Interreg - IPA CBC
Romania - Serbia

EUROPEAN UNION

Training for sustainable interventions in emergency situations (earthquakes, floods, dangerous weather events, contamination accidents, etc.) to be managed by professional and voluntary response structures in the area of cross-border cooperation

Cooperation beyond borders.
Interreg-IPA Cross-border Cooperation Romania-Serbia Programme is financed by the European Union under the Instrument for Pre-accession Assistance (IPA II) and co-financed by the partner states in the Programme.

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MODULE 1

RORS283 - Horizontal principles

Description

Sustainable development (environment)

positive

The project contributes to increasing the safety in conditions of natural risk and to increasing the responsibility of the population towards the environment.

The materials developed and the events will include messages that promote sustainable development and awareness related to environmental protection and resource efficiency. Sustainable development is observed in the preparation, implementation and post-implementation phase. Round tables on sustainable development will be organized.

Equal opportunities and non-discrimination

positive

Round tables on Equal Opportunities and Non-Discrimination will be organized and a balanced participation of participants in decision-making will be pursued. The materials contain information that promotes equal opportunities and non-discrimination. There are collaboration agreements with the Aurora CS School Center for Inclusive Education, Radio Reșița. CJCS provides Braille and visual symbols for people with disabilities.

Equality between men and women

positive

The project promotes the European principle of facilitating reconciliation between work and family life. Supports strengthening family ties and strengthening interpersonal relationships, as well as weekend work. Work relocation allows employees who are parents to have a flexible work schedule for the project. Post-implementation questionnaires will be completed through a participatory approach.

(Sustainable Development) - Contributing to efficient water supply, wastewater treatment and water reuse

positive

The project will contribute to the efficient supply of water, wastewater treatment and reuse of water through common measures and methodologies established in case of flood risk.

The acquisitions of the city of Vrsac will contribute to the efficient supply of water, wastewater treatment and water reuse.

(Sustainable development) - Contributing to efficient waste management, reuse and recycling

positive

The waste resulting from the implementation of the activities will be collected selectively, taking into account the major project implemented by the Caraş-Severin County Council "Integrated waste management system". A message will be written on the promotional materials that will be produced through the project urging the efficient management, reuse and recycling of waste.

(Sustainable development) -Contribution to sustainable mobility and interoperability;

positive

The project also contributes to sustainable mobility and interoperability through common cross-border risk methodologies and through the cross-border framework / cross-border collaboration agreement to be developed.

(Sustainable development) - Implement green public procurement in a systematic way

positive

The equipment that will be purchased through the project will be energy efficient.

To reduce the impact on the environment, "green procurement" procedures will be applied.

Public procurement will take into account the provisions of Law no. 69 of April 25, 2016 on ecological public procurement - Romania.

(Sustainable Development) - Contributing to energy efficiency, the use of renewable energy and the reduction of greenhouse gas (GHG) emissions

positive

Minibuses, fire trucks, purchased equipment have low fuel consumption, the latest model being max. 3 years.

Purchasing new technology equipment will help reduce GHG emissions.

The cars purchased will be used in accordance with the instructions in the Fuel Consumption and CO2 Emissions Guide provided by the manufacturer.

(Sustainable Development) - Contribution to the development of green infrastructures, including sound management of Romanian Natura 2000 sites and equivalent Serbian protected areas

positive

The project has a positive impact on the environment, by reducing the number of fires and areas affected and flood damage in the Natura 2000 project area on the RO side and equivalent on the Serbian side.

The Green IT platform will help protect the environment, protected natural areas, nature reserves and parks, Nature 2000 sites and protected natural areas on the Serbian side.

Sustainable development) - Contributing to raising awareness of climate change adaptation and risk prevention

positive

Climate change poses major challenges for the project area and requires specific responses. Extreme weather events may occur more frequently in the project area. Frequency and severity of floods, forest fires, storms, erosion, etc. are likely to present major challenges in interventions in the coming years.

(Sustainable development) - Contribution to more employment opportunities, education, training and support services in the context of environmental protection, risk management and sustainable development, etc.

positive

The project provides training and specialization for personnel involved in the protection area. Specialized staff will participate together in a diving course for 2 teams of 4 people, EU-recognized qualifications. Cross-border personnel will be trained to use the equipment for flood and fire interventions. The project activities will contribute to improving the level of specialization of staff in emergency interventions. Joint staff training will be organized.

I. The project "Sustainable common network for emergencies in Banat". Overview

Environmental risks such as floods, blizzards, landslides or earthquakes are common in the Banat area, and people are always in danger.

In order to strengthen the operational and institutional capacity of the local authorities responsible for emergencies, disaster prevention, mitigation, prevention of environmental accidents and emergency response in the Romanian-Serbian cross-border area, the Project " Sustainable joint network for emergencies in Banat ”financed by the INTERREG IPA Romania-Serbia Cross-Border Cooperation Program APPEAL II 2018, following the decision of the Joint Monitoring Committee of the Program taken on January 31, 2019.

The project has a value of almost 1.5 million euros, and an implementation period of 24 months. Partners are the Caraş-Severin County Council, ISU Semenic, Vârşeţ City Hall and the Intercommunity Development Association for Emergency Management. The project aims to strengthen the capacity of local authorities to prevent disasters, environmental accidents and emergency response in the cross-border area, represented by the counties of Caraş-Severin, Timiş (Romania) and South Banat District (Republic of Serbia) .

The general objective of the project is to strengthen the operational and institutional capacity of the local authorities responsible for emergencies, disaster prevention, mitigation, prevention of environmental accidents and emergency response in the Romanian-Serbian cross-border area, represented by the counties of Caraș-Severin, Timiș and the South Banat District.

The project team consists in the cooperation at the level of county and local public administrations and specialized intervention institutions in the area of cross-border cooperation in order to improve the technical basis of intervention, strengthen the professional capacity of intervention staff, develop a common risk management system

Within the project, intervention equipment for emergency situations will be purchased, joint Romanian-Serbian tactical exercises and military diving courses will be organized for ISU “SEMENIC” and ISU “BANAT” Timiș. Training sessions for intervention and administrative staff will be organized, a research study on emergencies and environmental risks in the project area will be developed and an awareness campaign will be carried out for the population on risk factors. Other proposed objectives:

- Formulation of a cross-border agreement on joint, integrated and sustainable management of emergency situations.
- Realization of a common professional training program for public administrations and cross-border intervention units, having as theme the common risks identified.
- Development of a training program for divers.
- Formulation of methodologies for common intervention, for the identified major risks.
- Development of a common web platform for alerting in cross-border emergencies.
- Realization of a common professional training program for public administrations and cross-border intervention units, having as theme the common risks identified.
- Development of a training program for divers.

II. Saving people from closed spaces

Abstract

"This is where the fears and a kind of inner fear that the darkness of darkness makes almost every human being feel come from."

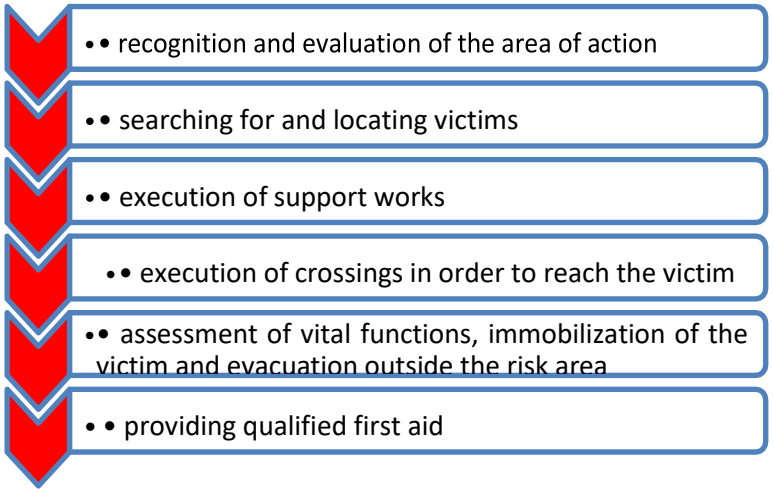
Georges Luis Leclarc Buffon- Natural History (1743)

People are permanently in an environment where they exposed to a great diversity of more or less dangerous situations, generated by many factors. The frequency and high intensity of risk phenomena, natural and anthropic, require the review and permanent completion of courses with such topics. Only the precise knowledge of these phenomena, called calamities and / or disasters (called by geographers and coincidences), allows the most appropriate measures to be taken.

Enclosed spaces are among the most dangerous, and working in such spaces presents a multitude of challenges. Despite special precautions, there are still too many accidents in the world. Some examples: asphyxiation, exposure to dangerous substances and trauma.

Search-rescue is a set of activities and measures performed by specialized teams, in order to detect and locate victims, to maintain living capital, extraction from the risk area, as well as their transport and delivery in order to provide qualified first aid.

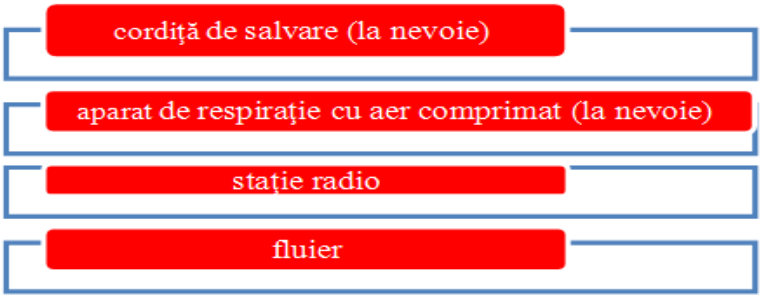
The missions of the search-rescue team consist of:



Composition and organization of the team

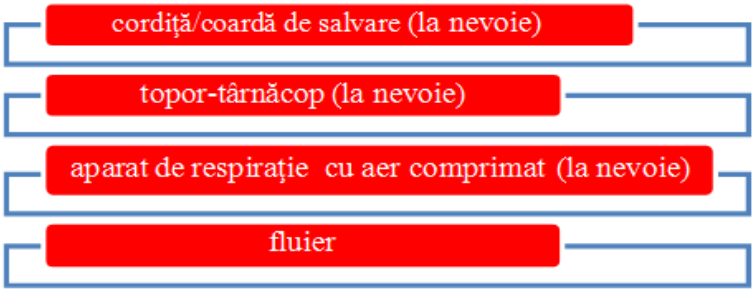
The equipment at the place of intervention is executed according to the missions expected to be executed or the orders received and is permanently adapted to the applied intervention techniques, so as to ensure the fulfillment of the missions in safe conditions.

The team leader will be additionally equipped with:



- lifeline (if needed)
- compressed air breathing apparatus (if required)
- radio station
- whistle

Rescuers will be additionally equipped with:



- rescue rope (if needed)
- ax-pickaxe (if needed)

- compressed air breathing apparatus (if required)
- whistle

Each member of the search and rescue team has the obligation to personally check his equipment, as well as the specific materials and accessories, before the intervention and within the established deadlines, according to the technical instructions for use, being forbidden to make changes to them.

The main attributions of the members of the search-urban rescue team are:

- demand interruption of gas, water and electricity supply
- participate in the execution of identification at the place of intervention
- identify, assess risks and inform team members
- determine measures to ensure the protection of rescuers
- analyze the situation and give a mission to team members
- coordinate the search for people
- coordinate the rescue of people
- apply life-saving techniques
- provide a link to the intervention commander - the command point of the subunit

Rescuers:

- search for people with equipment
- performs rescue of persons with available means and materials
- apply life-saving and accessory handling techniques from the categories (hand ladder, release, cutting and demolition, rescue and first aid, other miscellaneous accessories)
- by order, they participate in the execution of confessions at the place of intervention

In order to be able to perform complex missions, the rescue team may be equipped with:

- liberation accessories and genistic instruments
- accessories for smoke, gas and lighting
- wood material of different essences and sizes (at least 3 m3)
- building materials (nails of different sizes, clamps, screws, nuts)

NOTE: It is mandatory to set up a stock of materials for first aid intervention (nails of different sizes, clamps, screws / nuts, convex, dowels, wood of different species and sizes).

Depending on the particularities of the interventions, rescuers can be equipped with the following means:

- detectors (thermal, optical, ultrasonic, acoustic) for victims caught under the rubble;
- equipment for radio communications that can ensure the connection between team members, local authorities and other structures involved;
- detectors for dangerous substances (toxic, flammable, etc.);
- portable equipment for penetrating different materials;
- portable equipment for cutting materials; marking means;
- equipment for lifting / towing different materials; genistic tools;
- means for rescuing the people caught on the upper floors of the damaged constructions (sliding and fixed stairs, ropes, climbing equipment, rescue stretcher, etc.); camera, video.

The organization and development of the intervention includes:

- organizing and executing the recognition;
- organizing and executing the search; organizing and executing the rescue;
- organizing victim sorting points and providing qualified first aid.

The recognition represents the totality of the activities carried out for the collection of the preliminary information regarding the effects of the emergency situation, in order to provide the preliminary data necessary for the development of the search - rescue actions. The recognition team, in addition to the staff of professional structures for emergencies, may also include representatives of economic operators supplying gas, water, electricity, as well as staff from other structures of central and local public administration with responsibilities in managing created situation.

Recognition can be:
a) aerial - by observing, photographing or transmitting video images;
b) terrestrial - by performing direct observation.

Aerial recognition will be used especially when there is no easy access to the disaster area. It can only provide general information on the area of action, due to the distance from which the observation or photograph is taken, but provides a better overview of the situation on the ground, especially when the affected area is spread over a relatively large area.
(1) In the case of the use of air recognition means, information may be collected on:

- the magnitude of the disaster;
- the appearance of other emergency situations that may prevent the intervention.

Terrestrial recognition is performed by direct observation; it is much more efficient; usually the following activities are performed:

- locating victims and gathering information

- preliminary from survivors;
- establishing the presence in the atmosphere of some dangerous toxic substances;
- establishing the degree of destruction of the buildings, establishing the risks associated with the rescuer's action and the intervention tactics adopted;
- marking buildings or marking the area of rubble;
- the opportune intervention for the evacuation from the area of the persons who were not injured after the disaster and the provision of first aid to the wounded on the surface or superficially blocked.

NOTE:
1. It is recommended that at least one of the members of the recognition team be specialized in the structural assessment of buildings, being able to decide whether or not to allow rescuers to enter them.
2. All members of the recognition team must have a minimum knowledge of the structural assessment of constructions and the degree of risk regarding the access of the intervention forces in them (causes of damage to buildings; types of buildings and how to damage them; methods for collecting information, methods for selecting priorities, construction materials and their characteristics, architectural elements).

The structural assessment of the affected building will take into account the following factors:

1. Building data

- occupation and destination
- weight and footprint on the ground
- internal structure and architecture
- type of construction and materials used

2. Collapse

- cause of failure
- mode of collapse
- stopping the collapse

3. Effects of collapse

- how to clear debris
- impact on building resistance elements
- damage to the walls due to load
- impact on escape and intervention routes
- impact on public utility networks

4. Possible gaps

- gaps created by element structures
- gaps created by the contents of buildings
- estimating the size of gaps that offer a chance of survival

5. Structure and how it affects the intervention

- possible ways to access priority gaps
- the existence of building elements that can collapse

6. Support

- for safe penetration into the building
- to reduce the risk of collapse

7. Structural monitoring

- monitoring minor movements of karst sites
- assessment of possible future collapses

8. Evacuation plan

- communication procedures
- evacuation routes; evacuation district

As a rule, the imminent danger of drilling is indicated by the following instructions:

- acoustics: fossilized or built-in ceiling lights or resistance structures;
- visuals: existing cracks, mortars, inclinations of structural elements.

Note: When an intervention team is inside, it is mandatory for a rescuer to stand outside and observe any changes in the appearance of the building, being able to notify the team in case of signs of collapse.

The collapse of buildings can be of several types:

a) by overturning (the main cause being soil instability)

b) partial collapse

c) total collapse (pancake or sandwich type)

The marking of the buildings will be done after the execution of the recognition, in accordance with the international regulations in force.

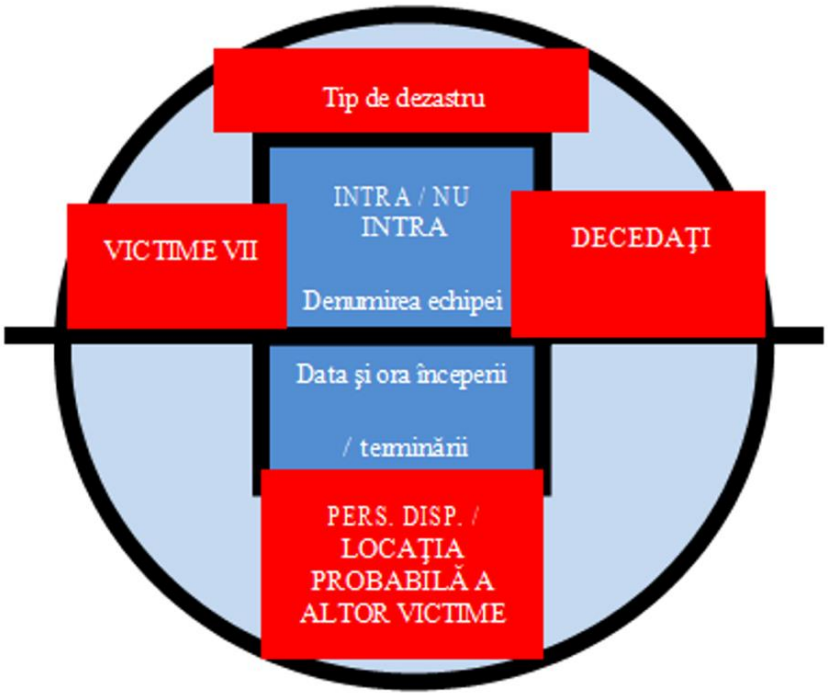
The markings are usually made in red, on the wall of the building, outside, near the access point, so as to provide the best visibility, within the limits of a square with a side of 1 meter.

Inside the square it will be noted:

a) "ENTER", if it is considered that the access to the building can be made safely;
b) "DO NOT ENTER", if it is considered that access to the building cannot be made safe;
c) the name of the team;
d) start date and time;
e) date and time of termination.

Outside the square:

a) information on the type of disaster and potential hazards (above);
b) missing persons and probable areas where other possible victims may be (below);
c) victims taken alive (left)
d) deceased victims (right)



IMPORTANT TO REMEMBER:

a) when a team has finished working on a building, a circle of the type above will appear around the marking;

b) when ALL operations have been completed, a horizontal line shall be drawn over that building over the inscribed markings.

c) within this marking system, the information will be included as the intervention activities are carried out.

NOTE:

1. It is very possible that the reconnaissance, search and rescue activities will take place in a very short time, or even partially overlap.

2. Normally, after the collapse of some buildings / construction elements and installations, there will be many victims with relatively minor injuries who have self-evacuated and will have to be directed or transported to the first aid and medical triage points.

Search and rescue teams will be permanently accompanied by medical / paramedical personnel, able to provide qualified medical assistance / first aid to the victims.

In the event that a large number of victims need to be discovered simultaneously who need to be rescued and who must be provided with qualified first aid (situation possible only in the first stage of the intervention), a triage of victims, the order of rescue and first aid being prioritized as follows:

- **priority I**: the victim is under the action of risk factors, there is an imminent danger that threatens his/her life;

- **priority II**: the victim is under the action of risk factors, but there is no imminent danger that threatens his/her life;
- **priority III**: the action of the risk factors does not threaten the life of the respective person.

For the safety of the personnel engaged in the search-rescue action, the following signals transmitted by means of acoustic signaling (whistle) will be used:

a) evacuation (3 short signals, lasting 1 second each - repeated at 10-second intervals until the evacuation of all personnel);

b) cessation of operations / silence (1 long signal, lasting 3 seconds);

c) resumption of operations (1 long signal lasting 3 seconds + 1 short signal lasting 1 second).

The search represents the totality of the activities necessary to detect and locate the victims under the action of the risk factors, in order to save them.
The search must be systematic and rigorous, based on the following principles:

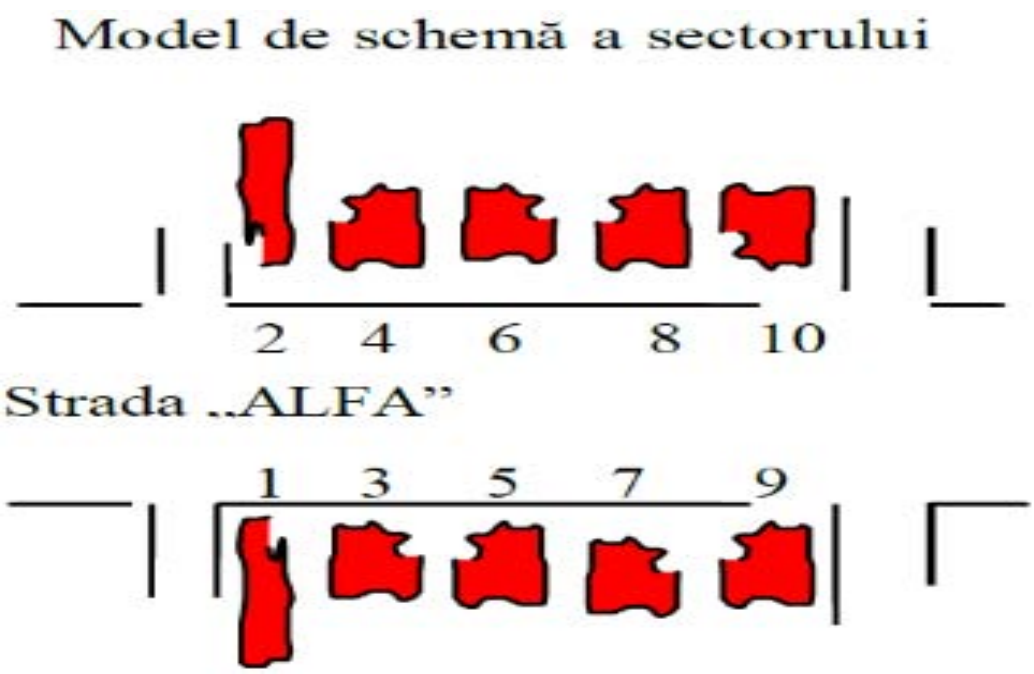
- the priority of the security of the members of the search component, avoiding overlaps and unnecessary duplication of effort and resources;
- combining search methods, techniques and procedures adapted to the field situation;
- speed of detection and location of victims; ensuring the permanent exchange of information with the team leader and the rescue component;
- correlation of requirements and resources.

Based on the information resulting from the execution of the reconnaissance, the head of the search-rescue team will organize the search for the victims, communicating:

- the general characteristics of the risk area (surface, access roads, etc.);
- summary assessment of the consequences of the disaster;
- work point / intervention sector assigned to the team; the type and number of buildings affected;
- the possibility of access in the damaged buildings; search objectives and priorities; the search methods that will be used;
- places where there may be survivors;
- damages to public utility systems and the possibilities of their interruption;

- identification and summary assessment of the risks in the area; safety and security measures.

Sector scheme model



- ✓ *scheme of the intervention sector (access roads, location of buildings and their destination, postal numbers, utility networks, cardinal points, area of destruction, estimated number of occupants of buildings and any other relevant data).*
- ✓ *the destination of the building; the number of people who are usually in it; the time of the disaster.*

In the case of complex events, the search involves first of all finding the places where there may be victims, an action that can be done, depending on the equipment, by:

- listening and observing the work area carefully to detect any noise that may come from the victims
- the use of sound detection, reception and amplification devices
- about the dog-assisted search component

The following are established during the search:

- the presence of people in danger, the ways and methods of rescuing them;
- arrangement of basement rooms, wells / technological channels and their destination;

- diameter of the well / pit, its nature (stone, tube, etc.), depth, whether or not there is water;
- the existence of different installations, following the sections crossed by various canals, pipes, etc.; the presence of smoke and toxic gases;
- presence and condition of utility installations (electricity, water, gas);
- identifying ways to access the area and take action to save people;
- the possibility of using access ladders for rescue operations;
- the possibility of using the means of evacuation of smoke and toxic gases;
- the need to demolish or dismantle some construction elements or to execute openings through them, for the rescue operations;
- protection measures for servants against smoke, toxic gases and collapses during the intervention action.

IMPORTATNT TO REMEMBER:
1. It is mandatory that persons performing the search in basements or wells / technological channels flooded with smoke, be equipped with lighting means, compressed air respirators and provided with lifebuoys, having previously established warning signs and signals. and communication.
2. The search can be performed with human personnel (physical search), using search dogs or technical means. It is best to use all the methods mentioned.

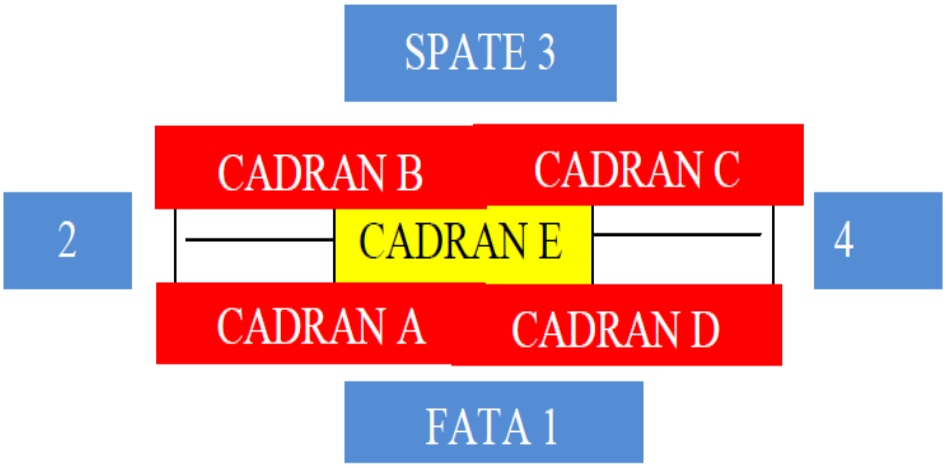
After finding the victim, it is recommended that a rescuer stay with her, performing the following:

- provides the victim with water or breathing conditions;
- provides first aid;
- communicates with the victim to keep her lucid and encourage her;
- collects information from the victim regarding the existence of other people nearby, its location before the disaster, etc.

In the situation when the building is partially collapsed, a scheme will be executed in order to systematize the search, as follows:

- the search will be performed initially by making a tour around the building,
- subsequently, the building is sectorized horizontally and vertically, as follows:

* the inside of the structure will be divided into dials, they will be marked alphabetically, clockwise, starting with the dial at the corner formed by the side "1" and the side "2";



** the E dial represents the main hall, the stairwell, the elevators and is shown on the diagrams of the multi-storey buildings; the front of the building will become "1";*
** the other sides will be numbered clockwise, starting from side "1";*
** for multi-storey structures, schemes will be made for each floor;*
** each scheme will be named and numbered according to reality (as seen from the outside).*
** The numbering will start with the ground floor, 1st floor, etc .;*

Search with specialized dogs

In order to search for the victims with the help of dogs, it is recommended to set up several canine couples (leader - dog) specialized in the execution of search - rescue missions.
The leader decides (in agreement with the team leader):

- where, when and how to perform the search;
- the working regime of the dog;
- situations of immediate interruption of the search.

The leader uses the dog only when he cannot personally detect the presence of people in the received search area.

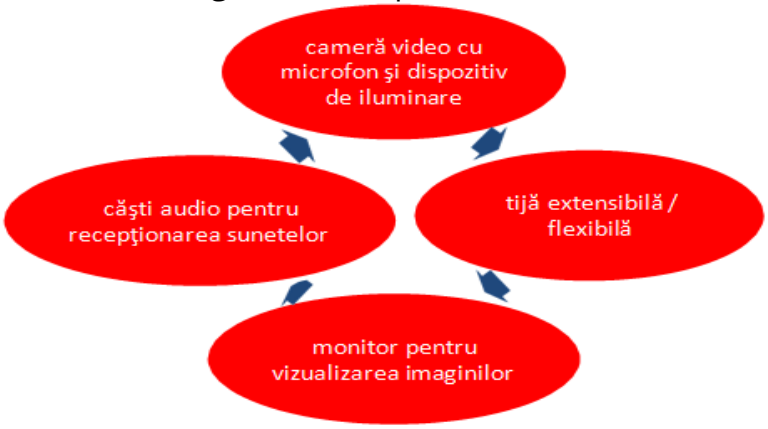
Search by technical means

The **acoustic detector** is a technical means that works on the principle of amplifying the very weak sounds produced by the victims caught under the rubble.

NOTE:
1. The disadvantages of using this detector are that the person trapped under the rubble must meet several conditions cumulatively (be aware, hear the signal transmitted by the team and understand how to react, be able to move his hands and find a hard object with which to strike in the structure to be heard).
2. CONCLUSION: there is a rather low chance that the victim will meet all the above-mentioned requirements!

Video camera detector

It is a technical means by which the free spaces under the rubble can be visualized in order to detect the victims caught in these places.



- video camera with microphone and lighting device
- audio headphones for audio reception

- extensible / flexible rod
- monitor for viewing images

The rescue represents the totality of the activities carried out in order to remove the victims from the action of the risk factors.

Rescue actions must be carried out as soon as possible after the emergency, because experience shows that most victims are rescued in the first hours after the event. As time goes on, the chances of finding victims alive decrease.

People trapped under the rubble manage to survive due to the fact that a beam, a portion of the floor or another part of the building collapses in such a way as to protect the victims from the weight of the main rubble.

Rescue actions continue with the provision of emergency medical care.

After discovering a victim under the rubble, the search component will notify the head of the search-rescue team, who will travel to the respective place to assess the situation.

Based on the information available, the head of the rescue search team organizes the rescue activity of the victim, transmitting the following information to the rescue component:

- the exact place where the victim is; the degree of stability of the structure;
- the way of access to the place where the rescue will be performed; the need to support the structure and the equipment, accessories and materials that will be used to support it; the condition of the victim (if known);
- the manner of entering the victim for its removal;
- dangers that can threaten rescuers (toxic substances, cracked water pipes, etc.);
- other information necessary for the proper conduct of the rescue activity.

RESCUE TECHNIQUES

During the actions of rescuing people, the following will be taken into account:

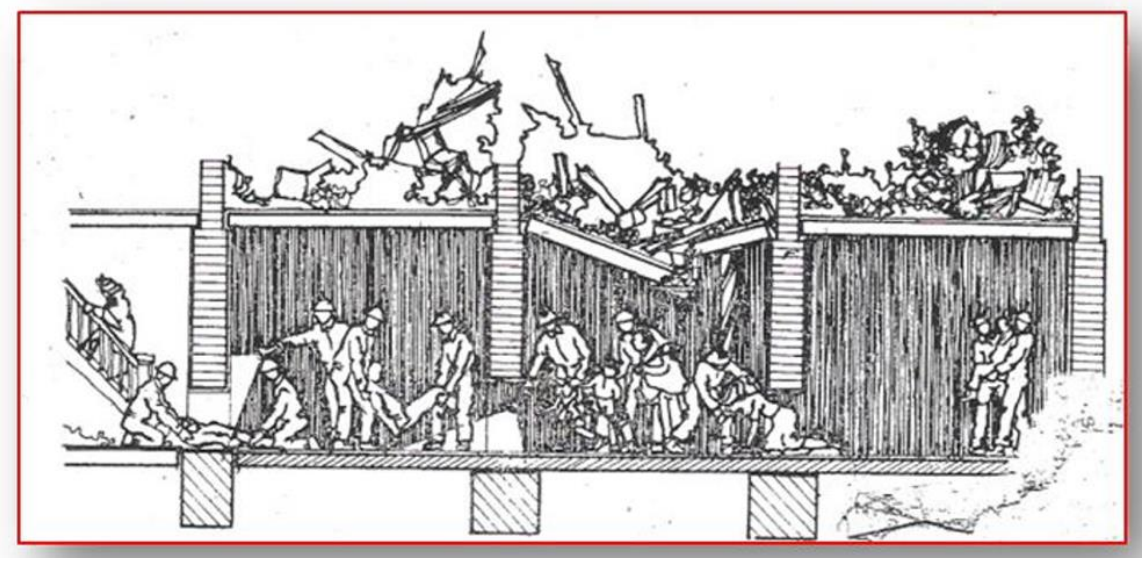
- avoiding the suffocation of the victim using the SADAC type breathing apparatus or an oxygen hose; ensuring access to the victim;
- the removal of the debris is done from top to bottom, manually, the heavy equipment will be used only for the removal of large construction elements;
- for rescues from wells, wells, technological canals or other narrow spaces below ground level, where rescuers' access is impossible by conventional means (manual ladders, ropes, ropes, etc.), or the rescue depth exceeds the technical possibilities of the equipment, execute successive “ramps /

embankments" up to the level of the victim;

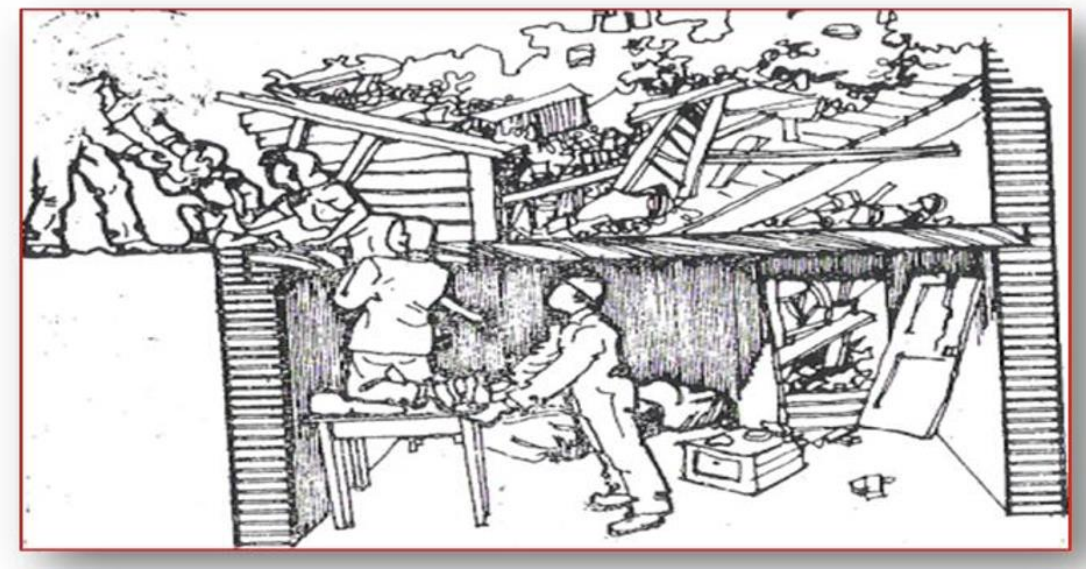
- when the entrances to the basements are blocked with large amounts of rubble, the penetration is made through wells made parallel to the walls or through tunnels of triangular or trapezoidal section, lined on the outside with planks, their route bypassing gas pipes, water and electrical cables;
- the cutting and breaking operations performed in the walls, as well as the demolition ones will be carried out only after the consolidation of the construction elements, and the holes practiced will have a "V" shape with the tip down;
- for the situations in which the soil becomes sandy or the vibrations of the equipment can affect the victim, the excavation operations will be stopped, following to be dug manually;
- in order to reduce the risk of collapse, temporary consolidation works will be carried out, where the endowment and improvised means will be used (wooden props, cabinets, planks, etc.);
- throughout the intervention, the people working below ground level will be provided with ropes / ropes in order to be saved in case of landslides;
- openings will be made manually or using equipment, if the soil stability allows, to ensure access to the victim;
- during the intervention, the subsequent collapses will be avoided, as much as possible, by avoiding and supporting the construction elements that do not present stability.

To enter narrow spaces where victims are caught, there are several ways **to access them:**

a) **Variant I -** there is an accessible room on the side of the blocked spaces. A break in the common wall will be made with the locked space in the form of an equilateral triangle with the tip upwards, with sides of 0.8 m (to allow the stretcher to pass). If possible, the crack in the wall should be made with the lower side at a height of 0.8 m from the floor, to allow easy access of rescuers.



b) Variant II - there is no adjoining room through which to enter the blocked space. The floor of the locked space did not collapse.

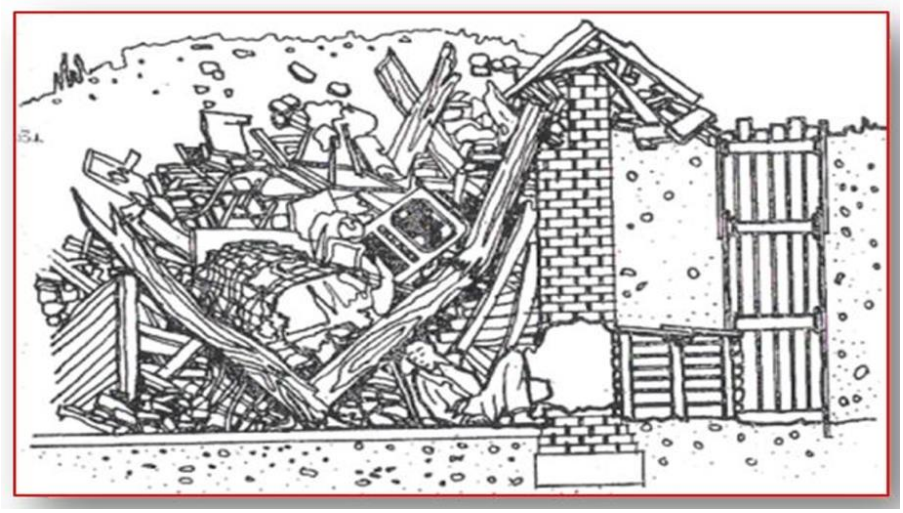


b1) in the first stage, the rescue of the wounded is done by clearing the debris from a certain portion of the floor;

b2) the floor is broken as much as necessary, so that rescuers can remove the injured persons by various procedures.

b3) the same procedure shall be followed if there is an accessible space under the place where the victim is trapped, in which case a bottom-up crack shall be made. Rescuers must be placed at a sufficient height to allow them to penetrate the floor and care must be taken to protect them from falling materials.

c) Variant III - The floor of the blocked space has completely collapsed and there is no adjoining room through which to enter to save the wounded.



c1) the victims will be able to be saved by executing several types of tunnels that start from the nearest accessible place to the place where the victims are caught;

c2) the section of a tunnel must be made in such a way as to allow the passage of a person; from experience, an optimal section of 80/90 cm results.

c3) if during the execution of the tunnel there are heavy obstacles (concrete blocks, masonry, etc.), it is often easier to change the route for bypassing them, than to cut a road through them.

c4) in some cases, water, gas, electrical cables, etc. may present obstacles to the progress of the tunnel; it is good to avoid cutting them; if, however, their sectioning is required, measures shall be taken to interrupt their supply;

c5) the following types of tunnels can be executed:

- horizontal;
- inclined;
- vertical;
- combined.

III. Management of emergencies resulting from incidents during the transport of hazardous materials

The United Nations Economic Commission for Europe (UN / ECE) is one of the five United Nations regional commissions under the UN Economic and Social Council (ECOSOC). It was created in 1947 with a mandate to help rebuild Europe after the war, to develop economic activity and strengthen economic relations between European countries, but also between Europe and the rest of the world. During the Cold War, the UNECE served as a unique platform for dialogue and economic cooperation between East and West. Despite the complexity of this period, significant results have been achieved, by consensus, on numerous harmonization and standardization agreements.

After the Cold War, the UNECE acquired not only new member states, but also new positions. Since the early 1990s, it has focused on analyzing the transition process, capitalizing on its experience in harmonization to facilitate the integration of Central and Eastern European countries into the world economy.

The UNECE is the forum in which the countries of Western Europe, Central and Eastern Europe, Central Asia and North America - a total of 56 countries - come together to build the instruments of economic cooperation. This cooperation covers economic, statistical, environmental, transport, trade, sustainable energy, wood and habitat issues. The Commission provides a regional framework for the development and harmonization of standards and conventions. Commission experts provide technical assistance to the countries of south-eastern Europe and the Commonwealth of Independent States. This assistance is in the form of consultancy services, training seminars and workshops where countries can share their experience and best practices.

The UNECE Directorate for Sustainable Transport provides the secretariat for the Inland Transport Committee (JTI) and the ECOSOC Committee of Experts on the Transport of Dangerous Goods and the Harmonized System of Classification and Labeling of Chemicals. The JTI and its 17 Working Groups, as well as the ECOSOC Committee and its Sub-Committees, are intergovernmental decision-making bodies working to improve the daily lives of people and the world economy in measurable ways and with concrete actions that increase traffic safety, environment, energy efficiency and competitiveness of the transport sector.

The ECOSOC Committee was set up in 1953 by the Secretary-General of the United Nations at the request of the Economic and Social Council to develop Recommendations on the Transport of Dangerous Goods. Its mandate was extended in 1999 to the Global (multi-sectoral) Harmonization of Chemical Classification and Labeling Systems. It is composed of experts from countries with relevant expertise and experience in international trade and the transport of

dangerous goods and chemicals. Its composition is limited to reflect the appropriate geographical balance between all regions of the world and to ensure the appropriate participation of developing countries. Although the Committee is a secondary body of ECOSOC, the Secretary-General decided in 1963 that secretarial services should be provided by the UNECE Transport Division.

The European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), concluded at Geneva on 30 September 1957 under the auspices of the United Nations Economic Commission for Europe, entered into force on 29 January 1968. The Agreement itself was amended by Protocol amending Article 14 (3), done at New York on 21 August 1957, which entered into force on 19 April 1985.

According to Article 2 of the Agreement, dangerous goods, the carriage of which is prohibited by Annex A, must not be the subject of international carriage, while the international carriage of other dangerous goods is authorized, provided that:

- the conditions imposed by Annex A for the goods in question, in particular for their packaging and labeling, and
- the conditions imposed by Annex B, in particular as regards the construction, equipment and movement of the vehicle carrying the goods in question.

HAZARDOUS SUBSTANCES. DEFINITION. CLASSIFICATION. TRANSPORT AND STORAGE RULES. INTERVENTION IN THE EVENT OF ACCIDENTS IN WHICH HAZARDOUS SUBSTANCES ARE INVOLVED

Substance - chemical element and its compounds in the natural state or obtained through a production process, containing any additive necessary to protect the stability of the product and any impurity arising from the process used, except any solvent which can be separated without affecting the stability of the substance and without change the composition;

Dangerous substances and preparations are as follows:

a) explosive substances and preparations: solid, liquid, pasty or gelatinous substances and preparations, which may react exothermically in the absence of oxygen in the atmosphere, immediately producing gaseous emissions, and which, under certain test conditions, detonate, produce a rapid explosion or under the effect of heat they explode when partially closed;
b) oxidizing substances and preparations: substances and preparations which, in contact with other substances, in particular flammable substances, have a strong exothermic reaction;
c) highly flammable substances and preparations: liquid chemicals and preparations with a very low flash point and a low boiling point, as well as

gaseous substances and preparations which are flammable in contact with air at ambient temperature and pressure;

d) highly flammable substances and preparations:
    - substances and preparations that can be heated and then ignited in contact with air at ambient temperature, without energy input; or
    - solid substances and preparations which can be easily ignited after a brief contact with a source of ignition and which continue to burn or be consumed even after removal of the source; or
    - liquid substances and preparations with a very low flash point; or
    - substances and preparations which in contact with water or humid air emit highly flammable gases in dangerous quantities;
e) flammable substances and preparations - liquid substances and preparations with a low flash point;
f) very toxic substances and preparations - substances and preparations which by inhalation, ingestion or penetration into the skin in very small quantities may cause death or chronic or acute health conditions;
g) toxic substances and preparations - substances and preparations which by inhalation, ingestion or penetration into the skin in small quantities may cause death or chronic or acute health conditions;
h) harmful substances and preparations - substances and preparations which by inhalation, ingestion or penetration into the skin may cause death or chronic or acute health conditions;
i) corrosive substances and preparations - substances and preparations which in contact with living tissues exert a destructive action on the latter;
j) irritating substances and preparations - non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membranes, may cause an inflammatory reaction;
k) sensitizing substances and preparations - substances and preparations which by inhalation or penetration into the skin may give rise to a hypersensitivity reaction, and in case of prolonged exposure produce characteristic adverse effects;
l) carcinogenic substances and preparations - substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce carcinogenic diseases or increase their incidence;
m) mutagenic substances and preparations - substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic abnormalities or increase their frequency;
n) substances and preparations toxic for reproduction - substances and preparations which by inhalation, ingestion or penetration into the skin may produce or increase the frequency of non-inherited harmful effects on the product of conception or which may damage male or female reproductive

functions or abilities;

o) substances and preparations dangerous for the environment - substances and preparations which, when used in the environment, could present or present an immediate or delayed risk for one or more components of the environment.

HAZARDS ASSOCIATED WITH SUBSTANCES

1. Danger of explosion and fire

• Explosiveness

Not only substances used as explosives (subject to special regulations and rules) but also other substances, gaseous, liquid or solid, can cause explosions when mixed with air, within certain concentration limits. The lower and upper explosion limits are the range of concentrations in which the mixture of substance and air explodes in the presence of an ignition source. Explosion limits for gases and vapors are expressed in% volume. For example, benzene has explosion limits of 1.2 - 8% (during this concentration the benzene-air mixture can explode in the presence of a source of ignition). Explosion limits for solids are expressed in mg / m3. Flammable solids are hazardous to explosion if dispersed in air in powder form. The values of the explosion limits can be found in the specialized literature and in the Safety Data Sheets.

• Flammability

flammability temperature (point) = the minimum temperature (at normal pressure) at which a liquid gives off a sufficient amount of vapor to form a flammable mixture with air on contact with a flame or spark. The lower the flash point, the more flammable the substance.

combustion temperature (point) = the temperature at which the combustion initiated in a flammable mixture persists and spreads. The burning point is higher than the flash point (a few degrees Celsius).

Flammable substances are characterized according to the temperature (flash point) as follows:

- flammable - with flammability temperature above 210^0C;
- highly flammable (or slightly flammable or with high flammability) - with a flammable temperature between 0 - 21 ^{0}C (or solids that ignite spontaneously in air or ignite slightly in contact with an ignition source and continue to burn after removal of the source);

- extremely flammable - liquids with flammability temperature below 0 ^{0}C and boiling point below 35 ^{0}C.

There are substances that self-ignite in contact with air, even in the absence of a source of ignition (flame, spark, overheated surfaces).

self-ignition temperature = the minimum temperature at which a substance ignites spontaneously in contact with air and at which combustion continues even in the absence of a source of ignition (flame or spark).

Oxidizing substances (chlorates, perchlorates, nitrates, chromic acid, hydrogen peroxide, peroxides, etc.) can release oxygen, an element that maintains combustion and causes fires in contact with combustible materials, in the presence of an ignition source.

2. Health hazard

• Toxicity

Toxicity can be defined as the property of substances to cause adverse effects on health.

Classification of health effects

- Depending on where the effect occurs:
  - local effect: manifests itself at the place of contact with the chemical agent;
  - systemic effect: occurs in other areas of the body, at a distance from the point of contact with the chemical;
- Depending on the duration of exposure:
  - acute effect: occurs after a short exposure, generally the manifestation is immediate
  - chronic effect: occurs after a long / repeated exposure, may occur after long periods of exposure.
- Depending on the evolution of the effects over time:
  - reversible effect: the manifestations on the state of health cease after the cessation of the exposure, naturally or as a result of a treatment;
  - irreversible effect: the manifestations on the health condition persist even after the cessation of the exposure, regardless of the treatment.

Toxicity is general if the effect of the chemical agents is undifferentiated on the organs.

When toxicity manifests itself on a small number of organs, they are called target organs.

Target organs are the organs on which the toxic effect of a substance is most pronounced.

There are three ways for chemicals to enter the body: inhalation, skin contact,

and ingestion.
Inhalation consists of entering the body by inhaling substances in the form of:

- gas;
- steam;
- powders.

Contact with skin and mucous membranes: consists in absorption into the body by contact with:

- substances;
- materials;
- impregnated protective equipment.

Ingestion is a route of entry into the body, especially in the case of:

- accidents (a substance is confused with a food (e.g. sugar, salt);
- non-compliance with working rules (e.g. mouth pipetting, identification of substances by tasting);
- non-compliance with hygiene rules (eating and smoking with unwashed hands).

• Corrosivity

Corrosive substances attack living tissues by destroying them deeply (chemical burns). The skin and the nasal, ocular and oral mucous membranes are mainly affected, but in case of ingestion, the gastrointestinal tract is also attacked, with very serious consequences.

Corrosivity is also manifested on the materials and is an important factor in the choice of materials for the execution of storage tanks, technological and auxiliary installations as well as corrosive waste storage containers.

The most common corrosive substances are acids and strong bases, but this class also includes oxidized compounds (certain peroxides, for example).

• Irritant character

The irritant nature of the substances is manifested:

- on the skin, from stinging, stinging to burning.
- at the level of the eyes, with different actions depending on the product (the action of the bases is more dangerous than that of the acids): conjunctivitis, keratitis and even visual disturbances;
- in the bronchi, where they produce respiratory discomfort with or without cough and even more serious conditions such as pulmonary edema, etc.

Diluted solutions of corrosive agents may, depending on the concentration, be irritating.

3. Danger to the environment

Dangerous substances for the environment

In addition to the negative effects on health and safety at work, the dangerous properties of the substances are also manifested on the environment.
The most important aspect regarding the effects of chemical agents on the environment is the potential to affect the health of the population. Other characteristics that may have an impact on the environment are mobility, persistence / degradability, bioaccumulation potential, aquatic toxicity, etc.
For each class of substances the following have been established:

- the name, by an established term (unfortunately, due to the translations, in the Romanian legislation there are inconsistencies of terms between the documents);
- the definition, which specifies the types of substances that fall into that class;
- the graphic warning symbol, to allow a safe and rapid identification of the class to which a chemical agent belongs. The graphic warning symbol includes:
- the danger symbol, consisting of an icon;
- the graphic sign, consisting of a letter, a letter and the + sign, or two letters (of which the first capital letter). The graphic sign contributes to the unequivocal identification of chemical agents that have the same graphic symbol;
- the inscription of its meaning, consisting of one or two terms describing the danger. In general, the terms in the inscription coincide with the name of the class of chemical agents, as defined.

In some cases the same symbol is used for several classes of agents, for example the symbols for the classes of toxic or harmful substances also apply to the substances belonging to the classes: sensitizing, carcinogenic, mutagenic, toxic for reproduction.

Romania has adopted the international provisions on the classification of chemical agents and the corresponding graphic warning symbols:
- explosives: solid, liquid, pasty or gelatinous substances and preparations which may react exothermically in the absence of oxygen in the atmosphere, immediately giving off gaseous emissions, and which, under certain test conditions, detonate, produce a rapid explosion or heat explodes when partially closed;

- oxidizing agents: substances and preparations which, in contact with other substances, in particular flammable substances, have a strongly exothermic reaction;
- extremely flammable: low-boiling liquid chemicals and preparations, as well as gaseous substances and preparations which are flammable in contact with air at ambient temperature and pressure;

- -highly flammable: substances and preparations which may heat up and then ignite in contact with air at ambient temperature without energy or solid substances and preparations which may easily ignite after brief contact with a source of ignition and which continues to burn or be consumed even after removal of the source or liquid substances and preparations with a very low flash point or substances and preparations which in contact with water or moist air emit highly flammable gases in dangerous quantities;
- flammable: liquid substances and preparations with a low flash point;
- very toxic: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin in very small quantities, may cause death or chronic or acute health damage;
- toxic: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin in small quantities, can cause death or chronic or acute health conditions;
- harmful: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may result in death or of chronic or acute ill health;
- corrosive: substances and preparations which, in contact with living tissues, have a destructive effect on the latter.
- irritant: non-corrosive substances and preparations which, through immediate, prolonged or repeated contact with the skin or mucous membranes, may cause an inflammatory reaction;
- sensitizers: substances and preparations which, if they are inhaled or if they penetrate the skin, may induce a hypersensitivity reaction, and in case of prolonged exposure they produce characteristic adverse effects;
- carcinogenic: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce carcinogenic conditions or increase their incidence;
- mutagenic: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce hereditary genetic abnormalities or increase their frequency;
- toxic for reproduction: substances and preparations which, if they are inhaled or ingested or if they penetrate the skin, may induce or increase the frequency of non-inherited harmful effects in the offspring or impair male or female reproductive function or capacity.
- dangerous for the environment: substances and preparations which, when introduced into the environment, could present or present an immediate or delayed risk for one or more components of the environment.

LABELING AND PACKAGING OF SUBSTANCES

Labeling

A first identification and essential information on the potential risks of the chemicals are given by the label of the substance.

For the safe use of chemicals, much more detailed information than on the label is required, which can be found in the safety data sheets. The basics of a label refer to:

- identification of the chemical agent - Chemicals often have synonymous scientific names, technical and popular names (they are presented in the safety data sheets). For an accurate identification it is recommended to use an internationally recognized name.
- hazard identification - The types of hazards associated with a chemical agent are specified by the hazard symbol and risk phrases. In the case of hazard symbols used for several classes of substances (eg symbols for toxic substances used and for carcinogens, mutagens, etc.) the risk phrases allow an unambiguous classification of the chemical agent in the corresponding class. There are 64 risk phrases (R phrases) that can be used as such or in combination.

The label of a chemical or dangerous preparation must contain the following elements:

- The name of the substance or an internationally recognized name;
- The name, full address and telephone number of the person responsible for placing the substance or preparation on the market, respectively the manufacturer, importer or distributor;
- Hazard symbols and, where appropriate, indications of hazards arising from the use of the substance;
- Typical phrases specific to the use of dangerous substances, referring to the risks that may arise from the use of the dangerous substance (R phrases);
- Safety standard phrases indicating recommendations regarding the caution with which the dangerous substance should be used (S phrases);
- Assigning the number of the European Economic Community in IESCE, if allocated;
- The nominal quantity (nominal mass or nominal volume) of product contained in the package, in the case of dangerous chemical preparations sold to individuals.

Examples of risk labels

R1 Dry explosive; R45 May cause cancer R23 Toxic if swallowed; R47 May cause mutagenic effects

Examples of security labels

S3 Store in a cool place; S 22 Do not inhale dust

S33 Take precautions against static discharges
For cases where a chemical agent corresponds to several warning symbols, the first two are chosen, in descending order of risk. To the right of the label is the hazard with the highest degree of risk, and to the left, the one with the lowest degree of risk.

PACKING

Under current legislation, the placing on the market of chemical agents is only allowed if the following packaging requirements are met:

- are designed and constructed in such a way as to prevent any loss of content by handling, transport and storage;
- the materials from which the packaging and sealing devices are made must be resistant to attack by the contents and must not form dangerous compounds such as this;
- packaging and sealing systems are solid and durable to avoid any loss and to meet safety criteria under normal handling;
- packaging and closing systems that re-close will be designed so that they can be re-closed repeatedly without loss of content;
- the packaging must be initially sealed with a seal whose breach is visible at the time of opening the package, and the seal is irreparably destroyed with the first opening.

STORAGE, HANDLING AND TRANSPORT OF CHEMICAL AGENTS

Location of warehouses
The location of the deposits must:

- be easily accessible for vehicles (including those of large size: transport, fire, etc.);
- be, as far as possible, located away from work and inhabited areas.

The open warehouses for chemical agents that produce powders during handling will be located at a distance of 20m from the industrial buildings and 50m from the social and sanitary buildings of the industrial complex.
***CAUTION**: Do not mix waste from different grades in the same container! Containers in which waste of unknown composition has been deposited shall be labeled as "general hazard".*

IDENTIFICATION OF SUBSTANCES AND HAZARDS

Vehicles carrying hazardous materials and substances must be marked with hazard warning signs and hazard labels, and the places where hazardous materials and substances are stored, and their packaging must be provided with hazard labels and handling.
A. DANGER SIGNALING PANELS

They are rectangular in shape with a base of 40 cm and a height of 30 cm and have a reflective orange color. These panels usually contain the hazard identification numbers (above) and the substance (below). These numbers provide information on what can be done in the event of an accident, with reference mainly to first aid measures, traffic safety and the use of protective equipment. If the vehicle is divided into compartments in which several substances are transported, the signal panels, with the hazard identification numbers and the substance respectively, shall be displayed on the sides of the tank, on each compartment. In this case, the signal panels in front and behind the vehicle will no longer be inscribed. In the annex no. 2 examples of signal panels are shown.

1***. The hazard identification number*** (KEMLER number) consists of 2 or 3 digits, which indicate the main hazard and the secondary hazard respectively.

- The first hazard identification figure refers to the main hazard of the substance and is based on the distribution of hazardous substances into classes:

The first digit of the hazard identification number	**Danger**	**Substance class**
2	Gas leaks from a container under pressure or from a chemical reaction	2
3	Flammability of a liquid substance, of a gas or self-ignition of a liquid	3, 4.2, 4.3
4	Flammability or self-ignition of a solid	4.1, 4.2, 4.3
5	Comburance	5.1, 5.2
6	Toxicity or danger of infection	6.1
7	Radioactivity	7
8	Corrosivity	8
9	Spontaneous violent reaction	9

- If the second or third digit of the identification number is different from the first (or second) it refers to the secondary hazard.
- When the hazard identification number is preceded by the letter “X” it indicates that the substance reacts very dangerously in contact with water. For these substances a total ban on contact with water is required, which can only be used with the approval of experts.
- When the hazard identification number is followed by the digit “0”, there is no secondary hazard.
- Doubling a number indicates a very high primary or secondary hazard.

2. Substance identification number (UN number). It defines and identifies the dangerous substance by its chemical composition and is always composed of 4 digits. This serial number has been assigned in a table of hazardous substances, drawn up by a UNECE expert committee operating under the auspices of the UN and included in Annex B of the ADR Agreement, and is valid for the recognition of each substance in the countries that have acceded to it. ADR and for all transport categories (road, sea, rail). The official list of dangerous substances, objects and materials admitted to road transport, in the order of the substance identification number is presented in Annex no.4.

B. LABELS

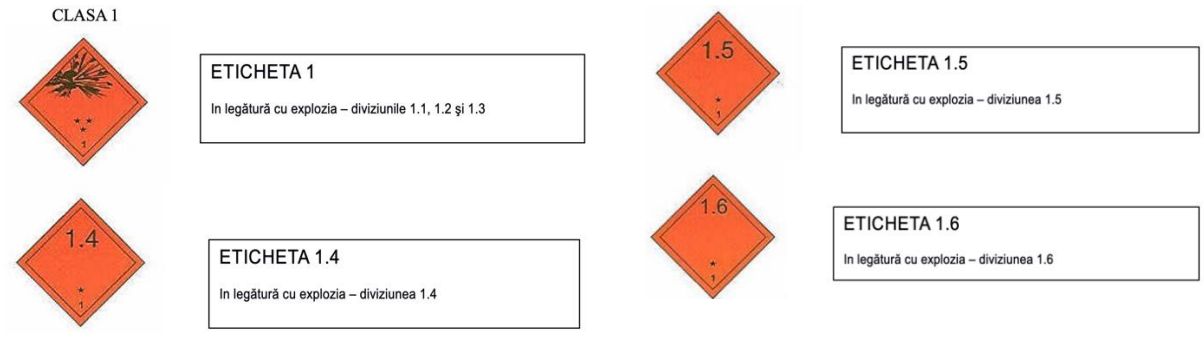
Hazard and handling labels can quickly and easily identify the danger posed by hazardous substances and how to handle them.

Hazard labels shall complete the signaling panels and shall be visible on the sides and rear of the vehicle. They have a square shape with a side of at least 25 cm and are fixed with the diagonal of the square positioned vertically. The numbers or letters indicating the class of the respective substance and the nature of the hazard may be written at the bottom of the label. The labeling shall be according to the requirements corresponding to the hazard class of each hazardous substance, respectively according to the risk group.

Handling labels are applied on the used packaging.

Hazard labels

a) depending on the class of the dangerous substance



CLASA 2

ETICHETA 2

Gaz inflamanbil

Gaz neinflamabil şi netoxic

Gaz toxic

CLASA 3

ETICHETA 3

Pericol de incendiu (substanie lichide inflamabile)

CLASA 4

ETICHETA 4.1

Substanlă solidă inflamabilă

ETICHETA 4.2

Substanlă predispusă la aprindere spontană

ETICHETA 4.3

Pericol de emanalie de gaz inflamabil în contact cu apa

CLASA 5

ETICHETA 5.1

Substanlă comburantă

ETICHETA 5.2

Peroxid organic: pericol de incendiu

CLASA 6

ETICHETA 6.1

Substanlă toxică (se line izolată de articole alimentare sau de alte obiecte destinate consumului in vehicule, precum şi de locuri de descărcare sau transbordare)

ETICHETA 6.2

Substanlă infecţioasă(se line izolată de articole alimentare sau alte obiecte de consum şi alimente pentru animale in vehicule, precum şi de locuri de încărcare, descărcare sau transbordare)

CLASA 7

ETICHETA 7A

Substanlă radioactivă în ambalaje (în caz de avarie a ambalajelor, pericol pentru sănătate în caz de ingerare, inhalare sau contact cu substanla împrăştiată)

ETICHETA 7B

Substanlă radioactivă în ambalaje (În caz de avarie a ambalajelor, pericol pentru sănătate prin ingerare, inhalare sau contact cu substanla împrăştiată, inclusiv riscuri de iradiere la distanlă)

ETICHETA 7C

Substanlă radioactivă în ambalaje (În caz de avarie a ambalajelor, pericol pentru sănătate prin ingerare, inhalare sau contact cu substanla împrăştiată, inclusiv riscuri de iradiere la distanlă)

ETICHETA 7

Substanlă radioactivă, prezentînd pericol de fisiune

CLASA 8

ETICHETA 8

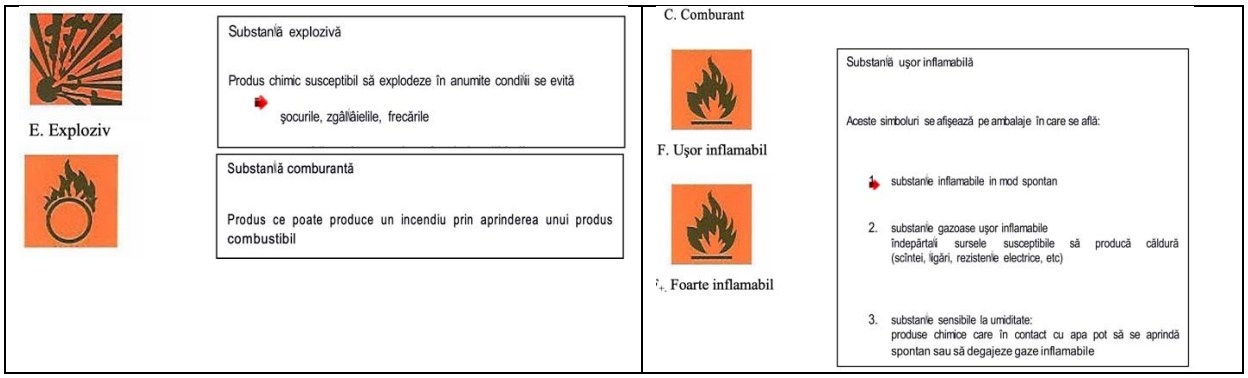
Substanlă corozivă

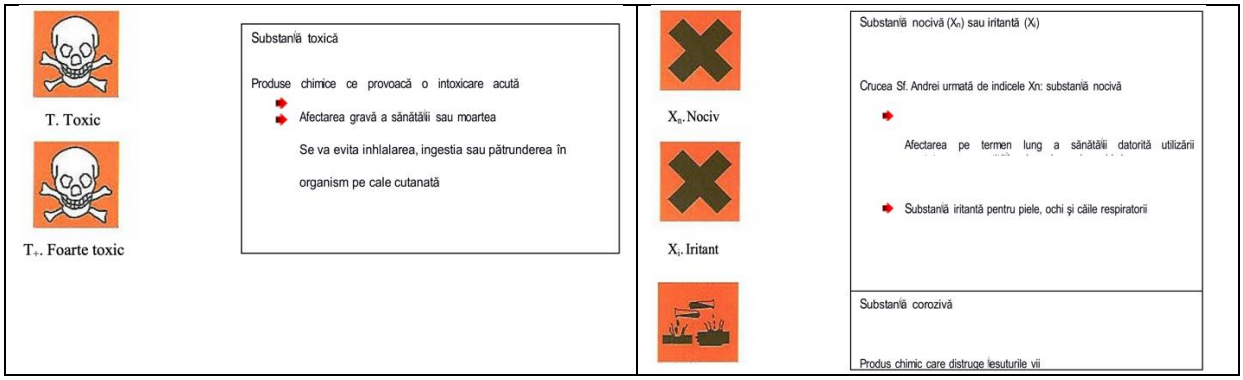
CLASA 9

ETICHETA 9

Substanie şi obiecte diverse, care în cursul transportului prezintă un pericol, altul decât cele pe care le prezintă celelalte clase

b) depending on the risk group





C. THE NEW COLOR SYSTEM FOR GAS BOTTLES

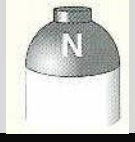
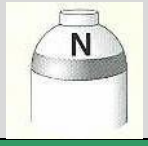
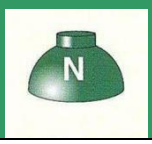
Standard SN EN 1089-3 on gas cylinders - gas cylinder markings / color codes, defines the uniform colors in European plan for gas cylinders. The standard applies to industrial and medical gas cylinders, except for liquid gas cylinders (LPG), which are the manufacturer's color, and fire extinguishers, which are red. The readjustment of all European countries to the new unique color marking will be completed in May 2006, which means that until this date on European roads there will be in circulation bottles with the old color codes, characteristic of each country and the new conventional colors, unique in EU member states. To avoid confusion, all cylinders marked with the new identification colors have, in addition, the letter N applied in two diametrically opposite positions.

NOTE: The label is the main element that indicates the contents of a bottle. The color marking of the cylinder nozzle provides additional information on the properties of the gas (fuel, oxidant, toxic, etc.). This marking has the advantage that it can be seen even when the label cannot be read from a certain distance.

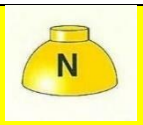
The norm does not prescribe the color of the cylindrical body; it can be freely chosen. Exceptions are gases and gas mixtures intended for the medical system,

where the body of the cylinder is mandatory white, in order to be clearly differentiated from gas cylinders intended for industrial applications.

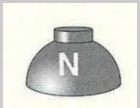
MARKING FOR BOTTLES
containing gases and gas mixtures

GASES AND GAS MIXTURES FOR MEDICAL USE		
TYPE OF GAS		COLOR CODE
OXYGEN	O_2	
NITROGEN PROTOXIDE	N_2O	
CARBON DIOXIDE	CO_2	
BREATHING AIR		
HELIUM / OXYGEN	He / O_2	
OXYCARBON	O_2 / CO_2	
ARGON	Ar	

NOTE: The bottle is always white.

GASES AND MIXTURES OF INDUSTRIAL GASES		
GAS TYPE		COLOR CODE
TOXIC AND / OR CORROSIVE ALL GASES AND MIXTURES OF TOXIC AND / OR CORROSIVE GASES		
CHLORINE AMMONIA	Cl_2 NH_3	
SULFUR DIOXIDE HYDROGEN SULFIDE CARBON MONOXIDE HYDROCHLORIC ACID	SO_2 H_2S CO HCl	
FLAMMABLE ALL FLAMMABLE GASES EXCEPT ACETYLENE		
HYDROGEN BUTANE ETHANE METHANE PROPANE ETHYLENE ETHYLENE OXIDE ETHYLENE CHLORIDE	H_2 C_4H_{10} C_2H_6 CH_4 C_3H_8 C_2H_4 C_2H_4O C_2H_4Cl	
ACETYLENE		
ACETYLENE	C_2H_2	
OXIDANTS ALL GASES OR MIXTURES OF OXIDIZING GASES (O2> 21%) EXCEPT OXYGEN AND NITROGEN PROTOXIDE		
MIXTURES OXIDIZING GASES / INERT GASES	de ex. O_2/CO_2 (O_2>21 %)	

OXYGEN		
OXYGEN	O_2	
NITROGEN PROTOXIDE		
NITROGEN PROTOXIDE	N_2O	
INERT GASES (AIR AND ASPHYXIATION) EXCEPT ARGON, CARBON DIOXIDE, NITROGEN AND HELIUM		
AIR SYNTHETIC AIR KRYPTON NEON XENON SULFUR HEXAFLORIDE OXIDANT GAS / INERT GAS MIXTURES	Kr Ne Xe SF_6 de ex. Ar/CO_2 (O_2<21 %)	

ARGON		
ARGON	Ar	
CARBON DIOXIDE		
CARBON DIOXIDE	CO_2	
NITROGEN		
NITROGEN	N_2	
HELIUM		

HELIUM	He	

NOTE: The bottle can be of any color. The color of the nozzle shows the primary danger of gas. If the gas or gas mixture has several risks, the cylinder nozzle will be colored after the primary risk. The color of the secondary risk can also be applied.

ACTIONS AND PROTECTIVE MEASURES AT INTERVENTION

1. **Upon arrival at the scene of the accident,** check whether hazardous materials are involved and if this is confirmed, identify the substance. During these actions one will observe the following protection measures*:*

a) Stopping vehicles away from the accident. The recommended distances for the arrangement of intervention vehicles are the following:

Accident type	Definition of accident	Recommended distance
Minor leaks	Drop by drop Thin flow	50 m
Major leaks	High flow Disposal of the container Quantity discharged > 150 l	100 m
If you have no information about the nature of the accident		100 m

a) Carefully approach from the direction from which the wind blows. Resist the temptation to hurry, as you will be convinced that you cannot help until the situation is fully assessed.
b) Isolation of the accident area. Without entering the area in the immediate vicinity of the accident, isolate the surface affected by product losses and ensure the safety of people and the environment, remove the curious outside the isolated perimeter. Make sure you have as much space as possible to move freely and maneuver the necessary equipment.

2. **Identify the hazards**. Hazard and / or handling labels, hazard warning signs, specific documents (transport, list of hazardous substances, characteristic data sheet) and / or any persons who have witnessed the accident are important sources of information. Evaluate and capitalize on all available information and consult your supervisor to reduce immediate risks.

3. **Evaluate the situation**. Consider the following:

- Is there a fire or only a loss of hazardous substances (leaks, vapors, etc.)?
- What are the weather conditions?
- How is the land?
- Who / what is in danger - people, environment or goods?
- What measures should be taken - is an evacuation necessary?
- What human and material resources are needed?
- What measures can be taken immediately?

4. **Intervene accordingly**. Depending on the evolution of events, constantly reevaluate the situation and change the actions taken. Rescue the wounded and evacuate the area if necessary, constantly maintaining the situation and change the actions taken. Remember that the main goal is the safety of people near the scene of the accident, including your own safety. Therefore, use the appropriate personal protective equipment during the operation. Only enter the area of the accident with appropriate personal protective equipment and self-contained breathing apparatus.

ACTIONS OF THE INTERVENTION FORCES ACCORDING TO THE TYPE OF ACCIDENT

A.-FIRE		
Gas on fire	Different materials	Tank Risk of BLEVE
Place the intervention vehicles at a distance of 20-50 m Evacuate the population within a radius of 100-200 m Do not extinguish inflamed gas leaks (only if leaks have been removed) Cool containers	Avoid placing emergency vehicles in the smoky area Evacuate the population within a radius of 300 m Use the appropriate stigmatizing agent	Place the intervention vehicles as far as possible Intervene with as few staff as possible Use the appropriate extinguishing agent Cool the exposed tank vigorously Evacuate the population within a radius of 500 m Withdraw immediately if the tank vibrates, discolors or starts to crack.
B.- LEAKS AND / OR SPILLS		

Reduced leaks or spills			Large leaks or spills		
GaS	Liquid	Solid	Gaz	Liquid	Solid
The population will be evacuated within a radius of 100 m.			The population will be evacuated within a radius of 300 m.		
Vehicles must be grouped at a distance of 50 m from the wind direction.			Vehicles must be grouped at a distance of 100 m from the wind direction.		
Only the necessary personnel will enter, who will have mandatory personal protective equipment and independent respiratory protection.			Only the necessary personnel will enter, who will have mandatory personal protective equipment and independent respiratory protection.		
Wear a visor as long as there is a danger of explosion.			Wear a visor as long as there is a danger of explosion.		
The victims will be evacuated quickly.			The victims will be evacuated quickly.		
Ignition sources should be avoided.			Ignition sources should be avoided.		

IMPORTANT! Do not step on or touch spilled substances and avoid inhaling smoke or vapors, even when they are not supposed to be involved in the accident and hazardous substances. Do not rush to consider that when they do not smell, gases or vapors are harmless, because it has been proven that gases or vapors, even without smell, can be harmful.

FIRST AID

If the victim has come into contact with a dangerous chemical, provide first aid as follows:

1. Transport the victim to an unaffected area;
2. Contact your doctor and tell him the name of the product the victim came in contact with;
3. If the victim has stopped cardiac arrest, try to resuscitate her;

CAREFUL! Do not use the mouth-to-mouth method if the victim has ingested or inhaled the substance.

4. If the victim has breathing problems, connect it to the oxygen tube;
5. Remove contaminated clothing and shoes and take measures to isolate them;

CAREFUL! Do not remove clothes that have stuck to the skin.

6. In case of contact with a substance, wash hands and eyes immediately for 10 minutes;
7. Calm the victim and cover her with a blanket;
8. Keep in mind that the effects due to exposure (inhalation, ingestion or skin contact) may occur later.

IV. Managing emergencies in a pandemic

Pandemic is an infectious process that occurs in a special geographical region, spreads over very large areas and infects a large percentage of the population, being produced by a strain of the infectious agent against which the population has no antigenic experience.

The viral pandemic does not appear by mutation from the previous circulating strains, but is produced by a new virus, in whose genome a large change has occurred, by recombination (in viruses with unitary genome) or by genomic reassortment, in those with segmented genome.

Smallpox pandemic 1870-1874 - The infectious agent is a poxvirus. Smallpox produced by the wild virus produces a systemic rash, fever, after an incubation period of 10-14 days. After incubation, in 1-2 days there is a systemic skin rash with centrifugal distribution: on the oral mucosa, face, extremities and less on the trunk. The rash is macular, but evolves into pustular and vesicular form. The lesions crust and fall off at 14 days.

Few infections are subclinical. The smallpox has a mortality of 30% and the minor, 1%. More than half of the survivors remain scarred on the skin of the face. Smallpox pandemics have claimed about 300 million lives over time. Smallpox is the first virus to be controlled by global vaccination. The first vaccine for smallpox immunization was collected from pustular lesions on the cow's udder. The protective properties of cowpox virus were intuited and used by the English farmer Benjamin Jesty (1774), but a true conspiracy of silence gave priority to the vaccination of veterinarian E. Jenner (1796). The inscription on the funerary monument bears witness to Jesty's priority. Smallpox is the only one eradicated because there is no natural animal reservoir!

Influenza pandemics are caused by viruses that have new antigenic variants of hemagglutinin (HA) or HA and NA (neuraminidase). The genome of influenza viruses is segmented (8 segments for type A and B, and 7 segments for type C). Influenza pandemics are caused only by subtypes of virus A (because they have an animal reservoir), whose genome is matched with the genome of infectious viruses for birds. The condition of genomic reassortment is that the 2 viral strains (human and avian) simultaneously infect the same cell. The crucible of the reassortment is represented by the cells of the respiratory tract of the pig, infected simultaneously by human and avian viruses.

The flu pandemic of 1889-1891 was caused by an H3-like virus. It started in Siberia and Kazakhstan and spread on the route Moscow - Finland - Poland - the rest of Europe. In 1890 it reached North America and Africa (360,000 victims). The 3 major pandemics of the 20th century, products of influenza A virus were:

- The Spanish flu (1918), originally from China, brought by Chinese workers to Europe, was produced by H1N1, a virus whose genome has been matched with the genome of an avian virus. Telephone services in Spain reported it in 1918 and hence the name "Spanish flu". It was the most severe, with a large number of victims (40-50 million, especially young adults). The number of victims was much higher, because many countries did not register the victims (post-revolutionary USSR). About 1.5 million people have died in sub-Saharan Africa, and a whole generation has disappeared in India.
- Asian flu (1957), caused by H2N2 began in Hong Kong and spread to China - USA - England (14,000 deaths). The second wave of the pandemic (1958) caused 1.1 million deaths. The new H2N2 virus resulted from genomic reassortment: it acquired 3 genomic segments (PB1, HA, NA) from the avian influenza virus and retained 5 genes from the human virus, and the virus from '68 acquired 2 genes (PB1 and HA) from the avian virus;
- Bird flu, caused by a pathogenic avian virus (H5N1), which infected between 1997 and 2007 millions of domestic birds, 278 people, of which 168 deaths. It is a typical example of a pandemic caused by an infectious bird virus, which has spread to humans but is free of contagion, has had a limited area of dissemination. The pathology of pneumonia produced by H5N1 is another example of an out-of-control innate immune response, amplified by cytokines released by nonspecific immune cells (macrophages and dendritic cells).

The influenza pandemics of 1918, 1957, 1968 were caused by viruses whose genome resulted from the resorting phenomenon.

In birds, the viruses multiply preferentially in the cells of the intestinal tract, but also in the respiratory tract, without clinical signs and are eliminated to a high degree, through feces and the fecal-oral cycle, reaching mammals. Avian viruses do not effectively infect primates, primarily due to receptor specificities: human influenza viruses bind to galactose-bound sialic acid (AS), and avian influenza virus has an affinity for galactose-bound AS by α2- 3. Epithelial cells of the human lower respiratory tract have AS receptors linked to galactose α2-6.

HIV / AIDS epidemic, 1981 - Two serological variants (subtypes) are known: HIV-1 and HIV-2, differentiated by the degree of virulence.

HIV 1 appears to have originated in infectious SIV for the chimpanzee (Pan troglodytes), and HIV 2 is thought to have originated from the SIV that infects Cercocebus atys. Chimpanzees infected with HIV 1 or SIV-cpz do not have AIDS, although humans and chimpanzees are 98% similar in genes. It is believed that SIV-cpz infected the chimpanzee about 10,000 years ago, during which time the interaction evolved through the selection of viral strains that do not kill the host. SIV-cpz passed to the human host, becoming HIV 1, recently, when man destroyed the

African jungle, the living environment of the chimpanzee. Human blood samples collected and frozen in 1959 and analyzed after the discovery of the virus were positive for anti-HIV. HIV evolved from SIV-cpz in the early 1950s, a short period that did not allow the selection of less pathogenic strains. HIV has killed 25 million people.

HIV is transmitted through sexual contact, blood and its derivatives, contaminated needles and syringes, especially to those who inject drugs intravenously, vertically, from mother to fetus during intrauterine life, at birth or after birth through milk secretion. Less than 20% of children born to HIV-positive mothers are born HIV-positive. Maternal anti-HIV antibodies cross the placenta, and a positive test in a child does not indicate infection. The virus has no natural reservoir.

EBOLA epidemic 2014-2016 - EBOLA - the agent of hemorrhagic fever has high tropism for non-specific cells of the immune system (monocytes, macrophages and dendritic cells) but also infects fibroblasts, hepatocytes, endothelial cells.

The first success in isolating the virus took place in Marburg (1967), as a result of 3 simultaneous infectious episodes in laboratory staff in Marburg, Frankfurt and Belgrade, after the import of the African green monkey (Cercopithecus aethiops) from Uganda. 31 people were infected (7 deaths) who had direct contact with the animals, infected tissues or infected blood. The virus was called Ebola (river in Congo - formerly Zaire). In West Africa (Zaire), ZEBOV (Zaire ebolavirus) infects monkeys and humans. Mortality is about 80%. In '76 and '79, new epidemics appeared in Sudan, caused by a related but distinct virus: SEBOV (Sudan ebolavirus). SEBOV is transmitted by direct contact, can penetrate mucous membranes or skin lesions and is less virulent, with a mortality rate of 60%.

Monkeys do not constitute a reservoir of virus, because the infection is lethal and thus the virus cannot be transmitted. The Marburg and Ebola viruses probably have a rodent or a bat as a reservoir and are accidentally transmitted to humans.

Measles (measles) - The etiological agent is a paramixivirus. In the absence of vaccination, epidemics are common. The infection produces a strong immunity, but in children with cellular immunodeficiency, the infection develops persistently. In the secondary viremia phase, the virus enters the central nervous system and can cause persistent neuronal infections associated with neurological diseases: acute post-infectious demyelinating encephalitis, associated with the autoimmune reaction to myelin, with inclusion bodies and rarely, sclerosing panencephalitis P subac). The virus has no natural reservoir.

The number of victims during the various pandemics is estimated at 200 million. For the control of measles virus infections, the attenuated vaccine is