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PREVENTION AND ELIMINATION OF EMERGENCY SITUATIONS OF MAN-MADE NATURE. MAN-MADE ACCIDENTS AND THEIR CONSEQUENCES

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Abstract: 7 types of disasters of a technogenic nature are included in the emergency situations of a technogenic nature, which are specified in the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 455 dated October 27, 1998

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Introduction

As is known, in the Republic of Uzbekistan there are currently 53 reservoirs, more than 150 dams distributing river waters to consumers, 28,122 km of main canals and other water structures. Such structures pose a great danger in the event of any emergency situations (both in wartime and in peacetime). Some of the hydraulic structures are located near large cities and large populated areas and are considered high-risk objects.

Hydraulic structures are divided into different types according to their characteristics:

1) by location:

a) above-ground structures (rivers, lakes, canals, etc.);

b) underground structures (conveyors, tunnels, etc.).

2) according to the purpose of use: a) water and energy structures;

b) water supply structures;

c) irrigation structures;

g) wastewater discharge structures;

d) fishery structures;

e) water sports structures, etc.

3) depending on the function:

a) hydroelectric power plants and other water structures (dams, etc.);

b) water transfer structures (canals, tunnels, pipelines);

c) weirs, suspension pipes, etc.;

g) abandoned water structures (for discharging excess water);

d) water flow regulation structures (water flow regulators, river and coastal levees)

improver, etc.);

d) fish farming facilities (for fish farming).

The failure of hydraulic structures can lead to the flooding of very large areas, including: cities and residential areas, industrial sectors and material resources, which will ultimately cause enormous moral and material damage.

In particular, water-damaged structures, damage to roads and railways, electricity and communication lines, the destruction of livestock, agricultural crops, fields, etc., the destruction of raw materials, fuel, food products, fertilizers and other resources; the cost of temporarily evacuating the population to safe places; the washing away of the fertile layer of land; the cost of transporting food, clothing, medicines and other necessary products to flooded areas, and other negative losses.

Hydraulic structures are destroyed as a result of the following impacts:

1) as a result of natural disasters (earthquakes, landslides, heavy rains, etc.);

2) natural wear and tear of equipment;

3) errors in the design and construction of the structure;

4) violation of water use rules;

5) as a result of explosions (military actions, terrorism, etc.).

The destruction of hydraulic structures leads to certain consequences, including: failure of the hydraulic structure to fulfill its functions; water waves causing harm to people and destruction of various structures; flooding of territories, causing serious material damage to property, land, material resources and other objects. Therefore, organizations using such structures are obliged to ensure their safety,

as specified in Articles 8 and 9 of the Law "On Civil Protection". According to it, it is necessary to analyze the causes of safety degradation during the design, construction and operation of such hazardous facilities, develop and implement measures to prevent possible accidents, as well as cooperate with emergency systems on such issues.

In this regard, it is worth noting the information about the accident that occurred on August 17, 2009 at the Sayan-Shushensk hydroelectric power station in Russia. This hydroelectric facility was built very poorly

It is over 1 km long, 250 m high, and has a hydrostatic weight of 22 million tons. The reason for the accident at the hydroelectric power plant was the failure of the most important hydroelectric facility in 1985.

The high pillar cracked, and a crack appeared in the entire dam body from one bank of the Yenisei River to the other. 550 liters of water began to flow through the crack every second, and as a result, the concrete of the dam began to deteriorate. The deterioration process continued for 8 years, and only in 1996 was the integrity of the crack restored by French specialists with polymer materials.

During this period (8 years), some sections of the structure shifted from 97 mm to 107 mm. However, according to the Law "On the Safety of Hydraulic Structures", a shift of 108 mm is considered a "dangerous" situation from a safety point of view. Despite such a deplorable state, as a result of the use of the hydraulic structure, the second aggregate parts of the dam fell apart and a fire broke out. It is known that more than 100 citizens were killed and significant material damage was caused as a result of this accident.

In order to prevent accidents at hydraulic structures, it is necessary to implement protective measures, including:

1) Avoiding errors in the design and construction of hydraulic structures;

2) Proper use of hydraulic structures;

3) Timely implementation of the specified measures and repair work at hydraulic structures;

4) Strengthening the embankment and the bottom of the structure;

5) Compliance with the rules and regulations when releasing and storing water (timely distribution);

6) Regulating the flow of flood waters using additional reservoirs;

7) Constantly monitoring the situation at hydraulic structures;

8) Reliable protection of the territory of hydraulic structures from the entry of unauthorized persons;

9) Regularly monitor hydrotechnical conditions to make predictions about the likelihood of adverse factors leading to disasters.

Citizens' actions in the event of an accident at a hydraulic structure:

Citizens must follow the following rules in the event of an accident at a hydraulic structure:

1) Citizens in the area of inundation should be well aware of the areas that may be flooded and the time of flooding, as well as the damaging factors (the height and speed of the waves that hit the water, etc.);

1) All residents should be prepared for the risk of flooding and actions to be taken in the event of flooding;

2) All residents should receive timely information about the possibility of flooding, the time of flooding, its boundaries and the evacuation procedure;

3) Upon receipt of a warning (warning) about the danger, the following actions should be taken:

- immediately take documents, valuables and necessary items, 2-3 days of food and drinking water with them;

- leave the houses in a state of emergency (turn off gas, water, electricity);

- move livestock to safe places; 5) In the event of a sudden catastrophic flood:

- climb to the upper parts of solidly built structures to protect themselves from the impact of the water;

- put on a pre-prepared rescue device (a lifebelt with 4-6 one-liter plastic bottles hanging from it);

- If a person is trapped inside a building (in the upper parts), white flags are hung to indicate their location and alert rescuers to come to their aid.

Accidents at fire-hazardous facilities:

Fire is an uncontrollable event that destroys invaluable material and cultural assets in an instant, disrupts the environment, and is especially an emergency situation that causes harm to citizens.

The origin of a fire is the result of the simultaneous occurrence of three factors in one place, namely:

- a combustible substance (oil, paper, wood, etc.);

- air temperature (heat);

- a spark (match, spark, short circuit of an electric wire).

The main causes of fires in the national economy are:

a) careless handling of fire during smoking, burning flammable substances, lighting with matches, etc. Such fires account for 26% of all fires;

b) children playing with fire - 14%;

c) as a result of violation of the rules for the operation of electrical equipment - 13.5%;

g) as a result of improper installation of stoves and chimneys - 8.5%;

d) improper use of heating equipment - 8.3%;

e) violation of the rules for the installation of electrical appliances - 5%;

y) violation of fire safety rules when performing welding work - 2.3%;

j) violation of the rules for operating technological equipment - 1.2%.

Thus, the primary causes of fires can be small sources of ignition - these are cigarette butts, sparks and unextinguished matchsticks; high-temperature heat sources - hot structures of flames, stoves and smoke exhaust pipes, etc. As a result of a fire, the following dangerous factors arise: open flames and sparks; high temperatures in the air and objects; acute harmful products formed by the fire; smoke; decreased oxygen content, destruction and destruction of buildings and structures; explosions; the release of various chemical and toxic substances into the environment at the fire site, explosions as a result of a mixture of various chemicals when extinguishing a fire with water, etc.

According to data, 60-80% of those who die in fires die from respiratory tract poisoning or lack of fresh air.

Combustion is a complex physical and chemical process that occurs as a result of the interaction between combustible products and oxidants, in which heat, toxic gases and light rays are released.

So, for the combustion process to occur, it is necessary to have a combustible material, an ignition source and oxidants.

When the oxygen content in the air is 14-16%, combustion stops and ignition begins. If the oxygen content decreases to 8-10%, ignition also stops.

When a fire occurs, ignition sources can be open (sparks, light forces, flames and burning objects) and closed (friction, impact with great force, heat of a chemical reaction, microbiological processes, etc.).

Combustible materials can be solid, liquid and gaseous, for example, wood, film, nitrocellulose, chemical solvents, hydrogen, methane, propane, coal, etc.

Oxidizers include oxygen, bromine, chlorine, sodium peroxide, nitric acid, bertolet salt.

The "max" temperature generated during combustion depends on the type of combustible material. For example, paper - 5100C, liquid fuel - 110 -13000C, wood - 10000C, gaseous fuel - 1200-13000C.

There are the following types of combustion of objects: ignition, flaming, combustion, spontaneous combustion, and spontaneous combustion.

1) Ignition is the combustion of liquid or solid materials in the vapor phase. Ignition is divided into flammable (up to 450C) and flammable liquids (above 450C). Fast-flammable liquids include: acetone, turpentine, alcohol, gasoline, kerosene and tanning oil, and slow-flammable liquids include mineral oils, brake fluids.

2) Ignition - in this case, the material heats up to its boiling point, burns and continues to burn. In this process, steam, volatile hydrocarbons and other combustible mixtures are formed. The ignition temperature is much higher than the ignition temperature.

3) Spontaneous ignition - this is a process in which the temperature at which the combustion occurs is divided into 2 groups: a) the temperature of the igniter may be higher than the ambient temperature or b) lower.

In the first, it burns as a result of heating the materials, in the second - it burns without heating. Spontaneous combustion includes oil, coal, peat, straw, sawdust, yellow phosphorus, etc.

The time of the combustion process is determined by the following formula:

Where: N - the amount of combustible substance, kg / m3; V - the burning rate of $T_{EH} = \frac{N}{V}$ hour ce, kg / m3.

4) spontaneous combustion is the process of combustion of materials as a result of thermal processes of oxidizers and the activity of microorganisms. These include: vegetable and animal fats, grain, peat, etc.

Places where fires occur are divided into two types: enterprises and organizations and residential areas of citizens, and the scale of the fire is: small, medium and large.

The main reasons for the rapid and widespread spread of fire include:

- errors and shortcomings in the development of the design of structures;
- non-compliance with building codes and regulations and state standards in the construction of structures;
- failure to comply with fire prevention measures prescribed by fire control and gas use control

personnel;

- negligence in children's games leading to a fire;
- factors such as the lack of rescue equipment used in fire fighting.

So, it can be seen from these that the main causes of fires are citizens.

That is why our recommendation to citizens is: “preventing a fire is better than extinguishing it”.

Fire prevention measures include:

- regular inspections of organizations and institutions, immediate elimination of deficiencies that cause fires and explosions;
- strict compliance with construction norms and rules, special orders on state standards;
- regular elimination of deficiencies indicated by state special inspection bodies and prevention of their occurrence;
- know the measures for extinguishing a fire, and remember that a bowl of water is enough for the first minute, a bucket for the second minute, and a tank of water for the third minute;
- regularly train the population to take fire prevention measures and demand them from others.

Measures of fire-fighting systems:

In our country, the fire department under the Ministry of Internal Affairs of the Republic (MIA) is responsible for combating fire disasters, and its subordinate (regional, district) branches also operate. The departments of the fire department are responsible for managing complex factors related to fire protection.

Special large enterprises have militarized and professional fire departments, and enterprises, institutions and organizations have a fire protection system.

In case of fire, the majority of fire brigade members and the population who come to extinguish the fire are divided into the following groups: fire extinguishing, water supply, protection and guard groups. Each group is headed by the head of the majority fire brigade.

1) Firefighting team - is responsible for the evacuation of people and material resources from the fire area and extinguishing the fire.
2) Water supply team - is responsible for ensuring a constant supply of water to water pumps, and if they are not installed in reservoirs, organizing water supply using hand-operated pumps. If there are no pumps, buckets and other containers are used.
3) Protection group - performs work to protect objects located around the fire. This group, if necessary, removes flammable structures of neighboring buildings and devices, thereby creating a gap (open distance) between the burning object, as a result of which the spread of fire is stopped.
4) Guard group - they assist the firefighting group in evacuating people and material resources to a safe place and ensure their protection. Members of this group must be able to provide primary medical care to the injured.

To extinguish a fire in containers and warehouses where flammable fuels and oils are stored, it is necessary to organize a fire-fighting foam attack and redirect oil products from burning reserves to reserve parts. The mouths of the tanks and openings of the tanks should be covered with a lid or a wet tarpaulin and extinguished.

Small fires caused by spilled liquid fuels can be extinguished with foam fire extinguishers and can be extinguished with sand, earth, felt and empty tarpaulins.

Fuel containers located close to the fire source should be quickly cooled with water, and fuels should be removed from the danger zone.

The advantage of extinguishing fires in forests, wheat fields and piles of fibrous materials is to isolate the fire. When isolating fires in forests and wheat fields, they are carried out by plowing the burning areas 4 meters wide around them with plows and spraying water or fire-fighting solutions on them.

Fire-fighting agents and their properties

Fire extinguishing agents - when brought close to the burning areas, they reduce the rate of combustion or completely extinguish the fibers.

There are the following types of fire extinguishing agents:

1) According to the aggregate state of the agent: gaseous (nitrogen, carbon (IV) oxide inert gases, non-flammable vapors and water vapor); in the liquid state - water, carbon (IV) chloride, ethyl bromide; in the solid state - soda, ormosler, dry ash, soil and in the mixed state - liquid and gaseous

foams, a mixture of solid and gaseous carbon dioxide, etc.

2) According to the principles of action: cooling (water, carbon (IV) chloride) isolating the access of oxygen to the combustion zone (powder agents, foams); agents that reduce the amount of oxygen in the combustion zone (water vapor, water, carbon dioxide); chemical agents that slow down the combustion process (methylene bromide, methyl bromide).

Water is used alone or mixed with various chemicals.

It is superior to other extinguishing agents in the following properties: a) wide penetration;

b) high heat capacity;

c) chemically neutrality;

g) ease of transportation;

d) low cost.

However, water also has negative aspects, including:

1) freezing at 0 C, causing rupture of pumps and hoses;

2) being electrically conductive, making it dangerous to extinguish fires in electrical equipment;

3) being a solvent, causing damage to decorated, polished buildings and archival treasures, not being able to extinguish fires when burning liquid fuel, the specific gravity of which is less than that of water, and other properties.

Carbon monoxide (IV) - (carbon dioxide) - is twice as heavy as air, so it isolates the oxygen supply to the combustion zone. It is useful in extinguishing fires caused by flammable liquid fuels and in extinguishing fires where water cannot be used (in museums, archives, electrical equipment).

Soluble agents - these are agents that help extinguish fires by increasing the solubility of mainly dry burning objects, such as rubber, coal, plaster, peat, fibrous materials. Soluble agents include soap, synthetic solvents, amyl sulfate, alkyl sulfinate, etc.

Foam - a small particle, to form which gas particles are surrounded by a water shell, that is, air particles are absorbed into water. Foam is usually produced by mechanically mixing a mixture of water, a foaming agent, and air. Foam is produced by mechanical and chemical methods. Chemically produced foam is 80% carbon dioxide gas, 19% water, and 0.3% foaming agent; mechanically produced foam is 90% air, 9.6% water, and 0.4% foaming agent.

Foam extinguishing is effective when burning solids and flammable liquids. Because flammable liquids have a lighter specific gravity than water, they do not mix or dissolve with water. Therefore, they cannot be extinguished with water.

Foam is characterized by a number of foam indicators, namely, durability, low density, viscosity and dispersibility. These properties prevent the penetration of flammable vapors and gases into the burning area, thereby extinguishing the fire. One of the important properties of foam is its cooling effect. As a result of the foam covering the surface of a flammable liquid or solid flammable material with a thin layer, it creates a barrier between the burning substance and the oxygen in the air. The strength of this barrier depends on the stability of the foam. If the stability of the foam is low, then a break may occur on the surface of the liquid, that is, the tensioned curtain will open, which will create conditions for the resumption of the fire.

Chemical foams have been used mainly in hand-held fire extinguishers (OXP-10). To use the OXP-10 fire extinguisher, turn the handle on the top of the device 180 degrees, point the top of the device downwards, and point the nozzle towards the fire. The device works for 50-60 seconds. When used, the device (OXP-10) can be refilled with chemical foam and reused. Currently, sodium carbonate, phosphoric acid, potassium and ammonium compounds are most often used in fire extinguishing. The practice of extinguishing fires that cannot be extinguished with water and foam using powder agents has been introduced.

For example, PS-1, OP, PSB type powder agents can be used even at low temperatures. Another advantage is that they do not cause corrosion and do not conduct electricity. That is why they are widely used in extinguishing fires in electrical equipment. This type of fire extinguishers surround the flame, that is, they stop the combustion process instead of inhibiting it, in this regard, their fire extinguishing efficiency is considered high, this property depends on the amount of carbon dioxide released. The composition and type of powders in fire extinguishers (PS, SI, etc.) have a special status and are used in stationary devices to extinguish large fires.

Inert gases (argon, helium, xenon and krypton) also help to extinguish fires, since they have very low chemical activity and flammability. Mechanical means can also be used in the initial stage of a fire. These include: tarpaulin, felt, sand, soil.

Accidents at explosive facilities:

It is known that fires and explosions are closely related, so in most accidents, explosions can occur as a result of fires, or vice versa, fires can occur as a result of explosions.

An explosion is a phenomenon that occurs when a large amount of energy is released in a short time, in a limited volume, or when explosive liquids and explosive substances, under the influence of force or heat, cannot fit into the volume in which they are located.

Usually, an explosion is observed because of intense heating of gases, creating high pressure.

Explosions mainly occur in facilities with a fire and explosion hazard, which can cause fires. Warehouses where explosive substances are stored, and facilities related to them are considered facilities with a fire hazard. These include oil and oil product processing and storage, chemical, gas, cotton, paper, bakery products, light industrial enterprises, and warehouses storing finished products produced by them.

Explosive factors include chemical (explosives), nuclear (nuclear weapons), mechanical (rupture of containers storing high-pressure liquids), electromagnetic (spark discharge and laser spark), etc.

Any explosions produce primary and secondary damaging factors. Primary factors include shock waves and fragmentation.

Shock waves - strong air waves generated by a high-pressure explosion, which cause the fragmentation and scattering of solid objects in the form of a powerful sound-emitting air wave and the scattering of objects that come in contact with it.

Fragmentation - the scattering of fragments of objects that have been destroyed in the explosion area (causing damage and destruction of objects, buildings).

Secondary damaging factors include: fires, chemical and radiation damage, widespread dam failure and flooding, collapse of buildings and other disasters. Thus, primary and secondary damaging factors lead to the disruption of normal living and working conditions of people, environmental degradation, and the loss of human lives and material resources.

According to data, every year in our Republic, more than 50 explosions occur in residential areas due to improper use of gases, resulting in the death of citizens and the injury of many people to varying degrees.

In 1998, as a result of a gas explosion in the Matlik-Khiva, Muborak-Zarbulak high-pressure gas pipelines, as a result of a collision of trains on the Novosibirsk-Adler, Adler-Novosibirsk routes, 780 out of 1,284 passengers died in a fire in 37 carriages. Such examples show that fires and explosions occur suddenly and cause death and serious bodily injury to many people. Therefore, the main purpose of the State System of Emergency Situations, promulgated by the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 558 dated December 23, 1997, and the Law of the Republic of Uzbekistan “On Protection of the Population and Territories from Emergencies of Natural and Technogenic Nature” and the Law of the Republic of Uzbekistan “On Civil Protection” of 2000: to protect citizens and take measures to restore the previous functioning of facilities damaged by explosions and fires and other causes.

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