Theoretical fundations of life safety.

- In ancient times, man has been poorly shielded from adverse living conditions: high and low temperature, natural disasters, experienced shortages of food, wounds, injuries or bites of poisonous animals. So that the first group of dangers that appeared on Earth was a **natural hazards**.

- The second group of hazards that threaten human began with the lifetime of the planet, were the **actions of other people**. Wars, conflicts, murders, kidnappings, assassinations and other violence that accompanied and escorted nowadays society.

- Third group of dangers was from objects created by humans, so-called **anthropogenic factors:** machinery, chemicals and explosives, sources of radiation, macro- and micro-organisms, and so on. These dangers associated with deep human desire to know themrself and the world around them, to create wealth and, paradoxically, in search of greater danger.

- There are many examples that would seem to indicate that the acquired knowledge through the development of civilization safety people increases. Humanity has overcome the epidemic of typhus, cholera, smallpox, plague, polio. Average life expectancy in the developed world is approaching 80 years and continues to grow. These results were achieved through the development of medicine that has its roots dated back to Hippocrates, who made reform of ancient medicine, and Aristotle, who in those distant times studied conditions.

- In the XX century humanity has entered a difficult period in the history of its development, when it captured a huge scientific and technical potential, but has not yet learned how to use it carefully and rationally. Rapid urbanization and industrialization, rapid growth of world population, intensive use of chemicals formation, strengthening the many other pressures on nature violated the biological cycle of substances in nature, hurt its mechanisms by which began its progressive destruction. This threatened the health and life of present and future generations, the existence of human civilization.

Basic concepts and definitions of subject "Safety”

- Safety and danger – are the central concepts in Safety. These multi-faceted concepts are used in different spheres of human activity, so there are a lot of definitions.
- Sefety - the degree of freedom from risk or no unacceptable risk associated with the ability to cause any harm to life and human health under any conditions of existence.

- Protection of housing, job, wealth, health, environment - the main problem of being a safe person.
- Danger or risk - this phenomena, processes, facilities, information and people who may cause unwanted consequences and lead to a deterioration of health or death of a person, harm the environment or economic activity.

- Life safety - the science that studies the problem of safe human presence in the environment during different types of activities (including work).
- This branch of knowledge, scientific and practical work aimed at studying the general laws of danger, their properties, the effects of their impact on the human body, the foundations of protection of health and life of person and his environment from hazards and to develop and implement appropriate means and measures to create and maintain healthy and safe living conditions and human activities both in everyday life and the conditions of production, and in emergency situations.

The purpose of discipline "Safety"

- • determine the content and nature of the basic concepts and terms, which operates the safety of life;
- • navigate the methodological tools and methods of life safety;
- • provide analysis of the contents of the main components of the system “person - living environment";
- • identify risk;
- • identify the causes and consequences of hazards;
- • classify dangerous, harmful and affecting factors;
- • assess the level of risk.

- The object of study of "Safety" as a science is a human and the human community, the environment that surrounds it, the process of human interaction with the environment (i.e., vital functions), and the dangers that arise while .

The task of the subject "Safety" is to:

- identify potential hazards that identify species, to determine the magnitude and probability of their development;
- determine hazardous, harmful and affecting factors arising from sources such hazards;
- predict the possibility and effects of dangerous and harmful factors on the human body;
- Use regulatory framework protecting the individual and the environment;
- develop and implement measures protection from the effects of dangerous, harmful and damaging factors;
- prevent emergencies, but if they occur to take appropriate decisions and perform actions aimed at their elimination;
- use in their practice socio-political, socio- economic, legal, technical , environmental , medical, preventive and educative measures to ensure healthy and safe living conditions of people in today's environment.

Classification of hazards

- One of the prerequisites for the development of effective measures to prevent hazards and elimination of their consequences is to identify hazards that clarify the type of hazard and establish its characteristics.
- Identification impossible without their classification. The range of dangers - a list of names, dates of possible dangers - of more than 150 items and not considered complete. In some cases, the range consists of dangers to individual objects (companies, departments, jobs etc.).

- Classification of hazards based on the taxonomy.
- Taxonomy - the science of classification and systematization of phenomena, processes and objects. Since the danger is in most cases a complex phenomenon that often has a complex hierarchical structure that has many features, taxonomy play an important role in the organization of scientific knowledge in the field of security of life and thus reveal the nature of the danger.

Classifications of Hazards

- By origin:
- 1. natural;
- 2. man-made;
- 3. natural and man-made.
- Natural hazards - are natural objects, events, nature, natural disasters that can cause harm to humans or pose a threat to life or health (earthquakes, landslides, mudflows, volcanoes, floods, avalanches, storms, hurricanes, heavy rains, hail, fog, ice, lightning, solar and cosmic radiation, dangerous animals, plants, fish, insects, fungi, bacteria, viruses, infectious disease).

- Man-made hazards - is primarily dangers associated with the use of vehicles to the operation of material handling equipment using fuel, flammable and explosive substances and materials using processes that occur at elevated temperatures and pressures, using electrical energy chemicals, various types of radiation (ionizing, electromagnetic).
- Natural and man-made hazards: smog, acid rain, ozone hole, "greenhouse effect", dust storms, soil erosion, reduction of soil fertility, the occurrence of desertification, landslides, mudflows, earthquakes and other tectonic phenomena arising due to human activities.

- By the nature of the action:
- 1. physical;
- 2. chemical;
- 3. biological;
- 4. physiological.
- The physical hazards include: noise, vibration, electromagnetic and ionizing radiation microclimate parameters (temperature, humidity, air mobility), pressure, light levels, dust, air pollution, etc.
- To chemical hazards include: poisonous, toxic substances in different phase states (gaseous, liquid or solid).
- Biological hazards - it is dangerous and harmful micro- macro-organism, their metabolic products and livelihoods.
- Psychophysiological - static and dynamic overload, mental overstrain, monotony of work and emotional stress.

- By the time symptoms negative effects on the realization of danger:
- 1. pulse (sold immediately or in a short period of time);
- 2. cumulative (characterized by considerable duration).
- Under the pulse dangers implied such a negative impact on a person whose habitat and turns directly after the implementation of risk. The level of the negative effects of such hazards are reduced over time.
- Cumulative hazard characterized by increased levels of risk in current some period after their implementation.

- The structure:
- 1. simple;
- 2. derivatives.
- As a result, emerging hazards are classified into those that cause fatigue, illness, injury, fatalities.
- In terms of localization:
- 1. associated with the lithosphere (earthquakes, landslides, mud volcanoes);
- 2. related to the hydrosphere (destructive rains , floods , tsunamis);
- 3. associated with the atmosphere, (hurricanes, tornadoes)
- 4. associated with space (meteorites, comets, solar activity);
- 5. complex.

- By type of damage is inflicted danger:
- 1. social;
- 2. technical;
- 3. environmental ;
- 4. complex.
- In the field of display :
- 1. production ;
- 2. military ;
- 3. road transport ;
- 4. household;
- 5. sports .
- The nature of human exposure:
- 1. active;
- 2. passive.

- Passive dangers are activated by the energy of human action. They are sharp (stabbing and cut) still objects and elements, surface roughness, on which a person moves, slopes, lifts, a slight friction between adjacent surfaces, one of which is part of the human body, etc.

- Active hazards include are implemented as a result of the release of potential energy of objects subject of human activity in vivo or in emergency, unusual situations.
- When solving problems of security of life is a major step in forecasting potential and actual hazards analysis in order to assess their level of anticipated negative impact on humans and the environment.

The concept of risk. Manage risk.

- Risk - a quantitative characterization of assessing the degree of danger. Risk is the criterion for the realization of danger. Infinitesimal ("null") risk indicates the absence of real danger in the system, and vice versa: the higher the risk, the higher reality of the impact hazard.
- The result is a manifestation of the dangers of accidents, accidents, disasters, accompanied by deaths, reducing the length of life, injury and so on.

- In order to standardize any effect hazards are define as damage. Every single type of damage is a quantitative expression, such as the number of dead, injured or sick, the area of the infected area, the area of forest that burned, destroyed buildings cost more. The most versatile quantitative means of determining the damage - it's expensive, that is the definition of damage in monetary terms.
- The second, equally important characteristic of danger, to be exact extent possible danger is the frequency with which it can be shown, or risk.

- As the degree of acceptability of risk is rejected, acceptable legal limit, excessive:
- 1. rejected the risk is so low level that it is within the tolerances of the natural (background) level;
- 2. acceptable level of risk is such that society can accept (allow), including technical, economic and social opportunities at this stage of its development ;
- 3. maximum allowable risk - is the maximum risk exposure that shall not be exceeded , regardless of the expected outcome ;
- 4. excessive risk is characterized by extremely high levels, which in most cases leads to negative consequences.

- In practice, to achieve zero risk, that absolute security is impossible! Because of this requirement of absolute security that draws its humanity, can turn into a tragedy for the people. Rejected risk at present as it is impossible to provide because of the lack of technical and economic prerequisites for this. Therefore, the modern concept of life safety is based on achieving a reasonable (acceptable) risk.

- There are the following methods for determining risk:
- • Engineering - based on statistics (frequency calculations manifestation dangers probabilistic safety assessment and building " trees " hazards);
- • Model - based on building models of the impact of hazards both on an individual and on the social and professional groups;
- • Expert - followed by the probability of different events defined by experienced specialists-experts ;
- • Sociology (Sociometric assessment) - based on a survey of the public and workers.