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METHODS OF EFFECTIVE ORGANIZATION OF FIRE AND RESCUE OPERATIONS

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Abstract: Due to the impact of humanity's technosphere and environment, the number of various types of emergencies is increasing. Among them, fires stand out due to the significant damage they cause. This is because such accidents and disasters negatively affect people's lives and health, the property of legal and physical entities, as well as the environment, leading to the disruption of living conditions. This necessitates the implementation of measures to prevent fire-related emergencies and the use of effective methods in organizing firefighting operations to eliminate their consequences with minimal damage in case of occurrence. During the research, normative-legal documents, technical regulations, and standards were analyzed, as well as national experience studied, and recommendations for improving the firefighting operations organization system were developed.

Keywords: Fire, safety, rescuer, rescue operations, squad, prevention.

Introduction. A fire is an uncontrollable combustion process that causes damage to people's lives and/or health, the property of legal and physical entities, as well as the surrounding natural environment. To prevent fires and, in case they occur, to eliminate their consequences quickly and with minimal damage, it is crucial to have sufficient reserves of material and technical supplies and to effectively organize firefighting operations.

The aim of the research is to improve the rational methods of organizing firefighting operations, and to achieve this goal, tasks have been set:

- analyzing the effectiveness of firefighting operations;
- studying the current state of firefighting equipment and technologies;
- considering the process of optimizing the work system of rescue services and teams;
- implementing a system for using new technologies in enhancing the qualifications of rescuers.

Literature analysis. A number of scientific research works have been conducted by various scholars to improve the effectiveness of firefighting operations. In particular, *I.I. Pukinel* conducted a series of studies in Russia on improving fire safety and rescue operations systems. He developed methods to enhance the effectiveness of firefighting operations and ensure safety. *A.A. Babayev* is a scientist who has carried out numerous scientific works on safety and firefighting operations, and his research is focused on the effective management and improvement of fire safety systems. *Yu.V. Zhukovskiy* has contributed to major scientific works in the field of firefighting operations, particularly known for his work on creating rational fire management systems. *V.I. Ryabov* has

conducted extensive research on fire safety and rescue operations, with his scientific works aimed at developing effective fire suppression technologies and strategies. *O.I. Lobanov* has carried out several scientific studies to improve the effectiveness of firefighting services and equip them with modern technologies. *A.A. Sushkov* has conducted scientific research aimed at improving the effectiveness of rescue operations. He developed innovative methods for managing and organizing firefighting operations systems. *M.F. Ilyin* has conducted theoretical and practical research aimed at improving the effectiveness of fire safety and rescue operations in this field [6, 9, 10].

These scholars and other experts have made significant contributions to the field by conducting scientific research aimed at improving and effectively organizing firefighting operations. Their studies serve to enhance the rapid detection, suppression of fires, and the improvement of rescue operations.

Research methodology. During the research, empirical research, document analysis, experimental methods, statistical analysis, and simulation methods were used.

Analysis and results. The Resolution of the Cabinet of Ministers of the Republic of Uzbekistan "On the Approval of the Regulations on the Procedure for Organizing Firefighting Units of the Ministry of Emergency Situations of the Republic of Uzbekistan in the Districts, Cities, and Other Settlements of the Republic, or in Facilities with High Fire and Explosion Hazards or of Critical State Importance" defines the procedure for organizing firefighting units. A firefighting unit is a multidisciplinary rescue team, including tasks such as radiological-chemical, medical-biological, mountain and water rescue, fire suppression, and other types of work. The unit is equipped with special and other types of vehicles and equipment for performing these tasks [2, 3].

Firefighting units composed of personnel with military service status and personnel with rescue status from the Ministry of Emergency Situations are organized in the Republic of Karakalpakstan, regional centers, and the city of Tashkent, as well as in certain cities and districts with a high risk of natural and technogenic emergencies, by a decision of the President of the Republic of Uzbekistan.

Firefighting units and their management bodies at facilities of critical state importance or those with high fire and explosion hazards are established based on the protocols of interdepartmental commissions, which include representatives from relevant ministries, agencies, and organizations, as well as from the relevant departments (centers) of the Ministry of Emergency Situations, in accordance with the Ministry's internal regulations. These commissions are formed based on the minutes of meetings and agreements between the facility or its higher-level organizations and the relevant departments of the Ministry of Emergency Situations.

At facilities of critical state importance or those with high fire and explosion hazards, the following are established:

- a) For a single firefighting unit and/or fire control and prevention group - a fire safety division;
- b) For two or more firefighting units and/or fire control and prevention divisions - a fire safety department;

c) For two or more fire safety departments - a fire safety management body (center) with legal entity status is established.

The typical organizational structure of the fire safety management body (center), department, and division at facilities of critical state importance or those with high fire and explosion hazards is determined by a decision of the President of the Republic of Uzbekistan.

The financial and material-technical support for firefighting units is provided as follows:

- for firefighting units of the Ministry of Emergency Situations established in the districts, cities, and other settlements of the republic - from the state budget of the Republic of Uzbekistan;

- for firefighting units and their management bodies established at facilities of critical state importance or those with high fire and explosion hazards, based on contracts - at the expense of the funds of these organizations.

The financial and material-technical support for firefighting units and their management bodies established based on contracts with organizations is provided according to the standards established for units maintained from the state budget of the Republic of Uzbekistan.

The construction and reconstruction costs of buildings and structures for firefighting units established in the districts, cities, and other settlements of the republic are financed within the framework of the centralized capital investment limits specified in the Republic of Uzbekistan's Investment Program for the relevant years, as well as other sources not prohibited by legislation. These costs are managed by the Ministry of Emergency Situations and local executive authorities.

Firefighting operations are a set of measures and actions carried out to protect people's lives, health, and property during a fire, as well as to quickly extinguish the fire. These operations are aimed at controlling the fire, preventing its spread, rapidly evacuating the victims, and providing them with medical assistance. The sequence of these actions is reflected in Table 1.

Table 1. Sequence of firefighting operations.

No	Name of the event
1	Firefighting. Necessary equipment, including water, chemicals, and others, is used to extinguish the fire. This process also includes creating and installing barriers to prevent the spread of the fire.
2	Evacuation. Evacuating people from danger zones, relocating them to safe areas, and providing living conditions in the relocated areas.
3	First aid. Providing quick first aid to those injured in the fire and sending them to a medical facility.
4	Fire preparedness. These activities include implementing fire safety measures at objects with fire hazards, checking the proper functioning of evacuation plans and equipment.

The methods of effective organization of firefighting operations are systems and methods that include the rapid detection of fires, effective firefighting, and the evacuation

of people to safe places. To improve the effectiveness of these processes, a number of methods, technologies, strategies, and organizational systems have been developed. Below are the key methods for effectively organizing firefighting operations [4, 5, 6, 7, 8]:

1. Implementation of modern firefighting equipment and technologies

a) Technological innovation. Modern equipment (such as robotics, drones, automated systems) can be used to extinguish fires. These technologies are particularly effective in managing large-scale fires.

b) Drones and sensors. Drones can be used to monitor the size and progression of fires in real-time. Sensors are useful for detecting toxic gases in the air during a fire.

2. Fire management and coordination system

a) Fire control systems. Centralized systems (such as automated alarm systems) allow for the rapid collection of fire-related data and its transmission to the appropriate personnel.

b) Fire safety centers. These centers are designed to monitor the firefighting process and provide the necessary assistance.

3. Effective organization of rescue operations

a) Rescue team readiness. Regular training and simulations for rescuers, preparing them for various conditions, such as fires, earthquakes, or floods, ensuring they are ready to act quickly and effectively in the event of natural disasters.

b) Evacuation plan. Implementing pre-prepared plans and routes for evacuating people to safe places during a fire, as well as developing special evacuation tools to minimize the consequences of the fire.

4. Effective prevention and education

a) Preventive measures. Taking proactive preventive actions to ensure fire safety, such as regularly checking fire safety rules in buildings, enterprises, and public places.

b) Public fire safety education. Regularly educating the public on fire safety and informing them on how to act during a fire. This approach helps people evacuate quickly and safely during a fire.

5. Necessary information systems and integration

a) Information systems. The integration of information systems for firefighting operations, allowing for the monitoring of rescue operations and enabling fast and efficient communication between various agencies (firefighters, police, healthcare services).

b) GPS and real-time monitoring systems. Using GPS systems to improve the success of rescue operations, allowing for the real-time tracking of rescuers' locations and the fire's center.

6. Innovative approaches and scientific research

Scientific research and new methods. New scientific approaches to improve the effectiveness of firefighting operations, such as artificial intelligence, data analysis, and forecasting systems, which allow for enhanced safety levels.

Crisis management and resource allocation. Improving the efficiency of rescue operations and fire management with new approaches, including developing systems for resource allocation and quick decision-making.

7. Regulatory and legal foundations and standards

Updating laws and regulations. To effectively organize firefighting operations, laws and regulatory documents need to be updated. Clear rules, standards, and approaches for ensuring fire safety should be developed for each organization and region.

Standardization. It is of great importance that all firefighting equipment, systems, and methodologies comply with international standards.

8. Collaboration of firefighting services

International cooperation. Developing international collaboration among firefighting services, exchanging experiences in fire safety, and working together to combat global risks and hazards.

Conclusion. During the research, I studied and analyzed regulatory and legal documents, textbooks, study guides, and websites related to the topic, and came to the following conclusion: effectively organizing firefighting operations is crucial in preserving human life and (or) health, protecting the property of legal and physical entities, and minimizing damage to the natural environment. Based on this, the following recommendations for the development of the field were proposed:

Enhancing international cooperation. In order to further improve the effectiveness of firefighting operations, it is essential to systematically hold international scientific and practical conferences with the participation of foreign experts in the field, as well as to implement advanced practices into the operations.

Implementation of modern technologies. It is essential to introduce new technologies for rapid fire detection, extinguishing, and evacuation, such as artificial intelligence, drones, sensors, and automated systems. Drones can quickly identify the location and scale of fires and provide real-time information to rescuers. This is especially effective in managing large-scale fires in vast areas. Through sensors, information can be collected about toxic gases in the air and the fire's location, enabling rescuers to work safely and efficiently.

Regular training and preparation of rescuers. To improve the effectiveness of rescue operations, it is essential to enhance the qualifications of rescuers and provide them with ongoing training. Through simulations and multi-disciplinary exercises, rescuers can be prepared for various scenarios, ensuring they can act swiftly and safely during fires, natural disasters, and accidents. Training improves efficiency in fire management, evacuation, and rescue operations. Preparation based on new technologies and methodologies further enhances rescuers' skills and capabilities.

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i

CONTENTS

TECHNICAL SCIENCES: COTTON, TEXTILE AND LIGHT INDUSTRY

Rakhimov R., Sultonov M.	3
Inspection of the strength of the column lattice of the improved fiber cleaner	
Turdiyev B., Rosulov R.	10
The influence of technological parameters of the elevator on cotton seed damage	
Khuramova Kh.	15
Graphic analysis of the obtained results on cotton regeneration	
Sharifbayev R.	20
Optimizing feature extraction in Ai-based cocoon classification: a hybrid approach for enhanced silk quality	
Akramov A., Khodzhiev M.	24
The current state and challenges of the global textile industry: key directions for the development of Uzbekistan's textile sector	

TECHNICAL SCIENCES: AGRICULTURE AND FOOD TECHNOLOGIES

Sattarov K., Jankurazov A., Tukhtamyshova G.	30
Study of food additives on bread quality	
Madaminova Z., Khamdamov A., Xudayberdiyev A.	37
Determination of amygdalin content in peach oil obtained by pressing method	
Kobilov N., Dodayev K.	43
Food safety and industrial importance of corn starch. the impact of the hydration process on the starch content in the grain	
Mustafaev O., Ravshanov S., Dzhakhangirova G., Kanoatov X.	50
The effect of storing wheat grain in open warehouses on the "aging" process of bread products	
Erkayeva N., Ahmedov A.	58
Industrial trials of the refining technology for long-term stored sunflower oil	
Boynazarova Y., Farmonov J.	64
Microscopic investigations on the effect of temperature on onion seed cell degradation	
Rasulova M., Xamdamov A.	79
Theoretical analysis of distillators used in the distillation of vegetable oil miscella	

CHEMICAL SCIENCES

Ergashev O., Bazarbaev M., Juraeva Z., Bakhronov H., Kokharov M., Mamadaliyev U.	84
Isotherm of ammonia adsorption on zeolite CaA (MSS-622)	
Ergashev O., Bakhronov H., Sobirjonova S., Kokharov M., Mamadaliyev U.	93
Differential heat of ammonia adsorption and adsorption mechanism in Ca ₄ Na ₄ A zeolite	
Boymirzaev A., Erniyazova I.	101
Recent advances in the synthesis and characterisation of methylated chitosan derivatives	
Kalbaev A., Mamataliyev N., Abdikamalova A., Ochilov A., Masharipova M.	106
Adsorption and kinetics of methylene blue on modified laponite	
Ibragimov T., Tolipov F., Talipova X.	114
Studies of adsorption, kinetics and thermodynamics of heavy metall ions on clay adsorbents	
Muratova M.	123
Method for producing a fire retardant agent with nitric acid solutions of various concentrations	
Shavkatova D.	132
Preparation of sulphur concrete using modified sulphur and melamine	
Umarov Sh., Ismailov R.	139
Analysis of hydroxybenzene-methanal oligomers using ¹ H nmr spectroscopy methods	
Vokkosov Z.	148
Studying the role and mechanism of microorganisms in the production of microbiological fertilizers	
Mukhammadjonov M., Rakhmatkarieva F., Oydinov M.	153
The physical-chemical analysis of KA zeolite obtained from local kaolin	
Shermatov A., Sherkuziev D.	160
Study of the decomposition process of local phosphorites using industrial waste sulfuric acid	
Khudayberdiev N., Ergashev O.	168
Study of the main characteristics of polystyrene and phenol-formaldehyde resin waste	

TECHNICAL SCIENCES: MECHANICS AND MECHANICAL ENGINEERING

Kudratov Sh.	
UZTE16M locomotive oil system and requirements for diesel locomotive reliability and operating conditions	174
Dadakhanov N.	181
Device studying the wear process of different materials	
Dadakhanov N., Karimov R.	189
Investigation of irregularity of yarn produced in an improved drawn tool	
Mirzaumidov A., Azizov J., Siddiqov A.	196
Static analysis of the spindle shaft with a split cylinder	
Mirjalolzoda B., Umarov A., Akbaraliyev A., Abduvakhidov M.	203
Static calculation of the saw blade of the saw gin	
Obidov A., Mirzaumidov A., Abdurasulov A.	208
A study of critical speed of linter shaft rotation and resonance phenomenon	
Khakimov B., Abdurakhmanov O.	217
Monitoring the effectiveness of the quality management system in manufacturing enterprises	
Bayboboev N., Muminov A.	232
Analysis of the indicators of the average speed of units for the process of loading into a potato harvesting machine	
Kayumov U., Kakhkharov O., Pardaeva Sh.	237
Analysis of factors influencing the increased consumption of diesel fuel by belaz dump trucks in a quarry	
Abdurahmonov J.	244
Theoretical study of the effect of a brushed drum shaft on the efficiency of flush separation	
Ishnazarov O., Otabayev B., Kurvonboyev B.	250
Modern methods of smooth starting of asynchronous motors: their technologies and industrial applications	
Kadirov K., Toxtashev A.	263
The influence of the cost of electricity production on the formation of tariffs	
Azambayev M.	271
An innovative approach to cleaning cotton linters	
Abdullayev R.	277
Theoretical substantiation of the pneumomechanics of the Czech gin for the separation of fiber from seeds	
Siddikov I., A'zamov S.	282
Study of power balance of small power asynchronous motor	

Obidov A., Mirzaakhmedova D., Ibrohimov I.	288
Theoretical research of a heavy pollutant cleaning device	
Xudayberdiyeva D., Obidov A.	294
Reactive power compensation and energy waste reduction during start-up of the electric motor of uxk cotton cleaning device	
Jumaniyazov K., Sarbarov X.	302
Analysis of the movement of cotton seeds under the influence of a screw conveyor	
Abdusalomova N., Muradov R.	310
Analysis of the device design for discharging heavy mixtures from the sedimentation chamber	
Ikromov M., Shomurodov S., Boborajabov B., Mamayev Sh., Nigmatova D.	318
Study of obtaining an organomineral modifier from local raw materials to improve the operational properties of bitumen	
Ikromov M., Shomurodov S., Boborajabov B., Mamayev Sh., Nigmatova D.	324
Development of composition and production technology for polymer-bitumen mixtures for automobile roads	
Muradov R., Mirzaakbarov A.	332
Effective ways to separate fibers suitable for spinning from waste material	

ADVANCED PEDAGOGICAL TECHNOLOGIES IN EDUCATION

Xoliddinov I., Begmatova M.	336
A method of load balancing based on fuzzy logic in low-voltage networks with solar panel integration	
Murodov R., Kuchqarov A., Boynazarov B., Uzbekov M.	345
Research on the efficiency of using hydro turbines in pumping mode and for electricity generation	
Abdurakhimova M., Romanov J., Masharipov Sh.	353
A literature review of settlement land trends (past, present, and future) based on english-language articles indexed in the web of science database from 2014 to 2023	
Muhammedova M.	360
Development and scientific justification of the design of orthopedical footwear for patients with injuries to the soul-foot joint	
Akbaraliyev M., Egamberdiyev A.	367
Methods of effective organization of fire and rescue operations	

A'zamxonov O., Egamberdiyev A.

Principles of organizing material and technical support in emergency situations **373**

Tuychibayeva G., Kukibayeva M.

The module of developing communicative competence of seventh and eighth-grade students in uzbekistan secondary schools **379**

Ismoilova Z.

Methods for enhancing the competence of future english teachers **383**

ECONOMICAL SCIENCES

Yuldashev K., Makhamadaliev B.

The role of small business entities in the program "From poverty to well-being" **389**

Mirzakhlikov B.

Organizational mechanism for the development of state programs for poverty reduction **397**

Rustamova S.

Specific characteristics of administration in developed countries **402**
