Convention and in this Recommendation.

2. For the purpose of this Recommendation –

(a) the term branches of economic activity covers all branches in which workers employed, including the public service;

(b) the term workers covers all employed persons, including public employees;

(c) the term workplace covers all places where workers need to be or to go by reason of their work and which are under the direct or indirect control of the employer;

(d) the term regulations covers all provisions given force of law by the competent authority or authorities;

(e) the termhealth, in relation to work, indicates notmerely the absence of disease or infirmity; it also includes the physical and mental elements affecting health which are directly related to safety and hygiene at work.

II. TECHNICAL FIELDS OF ACTION

3. As appropriate for different branches of economic activity and different types of work and taking into account the principle of giving priority to eliminating hazards at their source, measures should be taken in pursuance of the policy referred to in Article 4 of the Convention, in particular in the following fields:

(a) design, siting, structural features, installation, maintenance, repair and alteration of workplaces and means of access thereto and egress therefrom;

(b) lighting, ventilation, order and cleanliness of workplaces;

(c) temperature, humidity and movement of air in the workplace;

(d) design, construction, use,maintenance, testing and inspection ofmachinery and equipment liable to present hazards and, as appropriate, their approval and transfer;

(e) prevention of harmful physical or mental stress due to conditions of work;

(f) handling, stacking and storage of loads andmaterials,manually ormechanically;

(g) use of electricity;

(h) manufacture, packing, labelling, transport, storage and use of dangerous substances and agents, disposal of their wastes and residues, and, as appropriate, their replacement by other substances or agents which are not dangerous or which are less dangerous;

(i) radiation protection;

(j) prevention and control of, and protection against, occupational hazards due to noise and vibration;

(k) control of the atmosphere and other ambient factors of workplaces;

(l) prevention and control of hazards due to high and low barometric pressures;

(m) prevention of fires and explosions and measures to be taken in case of fire or explosion;

(n) design, manufacture, supply, use, maintenance and testing of personal protective equipment and protective clothing;

(o) sanitary installations, washing facilities, facilities for changing and storing clothes, supply of drinking water, and any other welfare facilities connected with occupational safety and health;

(p) first-aid treatment;

(q) establishment of emergency plans;

(r) supervision of the health of workers.

III. ACTION AT THE NATIONAL LEVEL

4. With a view to giving effect to the policy referred to in Article 4 of the Convention, and taking account of the technical fields of action listed in Paragraph 3 of this Recommendation, the competent authority or authorities in each country should –

(a) issue or approve regulations, codes of practice or other suitable provisions on occupational safety and health and the working environment, account being taken of the links existing between safety and health, on the one hand, and hours of work and rest breaks, on the other;

(b) from time to time review legislative enactments concerning occupational safety and health and the working environment, and provisions issued or approved in pursuance of clause (a) of this Paragraph, in the light of experience and advances in science and technology;

(c) undertake or promote studies and research to identify hazards and find means of overcoming them;

(d) provide information and advice, in an appropriate manner, to employers and workers and promote or facilitate co-operation between them and their organisations, with a view to eliminating hazards or reducing them as far as practicable; where appropriate, a special training programme for migrant workers in their mother tongue should be provided;

(e) provide specific measures to prevent catastrophes, and to co-ordinate and make coherent the actions to be taken at different levels, particularly in industrial zones where undertakings with high potential risks for workers and the surrounding population are situated;

(f) secure good liaison with the International Labour Occupational Safety and HealthHazard Alert System set up within the framework of the International Labour Organisation;

(g) provide appropriate measures for handicapped workers.

5. The system of inspection provided for in paragraph 1 of Article 9 of the Convention should be guided by the provisions of the Labour Inspection Convention,

1947, and the Labour Inspection (Agriculture) Convention, 1969, without prejudice to the obligations thereunder of Members which have ratified these instruments.

6. As appropriate, the competent authority or authorities should, in consultation with the representative organisations of employers and workers concerned, promote measures in the field of conditions of work consistent with the policy referred.

Article 4 of the Convention.

7. The main purposes of the arrangements referred to in Article 15 of the Convention should be to –

(a) implement the requirements of Articles 4 and 7 of the Convention;

(b) co-ordinate the exercise of the functions assigned to the competent authority or authorities in pursuance of Article 11 of the Convention and Paragraph 4 of this Recommendation;

(c) co-ordinate activities in the field of occupational safety and health and the working environment which are exercised nationally, regionally or locally, by public authorities, by employers and their organisations, by workers' organisations and representatives, and by other persons or bodies concerned;

(d) promote exchanges of views, information and experience at the national level, at the level of an industry or that of a branch of economic activity.

8. There should be close co-operation between public authorities and representative employers' andworkers' organisations, aswell as other bodies concerned inmeasures for the formulation and application of the policy referred to in Article 4 of the Convention.

9. The review referred to in Article 7 of the Convention should cover in particular the situation of the most vulnerable workers, for example, the handicapped.

IV. ACTION AT THE LEVEL OF THE UNDERTAKING

10. The obligations placed upon employers with a view to achieving the objective set forth in Article 16 of the Convention might include, as appropriate for different branches of economic activity and different types of work, the following:

(a) to provide and maintain workplaces, machinery and equipment, and use work methods, which are as safe and without risk to health as is reasonably practicable;

(b) to give necessary instructions and training, taking account of the functions and capacities of different categories of workers;

(c) to provide adequate supervision of work, of work practices and of application and use of occupational safety and health measures;

(d) to institute organisational arrangements regarding occupational safety and health and the working environment adapted to the size of the undertaking and the nature of its activities;

(e) to provide, without any cost to the worker, adequate personal protective clothing and equipment which are reasonably necessary when hazards cannot be otherwise prevented or controlled;

(f) to ensure that work organisation, particularly with respect to hours of work and rest breaks, does not adversely affect occupational safety and health;

(g) to take all reasonably practicablemeasures with a view to eliminating excessive physical and mental fatigue;

(h) to undertake studies and research or otherwise keep abreast of the scientific and technical knowledge necessary to comply with the foregoing clauses.

11. Whenever two ormore undertakings engage in activities simultaneously at oneworkplace, they should collaborate in applying the provisions regarding occupational safety and health and theworking environment,without prejudice to the responsibility of each undertaking for the health and safety of its employees. In appropriate cases, the competent authority or authorities should prescribe general procedures for this collaboration.

12. (1) The measures taken to facilitate the co-operation referred to in Article 20 of the Convention should include, where appropriate and necessary, the appointment, in accordance with national practice, of workers' safety delegates, of workers' safety and health committees, and/or of joint safety and health committees; in joint safety and health committees workers should have at least equal representation with employers' representatives.

(2) Workers' safety delegates, workers' safety and health committees, and joint safety and health committees or, as appropriate, other workers' representatives should –

(a) be given adequate information on safety and health matters, enabled to examine factors affecting safety and health, and encouraged to proposemeasures on the subject;

(b) be consulted when major new safety and health measures are envisaged and before they are carried out, and seek to obtain the support of the workers for such measures;

(c) be consulted in planning alterations of work processes, work content or organisation of work, which may have safety or health implications for the workers;

(d) be given protection from dismissal and other measures prejudicial to them while exercising their functions in the field of occupational safety and health as workers' representatives or as members of safety and health committees;

(e) be able to contribute to the decision-making process at the level of the undertaking regarding matters of safety and health;

(f) have access to all parts of the workplace and be able to communicate with the workers on safety and health matters during working hours at the workplace;

(g) be free to contact labour inspectors;

(h) be able to contribute to negotiations in the undertaking on occupational safety and health matters;

(i) have reasonable time during paid working hours to exercise their safety and health functions and to receive training related to these functions;

(j) have recourse to specialists to advise on particular safety and health problems.

13. As necessary in regard to the activities of the undertaking and practicable in regard to size, provision should be made for –

(a) the availability of an occupational health service and a safety service, within the undertaking, jointly with other undertakings, or under arrangements with an outside body;

(b) recourse to specialists to advise on particular occupational safety or health problems or supervise the application of measures to meet them.

14. Employers should, where the nature of the operations in their undertakings warrants it, be required to set out in writing their policy and arrangements in the field of occupational safety and health, and the various responsibilities exercised under these arrangements, and to bring this information to the notice of every worker, in a language or medium the worker readily understands.

15. (1) Employers should be required to verify the implementation of applicable standards on occupational safety and health regularly, for instance by environmental monitoring, and to undertake systematic safety audits from time to time.

(2) Employers should be required to keep such records relevant to occupational safety and health and the working environment as are considered necessary by the competent authority or authorities; these might include records of all notifiable occupational accidents and injuries to health which arise in the course of or in connection with work, records of authorisation and exemptions under laws or regulations to supervision of the health of workers in the undertaking, and data concerning exposure to specified substances and agents.

16. The arrangements provided for in Article 19 of the Convention should aim at ensuring that workers –

(a) take reasonable care for their own safety and that of other persons who may be affected by their acts or omissions at work;

(b) comply with instructions given for their own safety and health and those of others and with safety and health procedures;

(c) use safety devices and protective equipment correctly and do not render them inoperative;

(d) report forthwith to their immediate supervisor any situation which they have reason to believe could present a hazard and which they cannot themselves correct;

(e) report any accident or injury to health which arises in the course of or in connection with work.

17. No measures prejudicial to a worker should be taken by reference to the fact that, in good faith, he complained of what he considered to be a breach of statutory requirements or a serious inadequacy in the measures taken by the employer in respect of occupational safety and health and the working environment.

PART I. PRINCIPLES OF NATIONAL POLICY

Article 1

For the purpose of this Convention –

(a) the term occupational health services means services entrusted with essentially preventive functions and responsible for advising the employer,the workers and their representatives in the undertaking on –

(i) the requirements for establishing and maintaining a safe and healthy working environment which will facilitate optimal physical and mental health in relation to work;

(ii) the adaptation of work to the capabilities of workers in the light of their state of physical and mental health;

(b) the term workers' representatives in the undertaking means persons who are recognised as such under national law or practice.

Article 2

In the light of national conditions and practice and in consultation with the most representative organisations of employers and workers, where they exist, each Member shall formulate, implement and periodically review a coherent national policy on occupational health services.

Article 3

1. Each Member undertakes to develop progressively occupational health services for all workers, including those in the public sector and the members of production cooperatives, in all branches of economic activity and all undertakings. The

provision made should be adequate and appropriate to the specific risks of the undertakings.

2. If occupational health services cannot be immediately established for all undertakings, eachMember concerned shall draw up plans for the establishment of such services in consultation with the most representative organisations of employers and workers, where they exist.

3. Each Member concerned shall indicate, in the first report on the application of the Convention submitted under article 22 of the Constitution of the International Labour Organisation, the plans drawn up pursuant to paragraph 2 of this Article, and indicate in subsequent reports any progress in their application.

Article 4

The competent authority shall consult the most representative organisations of employers and workers, where they exist, on the measures to be taken to give effect to the provisions of this Convention.

PART II. FUNCTIONS

Article 5

Without prejudice to the responsibility of each employer for the health and safety of the workers in his employment, and with due regard to the necessity for the workers to participate in matters of occupational health and safety, occupational health services shall have such of the following functions as are adequate and appropriate to the occupational risks of the undertaking:

(a) identification and assessment of the risks from health hazards in the workplace;

(b) surveillance of the factors in the working environment and working practices whichmay affect workers' health, including sanitary installations, canteens and housing where these facilities are provided by the employer;

(c) advice on planning and organisation of work, including the design of workplaces, on the choice,maintenance and condition ofmachinery and other equipment and on substances used in work;

(d) participation in the development of programmes for the improvement of working practices as well as testing and evaluation of health aspects of new equipment;

(e) advice on occupational health, safety and hygiene and on ergonomics and individual and collective protective equipment;

(f) surveillance of workers' health in relation to work;

(g) promoting the adaptation of work to the worker;

(h) contribution to measures of vocational rehabilitation;

(i) collaboration in providing information, training and education in the fields of occupational health and hygiene and ergonomics;

(j) organising of first aid and emergency treatment;

(k) participation in analysis of occupational accidents and occupational diseases.

PART III. ORGANISATION

Article 6

Provision shall be made for the establishment of occupational health services –

(a) by laws or regulations; or

(b) by collective agreements or as otherwise agreed upon by the employers and workers concerned; or

(c) in any other manner approved by the competent authority after consultation with the representative organisations of employers and workers concerned.

Article 7

1. Occupational health services may be organised as a service for a single undertaking or as a service common to a number of undertakings, as appropriate.

2. In accordance with national conditions and practice, services may be organised by –

(a) the undertakings or groups of undertakings concerned;

(b) public authorities or official services;

(c) social security institutions;

(d) any other bodies authorised by the competent authority;

(e) a combination of any of the above.

Article 8

The employer, the workers and their representatives, where they exist, shall cooperate and participate in the implementation of the organisational and other measures relating to occupational health services on an equitable basis.

PART IV. CONDITIONS OF OPERATION

Article 9

1. In accordance with national law and practice, occupational health services should be multidisciplinary. The composition of the personnel shall be determined by the nature of the duties to be performed.

2. Occupational health services shall carry out their functions in co-operation with the other services in the undertaking.

3. Measures shall be taken, in accordance with national law and practice, to ensure adequate co-operation and co-ordination between occupational health services and, as appropriate, other bodies concerned with the provision of health services.

Article 10

The personnel providing occupational health services shall enjoy full professional independence from employers, workers, and their representatives, where they exist, in relation to the functions listed in Article 5.

Article 11

The competent authority shall determine the qualifications required for the personnel providing occupational health services, according to the nature of the duties to be performed and in accordance with national law and practice.

Article 12

The surveillance of workers' health in relation to work shall involve no loss of earnings for them, shall be free of charge and shall take place as far as possible during working hours.

Article 13

All workers shall be informed of health hazards involved in their work.

Article 14

Occupational health services shall be informed by the employer and workers of any known factors and any suspected factors in the working environment which may affect the workers' health.

Article 15

Occupational health services shall be informed of occurrences of ill health amongst workers and absence from work for health reasons, in order to be able to identify whether there is any relation between the reasons for ill health or absence and any health hazards which may be present at the workplace. Personnel providing occupational health services shall not be required by the employer to verify the reasons for absence from work.

I. PRINCIPLES OF NATIONAL POLICY

1. Each Member should, in the light of national conditions and practice and in consultation with the most representative organisations of employers and workers, where they exist, formulate, implement and periodically review a coherent national policy on occupational health services, which should include general principles governing their functions, organisation and operation.

2. (1) Each Member should develop progressively occupational health services for all workers, including those in the public sector and the members of production cooperatives, in all branches of economic activity and all undertakings. The provisionmade should be adequate and appropriate to the specific health risks of the undertakings.

(2) Provision should also be made for such measures as may be necessary and reasonably practicable tomake available to self-employed persons protection analogous to that provided for in the Occupational Health Services Convention, 1985, and in this Recommendation.

II. FUNCTIONS

3. The role of occupational health services should be essentially preventive.

4. Occupational health services should establish a programme of activity adapted to the undertaking or undertakings they serve, taking into account in particular the occupational hazards in the working environment as well as the problems specific to the branches of economic activity concerned.

A. SURVEILLANCE OF THE WORKING ENVIRONMENT

5. (1) The surveillance of the working environment should include –

(a) identification and evaluation of the environmental factors whichmay affect the workers' health;

(b) assessment of conditions of occupational hygiene and factors in the organization of work which may give rise to risks for the health of workers;

(c) assessment of collective and personal protective equipment;

(d) assessment where appropriate of exposure of workers to hazardous agents by valid and generally accepted monitoring methods;

(e) assessment of control systems designed to eliminate or reduce exposure.

(2) Such surveillance should be carried out in liaison with the other technical services of the undertaking and in co-operation with the workers concerned and their representatives in the undertaking or the safety and health committee, where they exist.

6. (1) In accordance with national law and practice, data resulting from the surveillance of the working environment should be recorded in an appropriate manner and be available to the employer, the workers and their representatives in the undertaking concerned or the safety and health committee, where they exist.

(2) These data should be used on a confidential basis and solely to provide guidance and advice on measures to improve the working environment and the health and safety of workers.

(3) The competent authority should have access to these data. They may only be communicated by the occupational health service to others with the agreement of the employer and the workers or their representatives in the undertaking or the safety and health committee, where they exist.

7. The surveillance of the working environment should entail such visits by the personnel providing occupational health services as may be necessary to examine the

factors in the working environment which may affect the workers' health, the environmental health conditions at the workplace and the working conditions.

8. Occupational health services should –

(a) carry out monitoring of workers' exposure to special health hazards, when necessary;

(b) supervise sanitary installations and other facilities for the workers, such as drinkingwater, canteens and living accommodation,when provided by the employer;

(c) advise on the possible impact on the workers' health of the use of technologies;

(d) participate in and advise on the selection of the equipment necessary for the personal protection of the workers against occupational hazards;

(e) collaborate in job analysis and in the study of organisation and methods of work with a view to securing a better adaptation of work to the workers;

(f) participate in the analysis of occupational accidents and occupational diseases and in accident prevention programmes.

9. Personnel providing occupational health services should, after informing the employer, workers and their representatives, where appropriate –

(a) have free access to all workplaces and to the installations the undertaking provides for the workers;

(b) have access to information concerning the processes, performance standards, products, materials and substances used or whose use is envisaged, subject to their preserving the confidentiality of any secret information they may learn which does not affect the health of workers;

(c) be able to take for the purpose of analysis samples of products, materials and substances used or handled.

10. Occupational health services should be consulted concerning proposed modifications in the work processes or in the conditions of work liable to have an effect on the health or safety of workers.

B. SURVEILLANCE OF THE WORKERS' HEALTH

11. (1) Surveillance of the workers' health should include, in the cases and under the conditions specified by the competent authority, all assessments necessary to protect the health of the workers, which may include –

(a) health assessment of workers before their assignment to specific tasks which may involve a danger to their health or that of others;

(b) health assessment at periodic intervals during employment which involves exposure to a particular hazard to health;

(c) health assessment on resumption of work after a prolonged absence for health reasons for the purpose of determining its possible occupational causes, of recommending appropriate action to protect theworkers and of determining the worker's suitability for the job and needs for reassignment and rehabilitation;

(d) health assessment on and after the termination of assignments involving hazards which might cause or contribute to future health impairment.

(2) Provisions should be adopted to protect the privacy of the workers and to ensure that health surveillance is not used for discriminatory purposes or in any other manner prejudicial to their interests.

12. (1) In the case of exposure of workers to specific occupational hazards, in addition to the health assessments provided for in Paragraph 11 of this Recommendation, the surveillance of the workers' health should include, where appropriate, any examinations and investigations whichmay be necessary to detect exposure levels and early biological effects and responses.

(2) When a valid and generally accepted method of biological monitoring of the workers' health for the early detection of the effects on health of exposure to specific occupational hazards exists, it may be used to identify workers who need a detailed medical examination, subject to the individual worker's consent.

13. Occupational health services should be informed of occurrences of ill health amongst workers and absences from work for health reasons, in order to be able to identify whether there is any relation between the reasons for ill health or absence and any health hazards which may be present at the workplace. Personnel providing occupational health services should not be required by the employer to verify the reasons for absence from work.

14. (1) Occupational health services should record data on workers' health in personal confidential health files. These files should also contain information on jobs held by the workers, on exposure to occupational hazards involved in their work, and on the results of any assessments of workers' exposure to these hazards.

(2) The personnel providing occupational health services should have access to personal health files only to the extent that the information contained in the files is relevant to the performance of their duties. Where the files contain personal information covered by medical confidentiality this access should be restricted to medical personnel.

(3) Personal data relating to health assessments may be communicated to others only with the informed consent of the worker concerned.

15. The conditions under which, and time during which, personal health files should be kept, the conditions under which they may be communicated or transferred

and the measures necessary to keep them confidential, in particular when the information they contain is placed on computer, should be prescribed by national laws or regulations or by the competent authority or, in accordance with national practice, governed by recognised ethical guidelines.

16. (1)On completing a prescribedmedical examination for the purpose of determining fitness for work involving exposure to a particular hazard, the physician who has carried out the examination should communicate his conclusions in writing to both the worker and the employer.

(2) These conclusions should contain no information of a medical nature; they might, as appropriate, indicate fitness for the proposed assignment or specify the kinds of jobs and the conditions of work which are medically contra-indicated, either temporarily or permanently.

17. Where the continued employment of a worker in a particular job is contraindicated for health reasons, the occupational health service should collaborate in efforts to find alternative employment for himin the undertaking, or another appropriate solution.

18. Where an occupational disease has been detected through the surveillance of the worker's health, it should be notified to the competent authority in accordance with national law and practice. The employer, workers and workers' representatives should be informed that this notification has been carried out.

C. INFORMATION, EDUCATION, TRAINING, ADVICE

19. Occupational health services should participate in designing and implementing programmes of information, education and training on health and hygiene in relation to work for the personnel of the undertaking.

20. Occupational health services should participate in the training and regular retraining of first-aid personnel and in the progressive and continuing training of all workers in the undertaking who contribute to occupational safety and health.

21. With a view to promoting the adaptation of work to the workers and improving the working conditions and environment, occupational health services should act as advisers on occupational health and hygiene and ergonomics to the employer, the workers and their representatives in the undertaking and the safety and health committee, where they exist, and should collaborate with bodies already operating as advisers in this field.

22. (1) Each worker should be informed in an adequate and appropriate manner of the health hazards involved in his work, of the results of the health examinations he has undergone and of the assessment of his health.

(2) Each worker should have the right to have corrected any data which are erroneous or which might lead to error.

(3) In addition, occupational health services should provide workers with personal advice concerning their health in relation to their work.

D. FIRST AID, TREATMENT AND HEALTH PROGRAMMES

23. Taking into account national law and practice, occupational health services in undertakings should provide first-aid and emergency treatment in cases of accident or indisposition of workers at the workplace and should collaborate in the organisation of first aid.

24. Taking into account the organisation of preventive medicine at the national level, occupational health services might, where possible and appropriate –

(a) carry out immunisations in respect of biological hazards in the working environment;

(b) take part in campaigns for the protection of health;

(c) collaborate with the health authorities within the framework of public health programmes.

25. Taking into account national law and practice and after consultation with the most representative organisations of employers and workers, where they exist, the competent authority should, where necessary, authorise occupational health services, in agreement with all concerned, including the worker and his own doctor or a primary health care service, where applicable, to undertake or to participate in one or more of the following functions:

(a) treatment of workers who have not stopped work or who have resumed work after an absence;

(b) treatment of the victims of occupational accidents;

(c) treatment of occupational diseases and of health impairment aggravated bywork;

(d) medical aspects of vocational re-education and rehabilitation.

26. Taking into account national law and practice concerning the organisation of health care, and distance fromclinics, occupational health servicesmight engage in other health activities, including curative medical care for workers and their families, as authorized by the competent authority in consultation with the most representative organisations of employers and workers, where they exist.

27. Occupational health services should co-operate with the other services concerned in the establishment of emergency plans for action in the case of major accidents.

E. OTHER FUNCTIONS

28. Occupational health services should analyse the results of the surveillance of the workers' health and of the working environment, as well as the results of biological monitoring and of personal monitoring of workers' exposure to occupational hazards, where they exist, with a view to assessing possible connections between exposure to occupational hazards and health impairment and to proposing measures for improving the working conditions and environment.

29. Occupational health services should draw up plans and reports at appropriate intervals concerning their activities and health conditions in the undertaking. These plans and reports should be made available to the employer and the workers' representatives in the undertaking or the safety and health committee, where they exist, and be available to the competent authority.

30. (1) Occupational health services, in consultation with the employers' and the workers' representatives, should contribute to research, within the limits of their resources, by participating in studies or inquiries in the undertaking or in the relevant branch of economic activity, for example, with a view to collecting data for epidemiological purposes and orienting their activities.

(2) The results of the measurements carried out in the working environment and of the assessments of the workers' health may be used for research purposes, subject to the provisions of Paragraphs 6(3), 11(2) and 14(3) of this Recommendation.

31. Occupational health services should participate with other services in the undertaking, as appropriate, in measures to prevent its activities from having an adverse effect on the general environment.

III. ORGANISATION

32. Occupational health services should, as far as possible, be located within or near the place of employment, or should be organised in such a way as to ensure that their functions are carried out at the place of employment.

33. (1) The employer, the workers and their representatives, where they exist, should co-operate and participate in the implementation of the organisational and other measures relating to occupational health services on an equitable basis.

(2) In conformity with national conditions and practice, employers and workers or their representatives in the undertaking or the safety and health committee, where they exist, should participate in decisions affecting the organisation and operation of these services, including those relating to the employment of personnel and the planning of the service's programmes.

34. (1) Occupational health services may be organised as a service within a single undertaking or as a service common to a number of undertakings, as appropriate.

(2) In accordance with national conditions and practice, occupational health services may be organised by –

(a) the undertakings or groups of undertakings concerned;

(b) the public authorities or official services;

(c) social security institutions;

(d) any other bodies authorised by the competent authority;

(e) a combination of any of the above.

(3) The competent authority should determine the circumstances in which, in the absence of an occupational health service, appropriate existing services may, as an interim measure, be recognised as authorised bodies in accordance with subparagraph 2(d) of this Paragraph.

35. In situations where the competent authority, after consulting the representative organisations of employers and workers concerned, where they exist, has determined that the establishment of an occupational health service, or access to such a service, is impracticable, undertakings should, as an interim measure, make arrangements, after consulting the workers' representatives in the undertaking or the safety and health committee, where they exist, with a local medical service for carrying out the health examinations prescribed by national laws or regulations, providing surveillance of the environmental health conditions in the undertaking and ensuring that first-aid and emergency treatment are properly organised.

IV CONDITIONS OF OPERATION

36. (1) In accordance with national law and practice, occupational health services should bemade up ofmultidisciplinary teams whose composition should be determined by the nature of the duties to be performed.

(2) Occupational health services should have sufficient technical personnel with specialised training and experience in such fields as occupationalmedicine, occupational hygiene, ergonomics, occupational health nursing and other relevant fields. They should, as far as possible, keep themselves up to date with progress in the scientific and technical knowledge necessary to perform their duties and should be given the opportunity to do so without loss of earnings.

(3) The occupational health services should, in addition, have the necessary administrative personnel for their operation.

37. (1)The professional independence of the personnel providing occupational health services should be safeguarded. In accordance with national law and practice, this might be done through laws or regulations and appropriate consultations between the employer, the workers, and their representatives and the safety and health committees,where they exist.

(2) The competent authority should, where appropriate and in accordance with national law and practice, specify the conditions for the engagement and termination of employment of the personnel of occupational health services in consultation with the representative organisations of employers and workers concerned.

38. Each person who works in an occupational health service should be required to observe professional secrecy as regards bothmedical and technical information which may come to his knowledge in connection with his functions and the activities of the service,subject to such exceptions as may be provided for by national laws or regulations.

39. (1) The competent authority may prescribe standards for the premises and equipment necessary for occupational health services to exercise their functions.

(2) Occupational health services should have access to appropriate facilities for carrying out the analyses and tests necessary for surveillance of the workers' health and of the working environment.

40. (1) Within the framework of a multidisciplinary approach, occupational health services should collaborate with –

(a) those serviceswhich are concernedwith the safety ofworkers in the undertaking;

(b) the various production units, or departments, in order to help them in formulating and implementing relevant preventive programmes;

(c) the personnel department and other departments concerned;

(d) the workers' representatives in the undertaking, workers' safety representatives and the safety and health committee, where they exist.

(2) Occupational health services and occupational safety services might be organized together, where appropriate.

41. Occupational health services should also, where necessary, have contacts with external services and bodies dealing with questions of health, hygiene, safety, vocational rehabilitation, retraining and reassignment, working conditions and the welfare of workers, as well as with inspection services and with the national body which has been designated to take part in the International Occupational Safety and Health Hazard Alert System set up within the framework of the International Labour Organisation.

42. The person in charge of an occupational health service should be able, in accordance with the provisions of Paragraph 38, to consult the competent authority, after informing the employer and the workers' representatives in the undertaking or the safety and health committee, where they exist, on the implementation of occupational safety and health standards in the undertaking.

43. The occupational health services of a national ormultinational enterprise withmore than one establishment should provide the highest standard of services, without discrimination, to the workers in all its establishments, regardless of the place or country in which they are situated.

Basic laws of human life

Acts of the International Labor Organization on occupational safety and health.

International legal standards, as the embodiment of the closest concentrated experience of legal regulation of labor relations, are an independent condition for the development and improvement of any national legal system. This result is realized by:

1) direct application of international norms. According to the Constitution of Ukraine, current international agreements, the consent of both employees of which was given by the Verkhovna Rada of Ukraine, are part of the national legislation of Ukraine (Article 9). Article 81 of the Labor Code of Ukraine stipulates the need to apply the rules of an international treaty or international agreement in cases where an international treaty or international agreement in which Ukraine participates establishes rules other than those contained in Ukrainian labor legislation ;

2) amendments to the legislation on its introduction in response to international norms through further ratification of international treaties;

3) inclusion of international legal standards in the text of current legislation.

Conventions and recommendations of the International Labor Organization (hereinafter - the ILO) occupy an important place among the main sources of international legal regulation of labor relations. As of September 2007, the ILO has adopted 188 conventions and 199 recommendations. Ukraine has ratified 54 ILO conventions.

ILO conventions and recommendations are characterized by the internal unity of various norms that cover a wide range of issues and apply to a huge number of working people. Such an array of ILO acts requires some systematization and classification, which is a complex and dynamic issue if there is no officially established and approved hierarchy of ILO acts. However, there is an informal city convention and ILO recommendations.

Thus, according to the importance of the ILO convention is divided into "fundamental" and "priority" [8]. The list of fundamental conventions is determined by the ILO Declaration on Fundamental Principles and Rights at Work (1998) . They are:

- Convention 29 on Forced or Compulsory Labor (1930);
- Convention 87 on Freedom of Association and Protection of the Right to Organize (1948);
- Convention № 98 on the application of the principles of the right to organize and to bargain collectively (1949);

- Convention № 100 on equal pay for men and women for equal work (1951);
- Convention № 105 on the Abolition of Forced Labor (1957);
- Convention № 111 on Discrimination in Respect of Employment and Occupation (1958);
- Convention № 138 on the Minimum Age for Admission to Employment (1973);
- Convention № 182 on the Prohibition and Immediate Action for the Elimination of the Worst Forms of Child Labor (1999).

The list of priority conventions is defined and may be periodically amended by the ILO Governing Body. Today the priorities include:

- Convention № 81 on labor inspection in industry and trade (1947);
- Convention № 122 on employment policy (1964);
- Convention № 129 Labor Inspectorate in Agriculture (1969);
- Convention № 144 on tripartite consultations to promote the application of international labor standards (1976) .

According to their substantive focus, ILO conventions and recommendations are divided into those adopted on issues of: freedom of association, collective bargaining, industrial relations; forced labor; termination of child labor and protection of children and youth; equal opportunities and protection; tripartite consultations; labor inspections; vocational training; employment protection; salaries; working hours; occupational safety and health; social protection; maternity protection; social policy; migrants; sailors; fishermen.

Since its inception, the ILO has paid considerable attention to occupational safety and health, in particular to the development of universal international standards for occupational safety and health. One of the basic ILO conventions in this area is the Convention № 155 on occupational safety and health and the working environment, adopted on June 22, 1981. It sets out the principles of national policy and measures at the national and industrial levels aimed at preserving the lives and health of workers. The Convention applies to all areas of economic activity and all workers working in these areas. A State may establish certain exceptions to the scope of the Convention, for example, in respect of shipping or fishing, for certain categories of workers if special difficulties arise.

The aim of national policy is to prevent accidents and damage to health resulting from work by minimizing the causes of hazards inherent in the work environment. An important factor in achieving this goal is a set of measures, which is determined on the basis of cooperation between employers and employees, their advice at both national and industrial levels.

The Convention defines the areas of national policy and a set of measures, which provides for the establishment of a central body and system of inspections, authorized to monitor compliance with labor protection legislation, coordination between them and other entities, establishing conditions for design, construction and planning of enterprises, their introduction into operation, introduction of a permit system for production processes, substances and agents that may adversely affect the lives and health of workers, investigation of accidents at work, etc.

The Convention defines a number of measures that are implemented at the enterprise level. The implementation of such measures is the responsibility of employers. They ensure the creation of jobs, machinery, equipment and the use of chemicals, biological and physical substances that are safe for the health of workers. Employers are obliged to provide workers with protective clothing and equipment, to organize their proper training in the field of occupational safety and health. The Convention provides for the right of an employee to leave a job if he or she considers that it poses an immediate and serious danger to his or her life and health.

The Convention is comprehensive and establishes a comprehensive system of measures to create safe and harmless working conditions. Nevertheless, there was a need to specify it on certain issues. As a result, on 20 June 2002, the ILO General Conference adopted a protocol to Convention № 155. The protocol details the issues of the system of registration and notification of accidents at work, occupational diseases and accidents, as well as sets requirements for the maintenance of national statistics on these issues.

The Protocol requires States parties to establish in national law (or through other methods and procedures) the responsibility of employers for the registration of accidents at work, occupational diseases, accidents and the notification of relevant entities, ensuring the proper registration of such cases and the use of it for the implementation of preventive measures, providing employees and their representatives with relevant information on the registration of accidents at work, occupational diseases, accidents, and the nature of the cases themselves. An important standard is the need to provide for the employer's liability for harassing an employee who reports an accident at work, an occupational disease or an accident.

The problems of creating safe and healthy working conditions, minimizing the negative impact of production on human health and life are constantly at the zenith of the ILO, as evidenced by the intensification of its rule-making activities on this issue. On 15 June 2006, the ILO General Conference adopted the Convention № 187 on the Fundamentals of Occupational Safety and Health and the relevant Recommendation № 197. Under Convention № 187, each State Party is obliged to continuously improve

occupational safety and health in order to prevent occupational injuries, diseases and deaths at work by developing national policies, systems and programs for occupational safety and health adopted on the basis of consultations with the largest representative organizations of employers and workers and should take into account the principles enshrined in ILO instruments and relating to the foundations that promote occupational safety and health. The Annex to Recommendation № 197 provides a list of ILO acts concerning the foundations that promote occupational safety and health.

№ п/п	Title of the convention or recommendation	Date of adoption of the convention or recommendation	Date entry into force of the Convention	Date of ratification by Ukraine of the Convention
	Convention № 81 on labor inspection in industry and trade	11.07.1947 p.	07.04.1950 p.	10.11.2004 (Convention № 81 is open for ratification both together with the Protocol and separately)
	Recommendation № 81 regarding labor inspection	11.07.1947 p.		
	Recommendation № 82 concerning labor inspection at mining and transport enterprises	11.07.1947 p.		
	Recommendation № 97 on the health of workers at work	25.06.1953 p.		

	Recommendation № 102 regarding household services for employees	26.06.1956 p.		
	Convention № 115 on protection of workers from ionizing radiation	22.06.1960 p.	17.06.1962 p.	19.06.1968 p.
	Recommendation № 114 on the protection of workers from ionizing radiation	22.06.1960 p.		
	Recommendation № 115 regarding housing construction for employees	28.06.1961 p.		
	Convention № 120 on hygiene in trade and institutions	08.07.1964 p.	29.03.1966 p.	19.06.1968 p.
	Recommendation № 120 on hygiene in trade and institutions	08.07.1964 p.		

	Convention № 121 on assistance in cases of occupational injuries	08.07.1964 р.	28.07.1967 р.	—
	Recommendation № 121 on benefits in cases of occupational injuries	08.07.1964 р.		
	Конвенція № 129 про інспекції праці в сільському господарстві	25.06.1969 р.	19.01.1972 р.	10.11.2004 р.
	Recommendation № 133 regarding labor inspection in agriculture	25.06.1969 р.		
	Convention № 139 on combating the dangers posed by carcinogenic substances and agents in industrial conditions, and prevention measures	24.06.1974 р.	10.06.1976 р.	—

	Recommendation № 147 on combating the dangers posed by carcinogenic substances and agents in the workplace and prevention measures	24.06.1974 p.		
	Convention № 148 on the protection of workers from occupational hazards caused by air pollution, noise and vibration in the workplace	20.06.1977 p.	11.07.1979 p.	—
	Recommendation № 156 on the protection of workers from occupational risks caused by air pollution, noise and vibration in the workplace	20.06.1877 p.		
	Convention № 152 on safety and hygiene at port works	25.06.1979 p.	05.12.1981 p.	—

	Recommendation № 160 on occupational safety and health at port works	25.06.1979 p.		
	Convention № 155 on occupational safety and health and the working environment	22.06.1981 p.	11.08.1983 p.	—
	Recommendation № 164 on occupational safety and health and the working environment	22.06.1981 p.		
	Convention № 161 about occupational health services	26.06.1985 p.	17.02.1988 p.	—
	Recommendation № 171 concerning occupational health services	26.06.1985 p.		
	Convention № 162 on labor protection when using asbestos	24.06.1986 p.	16.06.1989 p.	—

	Recommendation № 172 concerning labor protection when using asbestos	24.06.1986 p.		
	Convention № 167 on occupational safety and health in construction	20.06.1988 p.	11.01.1991 p.	—
	Recommendation № 175 on occupational safety and health in construction	20.06.1988 p.		
	Convention № 170 on safety in the use of chemicals in production	25.06.1990 p.	04.11.1993 p.	—
	Recommendation № 177 on safety in the use of chemicals in production	25.06.1990 p.		
	Convention № 174 on the prevention of major industrial accidents	22.06.1993 p.	03.01.1997 p.	—

	Recommendation № 181 on the prevention of major industrial accidents	22.06.1993 p.		
	Convention № 176 on occupational safety and health in mines	22.06.1995 p.	05.06.1998 p.	—
	Recommendation № 183 on occupational safety and health in mines	22.06.1995 p.		
	1995 Protocol to the 1947 Convention about labor inspection	22.06.1995 p.	09.06.1998 p.	—
	Convention № 184 on occupational safety and health in agriculture	21.06.2001 p.	20.09.2001 p.	—
	Recommendation № 192 on occupational safety and health in agriculture	21.06.2001 p.		

	Protocol of 2002 to the Convention № 155 on occupational safety and health and the working environment	20.06.2002 p.	09.02.2005 p.	—
	Recommendation № 194 on the list of occupational diseases, notification of accidents at work and occupational diseases and their registration	20.06.2002 p.		

Summarizing the above, taking into account the practice of application of acts of the International Labor Organization on occupational safety and health and guided by the provisions of the Decree of the President of Ukraine dated 13.07.2001 № 515/2001

"On urgent measures to prevent occupational injuries and diseases", NSPP branch in L'viv region in Interaction with labor arbitrators, independent mediators of the National Mediation and Reconciliation Service, the state of social and labor relations at enterprises where disagreements between the parties arose due to violations of Ukrainian labor protection legislation is constantly monitored and analyzed.

Human rights and health

The WHO Constitution (1946) envisages "the highest attainable standard of health as a fundamental right of every human being."

- Understanding health as a human right creates a legal obligation on states to ensure access to timely, acceptable, and affordable health care of appropriate quality as well as to providing for the underlying determinants of health, such as safe and

potable water, sanitation, food, housing, health-related information and education, and gender equality.

- A States' obligation to support the right to health – including through the allocation of "maximum available resources" to progressively realize this goal - is reviewed through various international human rights mechanisms, such as the Universal Periodic Review, or the Committee on Economic, Social and Cultural Rights. In many cases, the right to health has been adopted into domestic law or Constitutional law.
- A rights-based approach to health requires that health policy and programmers must prioritize the needs of those furthest behind first towards greater equity, a principle that has been echoed in the recently adopted 2030 Agenda for Sustainable Development and Universal Health Coverage.
- The right to health must be enjoyed without discrimination on the grounds of race, age, ethnicity or any other status. Non-discrimination and equality requires states to take steps to redress any discriminatory law, practice or policy.
- Another feature of rights-based approaches is meaningful participation. Participation means ensuring that national stakeholders – including non-state actors such as non-governmental organizations – are meaningfully involved in all phases of programming: assessment, analysis, planning, implementation, monitoring and evaluation.

"The right to the highest attainable standard of health" implies a clear set of legal obligations on states to ensure appropriate conditions for the enjoyment of health for all people without discrimination.

The right to health is one of a set of internationally agreed human rights standards, and is inseparable or 'indivisible' from these other rights. This means achieving the right to health is both central to, and dependent upon, the realization of other human rights, to food, housing, work, education, information, and participation.

The right to health, as with other rights, includes both freedoms and entitlements:

- Freedoms include the right to control one's health and body (for example, sexual and reproductive rights) and to be free from interference (for example, free from torture and non-consensual medical treatment and experimentation).
- Entitlements include the right to a system of health protection that gives everyone an equal opportunity to enjoy the highest attainable level of health.

Focus on disadvantaged populations

Disadvantage and marginalization serve to exclude certain populations in societies from enjoying good health. Three of the world's most fatal communicable diseases – malaria, HIV/AIDS and tuberculosis – disproportionately affect the world's

poorest populations, and in many cases are compounded and exacerbated by other inequalities and inequities including gender, age, sexual orientation or gender identity and migration status. Conversely the burden of non-communicable diseases – often perceived as affecting high-income countries – is increasing disproportionately among lower-income countries and populations, and is largely associated with lifestyle and behavior factors as well as environmental determinants, such as safe housing, water and sanitation that are inextricably linked to human rights.

A focus on disadvantage also reveals evidence of those who are exposed to greater rates of ill health and face significant obstacles to accessing quality and affordable healthcare, including indigenous populations. While data collection systems are often ill equipped to capture data on these groups, reports show that these populations have higher mortality and morbidity rates, due to no communicable diseases such as cancer, cardiovascular diseases, and chronic respiratory disease. These populations may also be the subject of laws and policies that further compound their marginalization and make it harder for them to access healthcare prevention, treatment, and rehabilitation and care services.

Violations of human rights in health

Violations or lack of attention to human rights can have serious health consequences. Overt or implicit discrimination in the delivery of health services – both within the health workforce and between health workers and service users – acts as a powerful barrier to health services, and contributes to poor quality care.

Mental ill health often leads to a denial of dignity and autonomy, including forced treatment or institutionalization, and disregard of individual legal capacity to make decisions. Paradoxically, mental health is still given inadequate attention in public health, in spite of the high levels of violence, poverty and social exclusion that contribute to worse mental and physical health outcomes for people with mental health disorders.

Violations of human rights not only contribute to and exacerbate poor health, but for many, including people with disabilities, indigenous populations, women living with HIV, sex workers, people who use drugs, transgender and intersex people, the health care setting presents a risk of heightened exposure to human rights abuses – including coercive or forced treatment and procedures.

Human rights-based approaches

A human rights-based approach to health provides a set of clear principles for setting and evaluating health policy and service delivery, targeting discriminatory practices and unjust power relations that are at the heart of inequitable health outcomes.

In pursuing a rights-based approach, health policy, strategies and programmes should be designed explicitly to improve the enjoyment of all people to the right to health, with a focus on the furthest behind first. The core principles and standards of a rights-based approach are detailed below.

Core principles of human rights

Accountability

States and other duty-bearers are answerable for the observance of human rights. However, there is also a growing movement recognising the importance of other non-state actors such as businesses in the respect and protection of human rights. (2)

Equality and non-discrimination

The principle of non-discrimination seeks '…to guarantee that human rights are exercised without discrimination of any kind based on race, colour, sex, language, religion, political, or other opinion, national or social origin, property, birth or other status such as disability, age, marital and family status, sexual orientation and gender identity, health status, place of residence, economic and social situation'.

Any discrimination, for example in access to health care, as well as in means and entitlements for achieving this access, is prohibited on the basis of race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, physical or mental disability, health status (including HIV/AIDS), sexual orientation ,and civil, political, social or other status, which has the intention or effect of impairing the equal enjoyment or exercise of the right to health.

The principle of non-discrimination and equality requires WHO to address discrimination in guidance, policies, and practices, such as relating to the distribution and provision of resources and health services. Non-discrimination and equality are key measures required to address the social determinants affecting the enjoyment of the right to health. Functioning national health information systems and availability of disaggregated data are essential to be able to identify the most vulnerable groups and diverse needs.

Participation

Participation requires ensuring that all concerned stakeholders including non-state actors have ownership and control over development processes in all phases of the programming cycle: assessment, analysis, planning, implementation, monitoring, and evaluation. Participation goes well beyond consultation or a technical addition to project design; it should include explicit strategies to empower citizens, especially the most marginalized, so that their expectations are recognised by the State.

Participation is important to accountability as it provides "…checks and balances which do not allow unitary leadership to exercise power in an arbitrary manner".

Universal, indivisible and interdependent

Human rights are universal and inalienable. They apply equally, to all people, everywhere, without distinction. Human Rights standards – to food, health, education, to be free from torture, inhuman or degrading treatment – are also interrelated. The improvement of one right facilitates advancement of the others. Likewise, the deprivation of one right adversely affects the others.

Core elements of a right to health

Progressive realization using maximum available resources

No matter what level of resources they have at their disposal, progressive realization requires that governments take immediate steps within their means towards the fulfilment of these rights. Regardless of resource capacity, the elimination of discrimination and improvements in the legal and juridical systems must be acted upon with immediate effect.

Non-retrogression

States should not allow the existing protection of economic, social, and cultural rights to deteriorate unless there are strong justifications for a retrogressive measure. For example, introducing school fees in secondary education which had formerly been free of charge would constitute a deliberate retrogressive measure. To justify it, a State would have to demonstrate that it adopted the measure only after carefully considering all the options, assessing the impact and fully using its maximum available resources.

Core components of the right to health

The right to health (Article 12) was defined in General Comment 14 of the Committee on Economic, Social and Cultural Rights – a committee of Independent Experts, responsible for overseeing adherence to the Covenant. (4) The right includes the following core components:

Availability

Refers to the need for a sufficient quantity of functioning public health and health care facilities, goods and services, as well as programmers for all. Availability can be measured through the analysis of disaggregated data to different and multiple stratifies including by age, sex, location and socio-economic status and qualitative surveys to understand coverage gaps and health workforce coverage

Accessibility

Requires that health facilities, goods, and services must be accessible to everyone. Accessibility has four overlapping dimensions:

- non-discrimination
- physical accessibility
- economical accessibility (affordability)
- information accessibility.

Assessing accessibility may require analysis of barriers – physical financial or otherwise – that exist, and how they may affect the most vulnerable, and call for the establishment or application of clear norms and standards in both law and policy to address these barriers, as well as robust monitoring systems of health-related information and whether this information is reaching all populations.

Acceptability

Relates to respect for medical ethics, culturally appropriate, and sensitivity to gender. Acceptability requires that health facilities, goods, services and programmers are people-centered and cater for the specific needs of diverse population groups and in accordance with international standards of medical ethics for confidentiality and informed consent.

Quality

Facilities, goods, and services must be scientifically and medically approved. Quality is a key component of Universal Health Coverage, and includes the experience as well as the perception of health care. Quality health services should be:

- Safe– avoiding injuries to people for whom the care is intended;
- Effective– providing evidence-based healthcare services to those who need them;
- People-centered– providing care that responds to individual preferences, needs and values;
- Timely– reducing waiting times and sometimes harmful delays.
- Equitable– providing care that does not vary in quality on account of gender, ethnicity, geographic location, and socio-economic status;
- Integrated– providing care that makes available the full range of health services throughout the life course;
- Efficient– maximizing the benefit of available resources and avoiding waste

WHO response

WHO has made a commitment to mainstream human rights into healthcare programmers and policies on national and regional levels by looking at underlying determinants of health as part of a comprehensive approach to health and human rights.

In addition, WHO has been actively strengthening its role in providing technical, intellectual, and political leadership on the right to health including:

- strengthening the capacity of WHO and its Member States to integrate a human rights-based approach to health;
- advancing the right to health in international law and international development processes; and
- advocating for health-related human rights, including the right to health.

Addressing the needs and rights of individuals at different stages across the life course requires taking a comprehensive approach within the broader context of promoting human rights, gender equality, and equity.

As such, WHO promotes a concise and unifying framework that builds on existing approaches in gender, equity, and human rights to generate more accurate and robust solutions to health inequities. The integrated nature of the framework is an opportunity to build on foundational strengths and complementarities between these approaches to create a cohesive and efficient approach to promote health and well-being for all.

The Environmental Law

Environmental law is the collection of laws, regulations, agreements and common law that governs how humans interact with their environment. The purpose of environmental law is to protect the environment and create rules for how people can use natural resources. Environmental laws not only aim to protect the environment from harm, but they also determine who can use natural resources and on what terms. Laws may regulate pollution, the use of natural resources, forest protection, mineral harvesting and animal and fish populations.

Early environmental laws

Environmental laws are relatively new in American history. Lawmakers began to pass environmental laws in the twentieth century. The environmental movement began to pick up pace in the 1960s with the majority of environmental laws and regulations being created since that time.

The first environmental laws focused on nuisance. When one person’s use of their property interferes with another person’s use of their own property, courts can step in to stop the nuisance. Nuisance laws largely developed through common law decisions in the courts. The laws protect a property owner from having another person or corporation infringe on their right to enjoy their own property. Early environmental laws didn’t focus on protecting the environment as a whole. They also didn’t give standing for a person to sue a polluter if they weren’t personally harmed by the other person’s actions.

What do environmental laws regulate?

Environmental laws cover a wide range of topics including the following:

Air Quality– Air quality laws protect the air from pollution and may include measures to protect the air from things like ozone depletion.

Water Quality – Environmental laws may protect water from pollution. They may also determine who can use water and how to handle potential problems like treating waste water and managing surface run off.

Waste Management – Municipal waste, hazardous substances and nuclear waste all fall in the category of waste management.

Contaminant Cleanup– Not all environmental law focuses on preventing pollution. Contaminant cleanup deals with addressing pollution after it happens. Laws may include protocols for cleanup as well as civil and criminal punishment for polluters.

Chemical Safety– Chemical safety regulations manage things like pesticide use and chemicals in products like plastic bottles.

Hunting and fishing – Environmental laws may regulate and protect wildlife populations. Lawmakers determine who can hunt and fish and how these activities are regulated.

Major environmental legislation

The first federal environmental law is the River and Harbors Act of 1889. The Clean Water Act revised much of the Harbors Act. The Act made it a crime to introduce waste into navigable waters without a permit. The law also made it a misdemeanor to alter a harbor or waterfront or otherwise alter a waterway by filling it or excavating it.

Other significant pieces of federal environmental legislation include:

Clean Air Act

Clean Water Act

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)$

Endangered Species Act;

National Environmental Policy Act;

Resource Conservation and Recovery Act

As environmental laws progressed, lawmakers addressed the issue of standing. Individuals no longer need to be personally aggrieved in order to bring a claim to stop environmental contamination. Changes in laws have led to landmark legal actions like the Scenic Hudson Preservation Conference v. Federal Power Commission which stopped a power plant from operating. The court ruled that a group of citizens have standing in court to challenge a development because of environmental concerns.

Sources of environmental law and the Environmental Protection Agency

Environmental laws come from a number of places. Most federal regulations come from the Environmental Protection Agency (EPA). Title 40 of the Code of Federal Regulations contains many environmental regulations created by the EPA. Decisions from the U.S. Supreme Court interpret EPA regulations broadly. One famous case affirming the EPA's wide powers is Calvert Cliffs Coordinating Committee v. U.S. Atomic Energy Commission. The EPA uses its Office of Enforcement and Compliance Assurance to enforce its regulations.

Other federal organizations that regulate the environment include:

U.S. Fish and Wildlife Service;

National Park Service;

U.S. Forest Service

Bureau of Land Management

Environmental law is administrative law

A great deal of environmental law enforcement takes place through administrative law. The EPA might investigate a violation and bring an administrative action to their own officials. Lawyers represent the EPA at these hearings, and they represent the people and corporations who are accused of violating rules. Those who are found responsible for violating the rules may appeal the decision to the courts. Most violations are a civil offense, but there are also criminal penalties for serious offenders.

International Agreements

Environmental regulation is a topic of international discussion and debate. International governments grapple with how to effectively regulate pollution and use of natural resources on an international scale. As environmental regulations can be a hot-button topic among local, state and national governments, environmental regulations and the use of natural resources are controversial issues between governments.

One of the first international summits on environmental issues was the 1972 United Nations Conference on the Human Environment. The 1992 United Nations Earth Summit followed. The Summit produced the Rio Declaration. In the Rio Declaration, signatory states said that humans should develop the earth in a way that meets developmental and environmental needs of present and future generations.

State-level environmental regulations

Even though there are federal laws and international agreements regarding environmental law, there are also a great deal of state and local laws regarding the

environment. Each state has an agency to manage and regulate natural resources in the state. They set regulations on how people can hunt and fish. Most states also have an agency for regulating environmental quality.

A practice in controversy

Environmental laws are controversial. Lawmakers must debate the necessity, fairness and cost-effectiveness of environmental regulations. It's often difficult to do a cost-benefit analysis of environmental regulations, because it can be difficult to calculate the cost of a regulation. Even when you can calculate the cost of a regulation, people may have a great deal of disagreement about the benefits of regulation.

Practicing environmental law requires a certain amount of diplomacy. You might have to speak to a local, municipal government about the benefits or dangers of a regulation. You may be an international diplomat discussing the same issues with a foreign government. If you're representing a corporation, you need to be able to work effectively with government agents if your corporation is accused of wrongdoing. For environmental lawyers, the ability to work with people is a critical legal skill.

Who practices environmental law?

Environmental lawyers work in public and private practice. They gravitate to large law firms, and they work as in-house counsel, but they may also represent individuals in small firm or solo practice. The EPA also needs lawyers to serve as administrative judges that hear allegations of rule violations.

Corporations rely on environmental lawyers to help them understand and comply with regulations. They turn to their own in-house lawyers for guidance. Some corporations prefer to contract with independent counsel. Even an attorney in private practice may have a single client for their entire career as an environmental compliance attorney.

There may be a significant amount of litigation involved with a practice in environmental law. Lawyers must represent their clients in administrative hearings and formal court. They must negotiate resolutions with EPA attorneys. To succeed in environmental law, a lawyer must be an effective negotiator. Speaking skills and trial advocacy skills are also a must for representing clients at hearings, depositions and in front of political bodies.

Environmental lawyers work throughout the United States and the world. Working for an international company may mean international travel or a permanent international assignment. Corporations must comply with environmental issues throughout the United States, so they rely on lawyers throughout the country. In addition, individuals who rely on lawyers to bring cases to protect them from environmental pollution and nuisance need lawyers to live and work throughout the

country. On a local level, lawyers may represent individuals when they face criminal and civil allegations of hunting and fishing violations.

Why Become an Environmental Lawyer?

Environmental law is important for both individuals and corporations. For lawyers who represent corporations, they provide a critical service that enables the corporation to conduct business in a lawful way. Lawyers who work for the EPA protect the public interest. In addition, lawyers help individuals protect their personal peace and safety when they're personally aggrieved by rule breakers. Lawyers in the field have the opportunity to influence local, state, national and international policies. For lawyers who have personal goals to influence environmental policies, the area of law can provide that opportunity.

When the law and the environment intersect

Environmental lawyers grapple with whether and how lawmakers should regulate the environment. When those decisions are made, lawyers help their clients implement regulations in the best ways possible. Lawyers for government agencies and for individuals provide a critical public service in creating, enforcing and challenging environmental laws and regulations throughout the United States.

GLOSSARY

Accumulate: increase, build up.

Acute effect: an immediate, obvious response, usually short-term and often reversible.

Administrative controls: controls designed to limit the amount of time a worker spends at a potentially hazardous job.

Air monitoring: the sampling and measuring of pollutants in the air.

Biological monitoring: usually consists of blood and urine tests performed to look for traces of chemicals and biological indicators of chemical exposure.

Check-list analysis: a method for identifying hazards by comparison with experience in the form of a list of failure modes and hazardous situations.

Code of practice: a document offering practical guidance on the policy, standard-setting and practice in occupational and general public safety and health for use by governments, employers and workers in order to promote safety and health at the national level and the level of the installation. A code of practice is not necessarily a substitute for existing national legislation, regulations and safety standards.

Competent authority: a minister, government department or other public authority with the power to issue regulations, orders or other instructions having the force of law. Under national laws or regulations, the competent authority may be given responsibilities for specific activities, such as for implementation of national policy and procedures for reporting, recording and notification, workers' compensation, and the elaboration of statistics.

Competent person: a person with suitable training and sufficient knowledge, experience and skill for the performance of the specific work, in good safety conditions. The competent authority may define appropriate criteria for the designation of such persons and may determine the duties to be assigned to them.

Comply: obey (in the case of laws).

Control banding: an approach to controlling exposure to chemicals using information readily available to users fromthe suppliers of chemicals. Taking the users through a series of simple steps, it allows them to choose practical control solutions that should reduce chemical exposures to levels that present no danger to health.

Dangerous occurrence: readily identifiable event as defined under national laws and regulations, with potential to cause an injury or disease to persons at work or the public.

Elimination: getting rid of (a specific hazard).

Engineering controls: common control measures, including isolation and enclosure ventilation.

Ergonomic principles: a concept whereby the work to be carried out is organized and specified – and tools and equipment designed and used – in such a way as to be matched with the physical and mental characteristics and capacity of the worker.

Excessive: above the level of comfort.

Exposure: the process of being exposed to something that is around; exposure can affect people in a number of different ways.

Employer: any physical or legal person who employs one or more workers.

Enterprise: an institutional unit or the smallest combination of institutional units that encloses and directly or indirectly controls all necessary functions to carry out its own production activities.

Establishment: an enterprise or part of an enterprise which independently engages in one, or predominantly one, kind of economic activity at or from one location or within one geographical area, for which data are available, or can be meaningfully compiled, that allow the calculation of the operating surplus.

Fatal occupational injury: occupational injury leading to death.

General ventilation: ventilation designed to keep the workplace comfortable.

Hazard: a physical situation with a potential for human injury, damage to property, damage to the environment or some combination of these.

Hazard analysis: the identification of undesired events that lead to the materialization of the hazard, the analysis of the mechanisms by which those undesired events could occur and, usually, the estimation of the extent, magnitude and relative likelihood of any harmful effects.

Hazard assessment: an evaluation of the results of a hazard analysis including judgements as to their acceptability and, as a guide, comparison with relevant codes, standards, laws and policies.

Hazardous substance: a substance which, by virtue of its chemical, physical or toxicological properties, constitutes a hazard.

Hazards: dangers.

Housekeeping: keeping the workplace clean and organized.

Hygiene: the practice of principles that maintain health, e.g. cleanliness.

IDLH (immediately dangerous to life or health): description of an environment that is very hazardous due to a high concentration of toxic chemicals or insufficient oxygen, or both.

Incapacity for work: inability to perform normal duties of work.

Incident: an unsafe occurrence arising out of or in the course of work where no personal injury is caused, or where personal injury requires only first-aid treatment.

Industrial hygiene: the recognition, measurement and control of workplace hazards.

Ingestion: the process of taking a substance into the body through the mouth.

Inhalation: the process of breathing in.

Isolation: an engineering control in which a hazardous job is moved to a place where fewer people will be exposed, or a worker is moved to a place where he or she will not be exposed at all.

Job enrichment: widening of the contents of the work tasks requiring e.g. higher qualification of the worker.

Job rotation: system whereby a worker carries out different work tasks, the change from one task to another occurring according to an agreed procedure or according to the initiative of the worker's work group.

Job security: protection against unlawful dismissal, as well as against unsatisfactory work conditions and an unsatisfactory work environment; sometimes also includes protection against falling income due to sickness or unemployment .

Labour inspection: a government function carried out by specially appointed inspectors who regularly visit work sites in order to establish whether legislation, rules and regulations are being complied with. They normally give verbal and written advice and guidance to reduce the risk factors and hazards at the workplace. They should, however, possess and use stronger power, e.g. to stop the work in cases of immediate and serious safety and health hazards or if their advice is repeatedly and unreasonably neglected by the employer. The goal is to improve the work conditions and the work environment.

Labour inspectorate: a government authority with the task of advising and giving directions on issues concerning the protection of workers and the work environment, as well as checking that the protection provided is sufficient.

Local exhaust ventilation: suction-based ventilation system designed to remove pollutant from the air.

Major accident: an unexpected, sudden occurrence including, in particular, a major emission, fire or explosion, resulting from abnormal developments in the course of an industrial activity, leading to a serious danger to workers, the public or the environment, whether immediate or delayed, inside or outside the installation, and involving one or more hazardous substances.

Major hazard installation: an industrial installation which stores, processes or produces hazardous substances in such a form and such a quantity that they possess the

potential to cause a major accident. The term is also used for an installation which has on its premises, either permanently or temporarily, a quantity of hazardous substance which exceeds the amount prescribed in national or state major hazard legislation.

Medical surveillance programme: a medical programme, including pre-employment and periodic examinations, which helps to identify early warning signs of occupational diseases.

Monitoring: in the workplace, close observation to determine whether an area is safe for workers.

National policy: refers to the national policy on occupational safety and health and the working environment developed in accordance with the principles of

National preventive safety and health culture: a culture in which the right to a safe and healthy working environment is respected at all levels, where government, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties, and where the principle of prevention is accorded the highest priority.

National programme on occupational safety and health: any national programme that includes objectives to be achieved in a predetermined time frame, priorities and means of action formulated to improve occupational safety and health, and means to assess progress.

National system for occupational safety and health: the infrastructure which provides the main framework for implementing the national policy and national programmes on occupational safety and health.

Non-fatal occupational injury: occupational injury not leading to death.

Notification: procedure specified in national laws and regulations which establishes the ways in which:

• the employer or self-employed person submits information concerning occupational accidents, commuting accidents, dangerous occurrences or incidents; or

• the employer, the self-employed person, the insurance institution or others directly concerned submit information concerning occupational diseases.

Occupational: related to the workplace.

Occupational accident: an occurrence arising out of, or in the course of, work which results in:

• fatal occupational injury or

• non-fatal occupational injury.

Occupational disease: a disease contracted as a result of an exposure to risk factors arising from work activity.

Occupational exposure limit: concentration in the air of a harmful substance which does not, so far as may be judged in the light of present scientific knowledge, cause adverse health effects in workers exposed for eight to ten hours a day and 40 hours a week. It is not an absolute dividing line between harmless and harmful concentrations but merely a guide for the prevention of hazards.

Occupational injury: death, any personal injury or disease resulting from an occupational accident.

Occupational safety and health management systems (OSHMS): A set of interrelated or interacting elements to establishOSHpolicy and objectives, and to achieve those objectives.

Personal hygiene: the practice of principles that maintain personal health, e.g. personal cleanliness.

Personal protective equipment: equipment a worker wears as a barrier between himself or herself and the hazardous agent(s).

Potential hazard: something that may be hazardous.

Preventive safety and health culture: one in which the right to a safe and healthy working environment is respected at all levels; where governments, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties; and where the principle of prevention is accorded the highest priority.

Recording: procedure specified in national laws and regulations which establish the means by which the employer or self-employed person ensures that information be maintained on:

(a) occupational accidents;

(b) diseases;

(c) commuting accidents; and

(d) dangerous occurrences and incidents.

Reporting: procedure specified by the employer in accordance with national laws and regulations, and in accordance with the practice at the enterprise, for the submission by workers to their immediate supervisor, the competent person, or any other specified person or body, of information on:

(a) any occupational accident or injury to health which arises in the course of or in connection with work;

(b) suspected cases of occupational diseases;

(c) commuting accidents; and

(d) dangerous occurrences and incidents.

Respiratory hazards: hazards to the body’s breathing system.

Risk: the likelihood of an undesired event with specified consequences occurring within a specified period or in specified circumstances. It may be expressed either as a frequency (the number of specified events in unit time) or as a probability (the probability of a specified event following a prior event), depending on the circumstances.

Risk management: all actions taken to achieve, maintain or improve the safety of an installation and its operation.

"Safe" levels: levels of exposure to substances below which there will not be a health risk to workers.

Safety audit: a methodical in-depth examination of all or part of a total operating system with relevance to safety.

Safety report: the written presentation of the technical, management and operational information covering the hazards of a major hazard installation and their control in support of a statement on the safety of the installation.

Safety team: a group which may be established by the works management for specific safety purposes, e.g. inspections or emergency planning. The team should include workers, their representatives where appropriate, and other persons with expertise relevant to the tasks.

Self-employed person: as defined by the competent authority with reference to the most recent version of the International Classification of Status in Employment (ICSE).

Short-term exposure limit (STEL): the maximum concentration that must not be exceeded for a continuous 15-minute exposure period. STELS are required by law in some countries.

Substitution: replacment of particularly hazardous chemicals or work processes by safer ones.

Susceptible: open to hazards, germs, etc.

Time-weighted average (TWA): exposures may be expressed as an eight-hour timeweighted average concentration, which is a measure of exposure intensity that has been averaged over an eight-hour work shift.

Toxic substance: a poisonous substance that can destroy life or injure health.

Vapour: tiny droplets of liquid suspended in the air.

Worker: any person who performs work, either regularly or temporarily, for an employer.

Workers' management: employers and persons at works level to whom responsibility and authority have been delegated by the employer for taking decisions

relevant to the safety of major hazard installations. When appropriate, the definition also includes persons at corporate level having such authority.

Workers' representative: any person who is recognized as such by national law or practice, in accordance with the Workers' Representatives Convention.

Work-related disease: a disease with multiple causal agents which may include factors in the work environment.

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PISKUNOVA Larisa
BONDAR Valeriia

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